



TEST REPORT

TEST OF A NON CATALYTIC WOOD BURNING FIREPLACE FOR EMISSIONS AND EFFICIENCY

PER EPA METHODS 28R AND ASTM E2515 and ASTM E2780, MAY 2015

Client:

**Foyers Suprême**

3594 Rue Jarry E,

Montréal,

QC H1Z 2G4

Model Name: 38 SFC

Attention: Rafael Sanchez

TESTED BY:

Services Polytests inc.

695-B Gaudette

St-jean-sur-Richelieu, QC, J3B 7S7

TEST DATES: March 14<sup>th</sup> to 22<sup>nd</sup> 2018

REPORT DATE: April 3<sup>rd</sup> 2018

Revision1: April 6<sup>th</sup> 2023

Revision2: June 6<sup>th</sup> 2023

Project number: PI-20164

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Revision 1 (April 6<sup>th</sup> 2023):

- Appendix 3 additional list of equipment with certification date due.
- Appendix 1 Raw data additional sheet with negative weight filter rounded to zero calculation demonstration and all efficiency data calculations.
- Appendix 9 updated for more detailed fuel load
- The section 3.4 p.12 updated for runs Anomalies, Validity, and appropriateness detail.
- The section 3.4 p.12 updated to address the negative back filter weight.
- appendix 1 molecular weight updated to 29 for all runs
- Appendix 1 wood density calculation corrected for each run
- Table 2.6 updated to include deviation in g/kg
- P9 Table 2.7 additional detail: run 3 failing of the temperature differential criteria (+-126F), Table 2.7 *ASTM 2780 Section 9.5.10 Wood heater thermal equilibrium*
- Appendix 8 updated with more details on dilution tunnel
- Table 2.1 reformatted to include CSAB415.1 g/Mj, Heat output & Efficiency for each run
- Section 3.6 updated for dilution tunnel details
- Section 3.4 run1, run2 included rule citation for low burn rate 40 CFR 60.537 (a)(2)

Revision 2 (June 6<sup>th</sup> 2023):

- Appendix 13 operation procedure implement by the manufacturer with more details
- Appendix 7 Manual implement with testing procedure p32 section 5.4.

## List of appendixes

APPENDIX 1: Raw data, forms and results

APPENDIX 2: Proportionality results

APPENDIX 3: Calibration data

APPENDIX 4: Unit pre burn

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APPENDIX 6: Drawings and specifications

APPENDIX 7: Operator's manual

APPENDIX 8: Photographs of test set up

APPENDIX 9: Test load photographs

APPENDIX 10: Laboratory Operating Procedures

APPENDIX 11: Sample calculations

APPENDIX 12: Volume calculations

APPENDIX 13: Operating instruction

APPENDIX 14: Drawing Air flow pattern

APPENDIX 15: 30-day notice, WHA, Discussion for alternative Firebox Lining, other



# 1 INTRODUCTION

## 1.1 GENERAL

### Laboratory

- Location: Services Polytests Inc., 695-B Gaudette St-jean-sur-Richelieu QC, Canada J3B 7S7
- Elevation: 100 feet above sea level

### Test program

- Purpose: unit qualification NSPS 2020
- Test dates: March 14<sup>th</sup> to 22<sup>nd</sup> 2018
- Test methods used:
  - Particulate emissions: ASTM E2780-10 ; ASTM E2515-11 methods 28R as referred into 40 CFR Part 60 Subpart AAA
  - Efficiency: CSA B415.1-10

## 1.2 TEST UNIT INFORMATION

### General

- Manufacturer: Foyers Suprême inc.
- Product type: Non-catalytic wood fireplace
- Combustion system: non-catalytic
- Unit tested: 38 SFC

### Particularities

The engine will have the model number of 38SFC, which comprises the standard components related to the combustion of the unit (such as the firebox, the controls, and the baffle system). The engine will however have an optional firebox lining; either with soapstone (model name: **Elegance 42 & Novo 38 - Soapstone**) or cast iron (model name: **Astra 38 & Novo 38 - Cast Iron**). The Elegance 42 and the Astra 38 are factory-built fireplaces, whereas the Novo 38 is a free-standing stove.

### In Summary:

- **Elegance 42**: Factory built fireplace with soapstone firebox lining.
- **Astra 38**: Factory built fireplace with cast iron firebox lining.
- **Novo 38 – Soapstone**: Freestanding wood stove with soapstone interior.
- **Novo 38 – Cast Iron**: Freestanding wood stove with cast iron interior.
- Convection fan installed on all units.

*Based on previous certification testing of the Ambiance Elegance 36 24SF (certification number 88-17), the Astra 24 24SFC (certification number 102-17), and the Astra 32 and Elegance 40 (certification number 117-18), permission has been granted by Dr. Rafael Sanchez with Mr. Toney's professional advice to perform future certification tests under the worst case condition, which is with a firebox lined with grey cast iron. As per Dr. Rafael Sanchez's recommendation, please find in Annex **ZZZ** the*

*certification test data of the Astra 32 and Elegance 40 (certification number 117-18, which includes a confirmation test of a soapstone lined firebox. In addition, Annex ZZZ includes the letter of recommendation from PFS-TECO and correspondences between the U.S. Environmental Protection Agency (EPA) and Foyers Supreme.*

### 1.3 RESULTS

Emission results obtained

- Weighted Average Emissions Rate: 1.8 g/hr
- Weighted Average Overall Efficiency: 67.83 %

Conformity: NSPS Phase 2020

### 1.4 PRETEST INFORMATION

- Unit condition: The unit was received by carrier March 2018 in good condition. The 50hrs of aging was done by the manufacturer. Fuel: BC FIR between 19% and 25%. (All data in Appendix 4).

Set up

- Venting system type: 6-inch steel pipe and insulated chimney
- System height from floor: 15 feet
- Particularities: Convection fan installed on all units

## 2 SUMMARY OF TEST RESULTS

### 2.1 EMISSIONS

Run Number	Test Date (YY-MM-DD)	Emission Rate (g/hr)	Burn Rate (kg/hr)	1st hour Emission Rate (g/hr)	CSA B415.1 CO emission Gr/hr	CSA B415.1 emission Gr/Mj	Heat output (BTU/HR)	(OHE) % HHV
1	2018-03-14	2,06	0,917	20,20	92,08	0,167	11 704	67,88
2	2018-03-15	1,81	1,180	14,69	105,12	0,113	15 225	68,62
3	2018-03-19	4,27	1,577	20,76	171,93	0,209	19 337	65,25
4	2018-03-20	1,05	1,542	5,67	146,18	0,051	19 548	67,45
5	2018-03-21	2,84	2,101	11,82	158,78	0,102	26 354	66,73
6	2018-03-22	5,51	2,325	19,20	163,34	0,18	28 625	65,51

## 2.2 WEIGHTED AVERAGE CALCULATION

Test No.	Burn Rate (Kg/hr)	(E) Ave. Emission Rate g/hr	(OHE) %	Heat Output (BTU/HR)	CSA B415.1 CO emission g/min
1	0,92	2,062	67,90	11 704	1,53
2	1,18	1,812	68,60	15 225	1,75
4	1,54	1,053	67,50	19 548	2,44
5	2,10	2,835	66,70	26 354	2,65
<b>Weighted particulate emission average of 4 test runs: 1.8 grams per hour.</b>					
<b>Weighted average HHV efficiency of 4 test runs: 68 %.</b>					
<b>Average Co 2.1 gr/min</b>					

## 2.3 TEST FACILITY CONDITIONS

Run Number	Room Temperature		Barometric pressure		Relative humidity		Air Velocity	
	Before (F)	After (F)	Before (in.Hg)	After (in.Hg)	Before (%)	After (%)	Before (ft/min)	After (ft/min)
1	74	75	29,323	29,264	31,8	27,9	8	6
2	69	75	29,264	29,382	29	28,9	4	12
3	70	75	29,973	29,914	19	18,3	2	3
4	71	76	29,973	29,884	18,7	25,1	6	3
5	72	76	29,884	29,796	22	27,4	5	3
6	75	80	29,825	29,766	24,2	22,3	4	8

## 2.4 FUEL QUALITIES

Run Number	Pre-test Load			Test Load						
	Loading Weight Wet Basis (lbs)	Moisture Content Dry Basis (%)	Coal bed Weight (lbs)	Weight Wet Basis (lbs)	Density Wet Basis (lbs/cuft)	Moisture Content Dry Basis (%)	Piece Length (in.)	Number of 2X4's	Number of 4x4's	Number of Spacers
1	30,20	20,65	5,5	26,45	7,557	20,53	22	0	5	20
2	30,98	21,08	5,3	26,05	7,444	20,14	22	0	5	20
3	29,10	21,20	5,2	25,97	7,421	19,89	22	0	5	20
4	29,08	21,56	5,2	26,06	7,445	20,10	22,25	0	5	20
5	28,90	22,14	5,2	26,13	7,465	20,86	22	0	5	20
6	31,37	21,84	4,8	23,10	6,601	20,21	19	0	5	20

## 2.5 DILUTION TUNNEL FLOW RATE MEASUREMENTS AND SAMPLING DATA (ASTM E2515)

Average dilution tunnel measurements				Sample Data			
Run Number	Burn Rate (Min)	Volumetric Flow Rate (dscf/min)	Total Temperatures (°R)	Volume sampled (DSCF)		Particulate catch (mg)	
				1	2	1	2
1	651	295,14	555,94	115,524	119,173	14,30	13,40
2	500	298,85	551,04	90,867	92,577	9,70	9,00
3	374	283,48	560,12	66,122	67,680	17,40	16,50
4	383	292,74	556,15	65,546	66,745	4,50	4,20
5	280	283,97	561,04	49,306	50,247	8,40	8,10
6	225	276,65	575,66	39,695	40,490	13,90	13,10

## 2.6 DILUTION TUNNEL DUAL TRAIN PRECISION

Run Number	Sample Ratio		Total Emission (g)			
	Train 1	Train 2	Train 1	Train 2	% Deviation	Deviation g/kg
1	1663,14	1612,23	23,38	21,19	4,91%	0,22
2	1644,43	1614,05	15,75	14,33	4,75%	0,15
3	1603,42	1566,52	27,53	25,47	3,89%	0,21
4	1710,52	1679,79	7,02	6,37	4,84%	0,07
5	1612,59	1582,42	13,55	12,82	2,76%	0,07
6	1568,11	1537,32	21,43	19,77	4,04%	0,19

## 2.7 GENERAL SUMMARY OF RESULTS

Run Number	Burn Rate (kg/hr)	Average Surface Temperature (F)	Change in surface Temperature (F)	Initial Draft (in. H2O)	static pressure tunnel (in. H2O)neg.	Primary Air Setting	Run Time (min)
1	0,917	270,69	-96,1	0,032	0,160	min	651
2	1,180	327,72	-73,6	0,040	0,160	min	500
3	1,577	376,01	-129,6	0,052	0,170	medium	374
4	1,542	380,70	-113,3	0,064	0,150	medium	383
5	2,101	418,30	-97,9	0,070	0,160	max output	280
6	2,325	590,03	123,8	0,051	0,150	medium	225

\*Run 3 have been rejected from the average calculation due to failing of the temperature differential criteria (+-126F), Table 2.7 ASTM 2780 Section 9.5.10 Wood heater thermal equilibrium

### 3 PROCESS DESCRIPTION

#### 3.1 DISCUSSION

Fireplace has been received in a good shape by a carrier in March 2018. Pre-burn was done by the manufacturer as preliminary testing with crib wood. The wood heater is equipped with a bi-metallic variable burn rate controller. The side walls of the combustion chamber are lined with either cast iron panels or soapstone slabs, allowing for a longer burn at a more uniform heat output. In addition, the casing of the combustion chamber is constructed out of stainless steel, allowing for a quick heat transfer. For the purpose of increasing the efficiency, a blower is installed into the unit.

#### 3.2 UNIT DIMENSIONS

##### Baffle

- Location: between top of combustion chamber and hearth
- Restriction: 1.25 X 23 inches at the front of unit
- Dimensions: covers the hearth area minus the restriction at front
- Material: Stainless steel baffle

##### Bricks

- Cast iron surrounding firebox, optional soapstone

##### Flue gas exhaust

- Location: top flue
- Dimensions: 6 in. diameter
- Material: Stainless

##### Gasket

The door of the unit consists of three sections of gaskets, where 2 of them are holding the glass (SGI-260-0230) and 1 is sealing around the door onto the firebox (SGI-265-0125). Please refer to page 64 of 38SFC\_Tech\_DRAW.pdf for information on dimensions, materials, and assembly details. Technical specification of the SGI-260-0230 and the SGI-265-0125 can be found in the DATA – Knitted Fiberglass Rope.pdf document.

##### Overall unit dimension

- Firebox dimensions : 23.875 in wide x 13.875 in. deep x 18.25 in. high
- Usable volume : 3.5 cuft
- Overall fireplace dimension : 32.250 inch wide x 22.75 inch deep x 41.125 high

##### Convection fan

- Convection fan supplied with unit see appendix 6 for all detail

##### Catalyst

- none

Bi-metallic combustion air control

The Primary Air Control is a patented mechanism (Patent No: US 7,325,541 B2) that regulates the air flow into the firebox based on the temperature of the unit. It is located on the top of the firebox, at the front center of the unit. The combustion air control of the 38SFC has two components: The Activator and the Burn Rate Selector. The left combustion control lever is the Activator. When starting a fire or adding a new load of wood, the Activator must be pushed in to allow a primary source of air to enter the firebox. The Activator will retract automatically with heat. The right combustion control lever is the Burn Rate Selector. The Burn Rate Selector can slide sideways to achieve different burn rates. When the Burn Rate Selector is positioned to the left, a maximum burn rate is achieved and when it is positioned to the right, a minimum burn rate is set. Please refer to page 50 of 38SFC\_TECH\_DRAW.pdf for details on the Primary Air Control assembly. The Secondary Air Control is a patented mechanism (Patent No: US 9,476,593 B2) that regulates the air flow into the baffle system based on the temperature of the unit. It is located on the top of the firebox, above the secondary air intake channel. The secondary air control of the 38SFC is factory set and has no intervention of the user. Please refer to page 59 of 38SFC\_TECH\_DRAW.pdf for details on the Secondary Air Control assembly.

### 3.3 AIR SUPPLY SYSTEM

Description

- Primary air: window wash design with air intake at the top of unit
- Secondary air: secondary baffle design with air intake at the top of unit. Refer appendix 6 for drawing details

Characterization

The following table shows the inlet and outlet sections of each system. The air introduction system number is referred to on a set of drawings in Appendix 6.

AIR INTRODUCTION SYSTEM		INLET (1) sq. in.			OUTLET (sq. in.)
Identification	Type	Imin	Imax	Controlled	
A *	Primary	0.05	4.64	Yes	28.27
B *	Secondary	0	1.77	Yes	1.27
C *	Pilot	N/A	N/A	None	N/A

\* This section would be filled by measuring and comparing with the manufacturer’s drawings included in the test report.

Legend

Identification: Tag name referred to on drawings in Appendix 14, section airflow pattern

Type: Characterization of air intake

Imin: Minimum air intake of a particular air channel

Imax: Maximum air intake of a particular air channel

Controlled: Determines if a provision for air control is present

Outlet: Total air outlet of a particular air channel



### 3.4 OPERATION DURING TEST

All runs have been found appropriate, no anomalies happened and all runs below have been validate and found compliant except for run 3 failed on temperature differential criteria (*ASTM 2780 Section 9.5.10 Wood heater thermal equilibrium*). Negatives weight found on filters stick on gaskets and it were handled property, no negative weight on gaskets or probe.

#### Run #1

This run was performed on March 14<sup>th</sup> 2018. It lasted 651 minutes and a category 2 burn rate was obtained at 0.917 kg/hr & emission at 2.06gr/hr. The convection fan was at on position during the entire test. The air inlet damper was fully closed at the minimum setting; the unit was not able to burn below 0.8kg/hr. the burn rate for the low burn rate category was no greater than the rate that an operator can achieve in home use.

#### Run #2

This run was performed on March 15<sup>th</sup> 2018. It lasted 500 minutes and a category 2 burn rate was obtained at 1.18 kg/hr & emission at 1.81gr/hr. The convection fan was at on position during the entire test. The air inlet damper was fully closed at the minimum setting; the unit wasn't able to burn below 0.8kg/hr after two attempts. the burn rate for the low burn rate category was no greater than the rate that an operator can achieve in home use.

#### Run #3

This run was performed on March 19<sup>th</sup>. It lasted 374 minutes and a category 3 burn rate was obtained at 1.58 kg/hr & emission at 4.27gr/hr. The convection fan was at on position during the entire test. This test failed on Delta T criteria at -129°F. failed on temperature differential criteria (*ASTM 2780 Section 9.5.10 Wood heater thermal equilibrium*).

#### Run #4

This run was performed on March 20<sup>th</sup> 2018. It lasted 383 minutes and a category 3 burn rate was obtained at 1.54 kg/hr & emission at 1.05gr/hr. The convection fan was at on position during the entire test.

#### Run #5

This run was performed on March 21<sup>st</sup> 2018. It lasted 280 minutes and a category 4 burn rate was obtained at 2.1 kg/hr & emission at 2.84gr/hr. The convection fan was at on position during the entire test.

#### Run #6

This run was performed on March 22<sup>nd</sup> 2018. No fan confirmation test, it lasted 225 minutes and a category 4 burn rate was obtained at 2.32 kg/hr & emission at 5.51 gr/hr. The convection fan was at off position during the entire test. During this test the fireplace miss the medium burn rate and emission target. . As a result of this test, the fireplace will be available only with the convection fan.

- Details: Refer to the front page of each test run data sheets found in appendix for the detailed test sequence showing air supply settings and adjustments, fuel bed adjustments and operational specifics of the test unit.

#### Test fuel cribs

- Type of wood: Douglas fir, grade c or better, 19 to 25% dry basis moisture content
- Description: for each test, description of the fuel crib is found on the front page of each test run data sheet together with photograph in appendix.

### 3.5 START-UP OPERATION

The complete manufacturer's firing procedure of each burn rate category is fully described in appendix 13.

### 3.6 SAMPLING LOCATIONS

Particulate samples are collected from the dilution tunnel. The tunnel has two elbows ahead of the sampling section. The sampling section is a continuous 8-inch diameter pipe straight over its entire length. Tunnel velocity pressure is determined by a standard pitot tube, thermocouple is installed on the pitot tube to measure the dry bulb temperature. MC is assumed, as allowed, to be 2%. Tunnel samplers are located downstream of the pitot tube and upstream from the end of this section. All detail of dilution tunnel can be found in appendix 8.

### 3.7 DRAWINGS

Various drawings of the stack gas sampling train and of dilution tunnel system are found in Appendix 6.

### 3.8 EMISSIONS EFFICIENCY TESTING EQUIPMENT LIST

The complete test equipment list together with all corresponding calibration data can be found in Appendix 3.

## 4 SAMPLING METHODS

### 4.1 PARTICULATE SAMPLING

Particulates were sampled in strict accordance with ASTM E2515. This method uses two identical sampling systems with Gelman A/E 61631 binder free (or equivalent), 47 mm diameter filters. The dryers used in the sample systems are filled with "Drierite" before each test run.

## 5 QUALITY ASSURANCE

### 5.1 INSTRUMENT CALIBRATION

#### 5.1.1 GAS METERS

At the conclusion of each test program the gas meters are verified using the reference dry gas meter. This process involves sampling the train operation for 1 cubic foot of volume. With readings made to .01 fr', the resolution is 1 %, giving an accuracy higher than the 2% required by the standard.

#### 5.1.2 SCALES

Before each test program, the different scales used are checked with traceable calibration weights to ensure their accuracy.

#### 5.1.3 GAS ANALYZERS

The continuous analyzers are zeroed and spanned before each test with NBS traceable gases. A mid-scale multi-component calibration gas is then analyzed (values are recorded). At the conclusion of a test, the instruments are checked again with zero, span and calibration gases (values are recorded only). The drift in each meter is then calculated and must not exceed 5% of the scale used for the test.

### 5.2 TEST METHOD PROCEDURES

#### 5.2.1 LEAK CHECK PROCEDURES

Before and after each test, each sample train is tested for leaks. Leakage rates are measured and must not exceed 0.02 CFM or 4% of the sampling rate. Leak checks are performed checking the entire sampling train. Pre-test and post-test leak checks are conducted with a vacuum of 5 inches of mercury. Vacuum is monitored during each test and the highest vacuum reached is then used for the post-test vacuum value. If leakage limits are not met, the test run is rejected. During these tests, the vacuum is typically less than 2 inches of mercury. Thus, leakage rates reported are expected to be much higher than actual leakage during the tests.

#### 5.2.2 TUNNEL VELOCITY FLOW MEASUREMENT

The tunnel velocity is calculated from a center point pitot tube signal multiplied by an adjustment factor. This factor is determined by a traverse of the tunnel as prescribed in EPA Method 1. Final tunnel velocities and flow rates are calculated from EPA Method 2, Equation 6.9 and 6.10. (Tunnel cross sectional area is the average from both lines of traverse.)

Pitot tubes are cleaned before each test and leak checks are conducted after each test.

#### 5.2.3 PM SAMPLING PROPORTIONALITY (ASTM E2515)

Proportionalities were calculated in accordance with ASTM E2515. The data and results are found in appendix.

## APPENDIX 1: Raw data, forms and results

## Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

### Description du test

Test standard	EPA
Run #	1
Date	14-03-2018
Technicien	m.m
Project #	pi 20164

### Description de l'unité

Manufacturier	foyer supreme	
Modèle	38 fsc	
Combustion system	Non-Cat	
Appliance type	fireplace	
Firebox volume	3,5	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

### Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category	1	
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

### Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,988	Dimensionless
Equipment number (DGM #1):	em 178	
Calibration Factor (DGM #2):	0,988	Dimensionless
Equipment number (DGM #2):	em 179	
Calibration Factor (DGM #3):	0,986	Dimensionless
Equipment number (DGM #3):	em 070	Dimensionless

### Tunnel

Targeted tunnel flow rate	300	scfm
Tunnel diameter	8	in.
Molecular weight	29	
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 20164
Date	14-03-2018
Technicien	<input type="text" value="m.m"/>

### Fuel data

Fuel type	Dimension	
Fuel specie	D. Fir	
HHV		19810,0 kJ/kg
%C		48,7
%H		6,9
%O		43,9
%Ash		0,5
HHV		8519,2 Btu/lb
LHV		7451,0 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480

	Start	End
Barometer (kPa):	99,3	99,1
Barometer (in.Hg):	29,323279	29,26421898
Dry Bulb (F):	72,14	74,8
Humidity (%):	31,8	27,9
Air velocity (ft/min)	8	6

DGM #1	Final:	22607,651	cuft
	Initial:	22483,033	cuft
DGM #2	Final:	20617,689	cuft
	Initial:	20489,089	cuft
DGM room			

	Final:	640177,380	Liter
	Initial:	636648,580	Liter
	Final:	583827,920	Liter
	Initial:	580186,380	Liter
	Final:	1041,250	cuft
	Initial:	986,430	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

201

Autres données à rentrer: dans preload data, load data, traverse et filter set weight

<b>Project nu.</b>	pi 20164
<b>Date</b>	14-03-2018
<b>Technicien</b>	m.m



**FUEL LOAD DATA SHEET, CSA B415**

Test Load Weight:  
 Lower Ideal Upper  
 22,1 24,5 27,0

\* For boilers, a loading density factor of 10 lb/ft<sup>3</sup> is applied

Load Volume: 0,78 cu. ft Loading Density: 7,6 lbs./ft<sup>3</sup>  
 Number of Spaces: 20 Load Density (wet): 31,4 lbs./ft<sup>3</sup>  
 Spacer weight: lbs Dry Wood Density: 26,0 lbs./ft<sup>3</sup>

Piece Size (in):			Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x Weight	Volume Cubic Inches	Ave. MC %
Thick	Wide	Length		20,60	20,90	20,40	20,30	20,40			
3,5	3,5	22	4,54	20,60	20,90	20,40	20,30	20,40	93,07872	269,50	20,5
3,5	3,5	22	4,59	19,10	19,30	19,40	19,50	19,50	88,82368	269,50	19,4
3,5	3,5	22	4,60	21,00	21,70	21,80	21,30	21,40	98,624	269,50	21,4
3,5	3,5	22	5,37	20,40	20,60	20,80	20,50	20,30	110,23344	269,50	20,5
3,5	3,5	22	5,37	20,10	20,40	20,80	20,60	20,70	110,23344	269,50	20,5
										0,00	
1,5	0,75	5	0,10			21,10			2,0256	5,63	21,1
1,5	0,75	5	0,10			21,60			2,16	5,63	21,6
1,5	0,75	5	0,10			22,00			2,112	5,63	22,0
1,5	0,75	5	0,10			21,30			2,13	5,63	21,3
1,5	0,75	5	0,10			21,40			2,2256	5,63	21,4
1,5	0,75	5	0,10			21,60			2,1168	5,63	21,6
1,5	0,75	5	0,10			21,30			2,0874	5,63	21,3
1,5	0,75	5	0,09			21,30			1,9596	5,63	21,3
1,5	0,75	5	0,10			21,80			2,0928	5,63	21,8
1,5	0,75	5	0,10			21,30			2,2152	5,63	21,3
1,5	0,75	5	0,10			21,40			2,0972	5,63	21,4
1,5	0,75	5	0,10			21,20			2,0352	5,63	21,2
1,5	0,75	5	0,10			21,30			2,0448	5,63	21,3
1,5	0,75	5	0,11			21,50			2,322	5,63	21,5
1,5	0,75	5	0,09			20,90			1,881	5,63	20,9
1,5	0,75	5	0,10			20,60			1,9776	5,63	20,6
1,5	0,75	5	0,11			20,3			2,1924	5,63	20,3
1,5	0,75	5	0,11			20,9			2,2572	5,63	20,9
1,5	0,75	5	0,098			20,3			1,9894	5,63	20,3
1,5	0,75	5	0,098			21,1			2,0678	5,63	21,1
										0,00	
										0,00	
										0,00	
										0,00	
SUM MCx									542,98288		21,1 %

Test Load Weight: 26,45 lbs. Dry Weight: 9,95 kg.

Average Moisture Content: %  
 Dry: 20,53 Dry(EPA) 20,53 Wet: 17,03  
 Dry(B415) 20,53 Must be 19-25 must be 15,2-22

Coal Bed Range: 5,3 lbs. to 6,6 lbs.

TEST CHARGE: Coal bed weight: 5,5 lbs.  
 Project nu. pi 20164  
 Date 14-03-2018  
 Technicien m.m



## Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,16 in. H2O  
 Barometer: 29,900 in. Hg

**Pour un tunnel de 12" et plus, prendre 6 lectures**

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=  
0,974

**Pour un tunnel moins de 12", prendre 4 lectures**

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,051	72,23	0,2258
B center	0,052	72,67	0,2280
A1	0,041	72,29	0,2025
A2	0,047	72,29	0,2168
A3	0,054	72,36	0,2324
A4	0,048	72,55	0,2191
B1	0,049	72,510	0,2214
B2	0,055	72,390	0,2345
B3	0,050	72,460	0,2236
B4	0,043	72,490	0,2074
AVERAGE	0,0490	72,4240	0,2211

<b>Project nu.</b>	pi 20164
<b>Date</b>	14-03-2018
<b>Technicien</b>	<span style="border: 1px solid red; padding: 2px;">m.m</span>

**Filter set weight**

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	10	8	9	9	11	10	11	18	17	12	13	19	14		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	94,6400	0,1269	0,1255	35,8612	93,7250	0,1255	0,1259	35,0090	108,9496	0,1257	0,1246	35,0301	0,1254	2018-03-13	18:00
Before (6)	94,6401	0,1270	0,1254	35,8613	93,7250	0,1255	0,1259	35,0089	108,9495	0,1257	0,1245	35,0302	0,1253	2018-03-14	10:00
After (1)	94,6429	0,1396	0,1255	35,8643	93,7269	0,1262	0,1254	35,0122	108,9511	0,1376	0,1243	35,0336	0,1256	2018-03-14	23:00
After (2)	94,6402	0,1374	0,1251	35,8632	93,7250	0,1262	0,1252	35,0113	108,9501	0,1373	0,1240	35,0321	0,1256	2018-03-26	08:00
After (3)	94,6402	0,1374	0,1251	35,8632	93,7250	0,1262	0,1252	35,0113	108,9501	0,1373	0,1240	35,0321	0,1255	2018-03-30	08:00
After (4)															
After (5)															
After (6)	94,6402	0,1374	0,1251	35,8632	93,7250	0,1262	0,1252	35,0113	108,9501	0,1373	0,1240	35,0321	0,1255	2018-03-30	08:00
Difference	0,0001	0,0104	-0,0003	0,0019	0,0000	0,0007	-0,0007	0,0024	0,0006	0,0116	-0,0005	0,0019	0,0002		
Total (mg)		12,1				14,5				13,6			0,2		
Total ajusté (mg)		<b>11,90</b>				<b>14,30</b>				<b>13,40</b>					

<b>Project nu.</b>	pi 20164
<b>Date</b>	14-03-2018
<b>Technicien</b>	m.m

# Demonstration purpose only not the real number, negative filter mass weight rounded to zero

## Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	10	8	9	9	11	10	11	18	17	12	13	19	14		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	94,6400	0,1269	0,1255	35,8612	93,7250	0,1255	0,1259	35,0090	108,9496	0,1257	0,1246	35,0301	0,1254	2018-03-13	18:00
Before (6)	94,6401	0,1270	0,1254	35,8613	93,7250	0,1255	0,1259	35,0089	108,9495	0,1257	0,1245	35,0302	0,1253	2018-03-14	10:00
After (1)	94,6429	0,1396	0,1255	35,8643	93,7269	0,1262	0,1254	35,0122	108,9511	0,1376	0,1243	35,0336	0,1256	2018-03-14	23:00
After (2)	94,6402	0,1374	0,1251	35,8632	93,7250	0,1262	0,1252	35,0113	108,9501	0,1373	0,1240	35,0321	0,1256	2018-03-26	08:00
After (3)	94,6402	0,1374	0,1251	35,8632	93,7250	0,1262	0,1252	35,0113	108,9501	0,1373	0,1240	35,0321	0,1255	2018-03-30	08:00
After (4)															
After (5)															
After (6)	94,6402	0,1374	0,1254	35,8632	93,7250	0,1262	0,1259	35,0113	108,9501	0,1373	0,1245	35,0321	0,1255	2018-03-30	08:00
Difference	0,0001	0,0104	0,0000	0,0019	0,0000	0,0007	0,0000	0,0024	0,0006	0,0116	0,0000	0,0019	0,0002		
Total (mg)		12,4				15,5				14,1			0,2		
Total ajusté (mg)		<b>12,20</b>				<b>15,30</b>				<b>13,90</b>					

<b>Project nu.</b>	pi 20164
<b>Date</b>	14-03-2018
<b>Technicien</b>	m.m

SFBA EPA EMISSION RESULTS

RESULTS

**Average emission rate:** 2,1 g/hr  
 Burn Rate : 0,917 Dry kg/hr

**Test Duration:** 651 min

PRESSURE FACTOR: DGM 1 0,95350  
 DGM 2 0,95366  
 DGM 3 0,97907

BAROMETRIC PRESSURE  
 Average: 29,293749 in Hg  
 Start: 29,323279 in Hg  
 End: 29,264219 in Hg

TEMPERATURE FACTORS DGM 1 0,98417  
 DGM 2 0,98310  
 DGM 3 0,98984

DGM CONTROLLER VALUES  
 DGM 1 Final: 22607,651 Cuft  
 Initial: 22483,033 Cuft

VOLUMES SAMPLED DGM 1 115,524 SCft  
 DGM 2 119,173 SCft  
 DGM 3 52,405 SCft

DGM 2 Final: 20617,689 Cuft  
 Initial: 20489,089 Cuft

DGM #3 Final: 1041,250 Cuft  
 Initial: 986,430 Cuft

TOTAL TUNNEL VOLUME : 192134

TEMPERATURES  
 DGM 1 536,493 °R  
 DGM 2 537,077 °R

SAMPLE RATIOS  
 Sample Train 1: 1663,142  
 Sample Train 2: 1612,228

CALIBRATION FACTORS  
 DGM 1 0,9879  
 DGM 2 0,9884  
 DGM #3 0,9864

Paticulate concentration  
 Sample Train 1 **0,000126** g/dscf  
 Sample Train 2 **0,000114** g/dscf  
 Room **0,000004** g/dscf

TUNNEL FLOW RATE: 295,136 Dscfm

TOTAL EMISSIONS  
 Sample Train 1 **23,38** g  
 Sample Train 2 **21,19** g

PARTICULATE CATCH  
 Total Sample Train 1: 14,50 mg  
 Total Sample Train 2: 13,60 mg  
 Total Sample Train 1 1st hour: 12,10 mg

EMISSION RATES  
 Sample Train 1 **2,16** g/hr  
 Sample Train 2 **1,95** g/hr

1st hour emission rate **20,12** g/hr

DEVIATION: 4,91%

Cs Train 1 Train 2  
 0,0001255 0,00011412



Table with 29 columns and 1000 rows of numerical data. Columns represent various data points, likely related to particulate calculations as indicated by the footer.

Table with columns for PM2.5, PM10, SO2, NO2, CO, O3, and various other pollutants. It contains multiple rows of data, each representing a measurement at a specific location and time. The columns are organized into groups, with the first two columns (PM2.5 and PM10) having three sub-columns each, and the remaining columns (SO2, NO2, CO, O3) having single sub-columns.









601,0	802,0	0,4	1,7	5,0	163,9	122,1	71,3	73,0	159,0	135,4	144,2	207,1	174,1	0,18	72,49	73,13	72,22	0,18	72,84	73,68	72,21	0,06	0,01	-97,49346
602,0	803,0	0,4	1,7	5,0	163,8	122,2	71,4	73,0	159,2	135,4	144,4	205,5	174,8	0,18	72,50	73,15	72,19	0,18	72,84	73,67	72,17	0,06	0,01	-97,59268
603,0	804,0	0,4	1,7	5,0	164,3	122,0	71,2	73,0	159,3	135,4	144,6	205,8	176,5	0,18	72,48	73,14	72,19	0,18	72,83	73,66	72,18	0,06	0,01	-97,18006
604,0	805,0	0,4	1,7	5,0	164,2	122,1	71,2	72,9	159,1	135,7	144,6	204,8	176,7	0,18	72,50	73,12	72,20	0,18	72,82	73,65	72,18	0,06	0,01	-97,25087
605,0	806,0	0,4	1,8	5,0	164,4	122,3	71,4	73,0	159,2	136,1	144,7	203,7	178,2	0,18	72,50	73,12	72,18	0,18	72,85	73,65	72,17	0,06	0,01	-97,05003
606,0	807,0	0,3	1,7	4,9	164,4	122,5	71,2	73,0	158,9	136,1	145,1	202,1	179,9	0,18	72,51	73,12	72,18	0,18	72,83	73,64	72,18	0,06	0,01	-97,02221
607,0	808,0	0,3	1,7	4,7	164,6	123,0	71,1	73,0	159,3	136,5	145,3	201,1	180,8	0,18	72,47	73,09	72,15	0,18	72,79	73,63	72,14	0,06	0,01	-96,84393
608,0	809,0	0,4	1,7	4,7	164,4	123,0	71,2	72,9	159,0	136,3	145,3	200,0	181,6	0,18	72,44	73,08	72,16	0,18	72,76	73,62	72,15	0,06	0,01	-96,99315
609,0	810,0	0,3	1,8	4,6	164,6	122,1	71,2	72,9	158,8	137,0	145,8	199,9	181,5	0,18	72,45	73,08	72,14	0,18	72,76	73,60	72,14	0,06	0,01	-96,87491
610,0	811,0	0,3	1,8	4,7	164,5	123,1	71,2	72,9	158,8	137,0	145,9	198,8	181,8	0,18	72,43	73,05	72,14	0,18	72,73	73,59	72,12	0,06	0,01	-96,98124
611,0	812,0	0,3	1,9	4,7	164,3	123,0	71,2	72,9	158,4	137,1	146,3	198,0	181,9	0,18	72,43	73,05	72,14	0,18	72,73	73,59	72,12	0,06	0,01	-97,11206
612,0	813,0	0,3	1,8	4,8	164,1	122,9	71,1	72,9	157,6	137,4	146,2	196,8	182,7	0,18	72,43	73,05	72,12	0,18	72,75	73,57	72,12	0,06	0,01	-97,31425
613,0	814,0	0,3	1,9	4,9	164,3	122,8	71,1	72,9	158,1	137,9	146,5	196,2	182,9	0,18	72,40	73,03	72,10	0,18	72,73	73,55	72,10	0,06	0,01	-97,12646
614,0	815,0	0,3	1,9	4,9	164,0	122,6	71,1	72,9	157,1	138,2	146,4	195,4	183,1	0,18	72,43	73,02	72,09	0,18	72,75	73,55	72,09	0,06	0,01	-97,39949
615,0	816,0	0,3	1,9	4,9	164,4	122,5	71,0	72,8	157,2	138,7	146,5	194,8	184,5	0,18	72,50	73,02	72,09	0,18	72,79	73,57	72,07	0,06	0,01	-97,08735
616,0	817,0	0,3	1,9	4,8	164,7	122,6	71,0	72,8	157,7	139,2	147,0	194,6	185,1	0,18	72,55	73,04	72,09	0,18	72,83	73,57	72,07	0,06	0,01	-96,74068
617,0	818,0	0,3	1,9	4,8	164,9	122,9	70,9	72,8	158,2	139,6	147,0	194,1	185,7	0,18	72,57	73,04	72,08	0,18	72,85	73,58	72,07	0,06	0,01	-96,51608
618,0	819,0	0,3	1,9	4,9	165,0	123,1	71,0	72,8	158,2	140,1	146,9	193,4	186,5	0,18	72,56	73,03	72,07	0,18	72,86	73,58	72,04	0,06	0,01	-96,43206
619,0	820,0	0,2	1,8	4,9	164,9	123,2	70,9	72,8	158,2	140,5	147,1	192,5	186,2	0,18	72,53	73,02	72,06	0,18	72,82	73,55	72,05	0,06	0,01	-96,53238
620,0	821,0	0,2	1,8	4,9	164,8	123,3	71,0	72,8	157,6	140,9	147,2	191,2	187,1	0,18	72,48	73,00	72,04	0,18	72,80	73,55	72,03	0,06	0,01	-96,63152
621,0	822,0	0,3	1,9	4,8	164,7	123,6	71,0	72,8	157,7	141,3	147,5	190,3	186,7	0,18	72,47	73,01	72,02	0,18	72,79	73,52	72,01	0,06	0,01	-96,73549
622,0	823,0	0,2	1,9	4,7	164,8	123,5	70,9	72,8	157,5	141,4	147,5	190,2	187,2	0,18	72,42	73,02	72,02	0,18	72,79	73,54	71,99	0,06	0,01	-96,66567
623,0	824,0	0,2	1,9	4,6	164,6	123,4	71,0	72,8	156,8	141,7	147,3	189,4	187,9	0,18	72,39	73,01	72,03	0,18	72,77	73,55	72,02	0,06	0,01	-96,81066
624,0	825,0	0,2	2,0	4,5	164,4	123,4	70,9	72,8	156,3	141,9	147,4	188,3	188,0	0,18	72,34	72,99	72,03	0,18	72,75	73,52	72,02	0,06	0,01	-97,05708
625,0	826,0	0,2	2,0	4,5	164,5	123,4	70,9	72,8	156,4	142,5	147,3	187,6	188,6	0,18	72,33	72,98	72,01	0,18	72,71	73,51	72,00	0,06	0,01	-96,95797
626,0	827,0	0,2	1,9	4,7	164,4	123,4	70,9	72,8	156,4	142,5	147,3	186,3	189,5	0,18	72,32	72,95	72,02	0,18	72,68	73,48	71,96	0,06	0,01	-97,04969
627,0	828,0	0,2	1,9	4,8	164,4	123,5	70,8	72,9	156,2	142,8	147,5	185,8	189,6	0,18	72,32	72,95	71,98	0,18	72,67	73,48	71,97	0,06	0,01	-97,08803
628,0	829,0	0,2	1,9	4,7	164,6	123,5	70,9	72,8	156,8	143,2	147,4	185,5	189,9	0,18	72,34	72,94	71,98	0,18	72,66	73,47	71,97	0,06	0,01	-96,85408
629,0	830,0	0,2	2,0	4,7	164,6	123,4	70,7	72,8	156,3	143,3	147,8	184,8	191,0	0,18	72,37	72,93	71,95	0,18	72,67	73,48	71,94	0,06	0,01	-96,79334
630,0	831,0	0,2	2,0	4,6	164,5	123,5	70,8	72,8	155,4	143,4	147,9	184,2	191,7	0,18	72,34	72,92	71,97	0,18	72,66	73,46	71,92	0,06	0,01	-96,90747
631,0	832,0	0,2	2,0	4,6	164,2	123,2	70,9	72,7	154,7	143,8	147,6	184,0	190,9	0,18	72,37	72,92	71,96	0,18	72,68	73,45	71,93	0,06	0,01	-97,25163
632,0	833,0	0,2	2,1	4,4	164,0	123,0	70,8	72,7	153,9	143,8	147,6	183,2	191,4	0,18	72,38	72,90	71,94	0,18	72,68	73,45	71,93	0,06	0,01	-97,45139
633,0	834,0	0,1	2,1	4,5	163,8	122,8	70,8	72,7	153,3	144,1	147,6	183,0	190,9	0,18	72,38	72,89	71,93	0,18	72,70	73,45	71,91	0,06	0,01	-97,65461
634,0	835,0	0,2	2,1	4,6	163,8	123,0	70,9	72,8	153,0	144,2	147,9	182,1	191,9	0,18	72,35	72,89	71,93	0,18	72,67	73,44	71,93	0,05	0,01	-97,61136
635,0	836,0	0,1	2,1	4,7	164,0	122,7	70,8	72,7	153,2	144,0	148,0	181,7	192,8	0,18	72,36	72,90	71,90	0,18	72,67	73,43	71,90	0,06	0,01	-97,47444
636,0	837,0	0,1	2,2	4,6	164,1	122,6	71,0	72,7	153,5	144,5	148,2	181,5	192,9	0,18	72,35	72,89	71,90	0,18	72,67	73,43	71,92	0,06	0,01	-97,31124
637,0	838,0	0,1	2,0	4,7	163,9	122,6	70,7	72,8	153,6	144,7	147,9	181,3	192,0	0,18	72,36	72,89	71,91	0,18	72,71	73,43	71,89	0,06	0,01	-97,55489
638,0	839,0	0,1	2,0	4,9	163,8	122,4	70,8	72,7	153,7	145,1	147,8	180,4	192,0	0,18	72,38	72,89	71,88	0,18	72,70	73,44	71,88	0,06	0,01	-97,64666
639,0	840,0	0,1	2,0	4,9	163,8	122,5	70,9	72,7	154,0	145,3	148,1	180,1	191,8	0,18	72,41	72,91	71,87	0,18	72,71	73,44	71,86	0,06	0,01	-97,60114
640,0	841,0	0,1	2,0	4,9	163,9	122,4	70,8	72,7	154,2	145,5	148,2	179,7	191,8	0,18	72,41	72,91	71,87	0,18	72,72	73,43	71,87	0,06	0,01	-97,53505
641,0	842,0	0,1	2,0	4,9	163,9	122,6	70,8	72,7	154,7	145,9	148,2	179,2	191,7	0,18	72,38	72,90	71,87	0,18	72,71	73,43	71,86	0,06	0,01	-97,51937
642,0	843,0	0,1	1,8	5,3	164,1	122,5	70,8	72,7	155,6	146,1	148,2	179,0	191,5	0,18	72,36	72,88	71,86	0,18	72,71	73,41	71,84	0,05	0,01	-97,344
643,0	844,0	0,1	1,6	5,9	164,6	122,2	70,7	72,7	156,8	146,6	148,5	179,3	191,8	0,18	72,37	72,89	71,86	0,18	72,71	73,42	71,85	0,06	0,01	-96,83972
644,0	845,0	0,1	1,6	6,0	164,7	122,4	70,7	72,7	157,0	146,9	148,9	179,0	191,8	0,18	72,35	72,88	71,85	0,18	72,73	73,42	71,83	0,06	0,01	-96,72185
645,0	846,0	0,1	1,6	5,9	164,6	122,8	70,8	72,6	157,3	147,3	148,6	178,8	191,2	0,18	72,33	72,87	71,85	0,18	72,70	73,42	71,82	0,06	0,01	-96,80182
646,0	847,0	0,1	1,7	5,7	165,0	123,3	70,9	72,6	157,9	147,2	148,9	178,2	192,5	0,18	72,35	72,87	71,84	0,18	72,70	73,42	71,83	0,06	0,01	-96,48246
647,0	848,0	0,1	1,8	5,6	165,1	123,3	70,8	72,6	157,7	147,4	149,0	177,9	193,4	0,18	72,42	72,87	71,84	0,18	72,71	73,42	71,82	0,06	0,01	-96,37867
648,0	849,0	0,1	1,7	5,6	165,0	123,2	70,7	72,7	157,5	147,6	149,1	177,6	193,0	0,18	72,46	72,86	71,83	0,18	72,70	73,40	71,83	0,06	0,01	-96,47571
649,0	850,0	0,1	1,7	5,6	165,0	123,4	70,7	72,6	157,1	148,3	149,3	177,5	192,6	0,18	72,46	72,86	71,83	0,18	72,69	73,39	71,81	0,06	0,01	-96,48159
650,0	851,0	0,1	1,8	5,5	165,3	123,7	70,7	72,6	157,2	148,3	149,5	177,2	194,2	0,18	72,47	72,85	71,81	0,18	72,70	73,40	71,81	0,06	0,01	-96,1





207,00	1,39	2,74	5,47	139,3%	20,40	13,56	104,7	23,7	73,3%	78,5%	57,6%
208,00	1,39	2,72	5,47	139,8%	20,40	13,57	104,2	23,4	73,5%	78,6%	57,7%
209,00	1,39	2,70	5,42	141,8%	20,40	13,63	103,5	23,4	73,4%	78,6%	57,7%
210,00	1,39	2,73	5,37	142,4%	20,40	13,67	102,9	23,5	73,1%	78,5%	57,4%
211,00	1,39	2,76	5,34	142,7%	20,41	13,69	102,3	23,5	72,8%	78,5%	57,2%
212,00	1,39	2,77	5,27	144,4%	20,41	13,75	101,6	23,5	72,5%	78,5%	56,9%
213,00	1,35	2,78	5,21	145,9%	20,41	13,81	101,4	23,4	72,3%	78,4%	56,7%
214,00	1,39	2,80	5,22	145,0%	20,41	13,79	100,6	23,5	72,2%	78,5%	56,7%
215,00	1,39	2,81	5,21	145,0%	20,41	13,80	99,8	23,6	72,1%	78,6%	56,6%
216,00	1,35	2,77	5,11	149,3%	20,42	13,93	99,4	23,5	72,0%	78,4%	56,4%
217,00	1,35	2,78	5,04	151,0%	20,42	13,99	98,8	23,4	71,7%	78,4%	56,2%
218,00	1,35	2,81	4,90	154,9%	20,43	14,13	98,1	23,5	71,0%	78,2%	55,5%
219,00	1,35	2,95	4,73	155,7%	20,43	14,23	97,4	23,6	69,5%	77,9%	54,1%
220,00	1,30	2,96	4,72	155,8%	20,43	14,24	96,8	23,5	69,4%	77,9%	54,1%
221,00	1,35	2,97	4,71	156,0%	20,43	14,24	96,1	23,6	69,3%	78,0%	54,0%
222,00	1,35	2,95	4,60	159,9%	20,44	14,36	95,3	23,6	69,0%	77,9%	53,7%
223,00	1,34	3,09	4,51	158,3%	20,44	14,38	94,8	23,6	67,8%	77,7%	52,7%
224,00	1,35	3,38	4,14	161,2%	20,44	14,62	94,1	23,5	64,5%	76,7%	49,5%
225,00	1,30	3,45	4,05	161,8%	20,44	14,67	93,4	23,4	63,8%	76,6%	48,8%
226,00	1,30	3,45	4,01	163,2%	20,45	14,71	92,9	23,3	63,6%	76,6%	48,7%
227,00	1,30	3,42	3,98	165,6%	20,45	14,76	92,1	23,4	63,7%	76,6%	48,8%
228,00	1,30	3,40	3,97	166,4%	20,45	14,78	91,4	23,4	63,7%	76,7%	48,8%
229,00	1,30	3,38	3,95	167,9%	20,46	14,81	90,6	23,4	63,7%	76,8%	48,9%
230,00	1,30	3,32	3,91	171,7%	20,46	14,89	89,7	23,4	63,9%	76,8%	49,1%
231,00	1,30	3,27	3,87	175,2%	20,47	14,96	88,9	23,4	64,0%	76,8%	49,2%
232,00	1,30	3,22	3,84	178,5%	20,47	15,03	88,2	23,5	64,1%	76,9%	49,3%
233,00	1,30	3,14	3,75	185,0%	20,48	15,16	87,6	23,4	64,2%	76,8%	49,3%
234,00	1,30	3,12	3,74	186,5%	20,49	15,19	86,9	23,4	64,2%	76,9%	49,4%
235,00	1,26	3,04	3,68	192,4%	20,50	15,30	86,3	23,3	64,4%	76,8%	49,5%
236,00	1,26	3,03	3,68	192,4%	20,50	15,30	85,6	23,3	64,5%	76,9%	49,6%
237,00	1,26	3,05	3,69	191,3%	20,49	15,28	85,1	23,3	64,4%	77,0%	49,6%
238,00	1,26	3,02	3,66	193,8%	20,50	15,33	84,7	23,4	64,4%	77,0%	49,6%
239,00	1,21	2,97	3,62	198,0%	20,50	15,40	84,3	23,3	64,5%	77,0%	49,7%
240,00	1,26	2,93	3,57	202,1%	20,51	15,47	83,6	23,4	64,6%	77,0%	49,8%
241,00	1,26	2,93	3,58	201,9%	20,51	15,47	83,0	23,4	64,6%	77,1%	49,8%
242,00	1,26	2,90	3,55	204,2%	20,51	15,51	82,5	23,3	64,6%	77,1%	49,9%
243,00	1,26	2,90	3,56	203,7%	20,51	15,50	81,8	23,3	64,7%	77,2%	50,0%
244,00	1,26	2,90	3,56	204,1%	20,51	15,50	81,3	23,3	64,7%	77,3%	50,1%
245,00	1,26	2,89	3,55	205,0%	20,51	15,52	80,9	23,3	64,7%	77,4%	50,1%
246,00	1,26	2,89	3,55	205,1%	20,51	15,52	80,3	23,4	64,7%	77,5%	50,1%
247,00	1,21	2,87	3,53	207,2%	20,52	15,56	79,9	23,5	64,8%	77,5%	50,2%
248,00	1,21	2,86	3,53	207,3%	20,52	15,56	79,6	23,5	64,8%	77,5%	50,3%
249,00	1,21	2,86	3,52	207,8%	20,52	15,57	79,2	23,3	64,8%	77,6%	50,3%
250,00	1,21	2,87	3,53	207,2%	20,52	15,56	78,8	23,4	64,7%	77,6%	50,3%
251,00	1,21	2,87	3,53	206,7%	20,52	15,55	78,5	23,3	64,7%	77,7%	50,3%
252,00	1,21	2,87	3,52	207,5%	20,52	15,56	78,3	23,3	64,7%	77,7%	50,3%
253,00	1,21	2,86	3,51	208,7%	20,52	15,58	77,8	23,1	64,7%	77,7%	50,3%
254,00	1,21	2,93	3,56	202,6%	20,51	15,49	77,4	23,2	64,5%	77,9%	50,2%
255,00	1,21	2,93	3,55	203,0%	20,51	15,49	77,0	23,3	64,5%	77,9%	50,2%
256,00	1,21	2,91	3,55	203,9%	20,51	15,51	76,8	23,4	64,6%	78,0%	50,3%
257,00	1,21	2,88	3,51	207,7%	20,52	15,57	76,6	23,4	64,6%	77,9%	50,3%
258,00	1,21	2,88	3,50	207,9%	20,52	15,58	76,3	23,4	64,6%	77,9%	50,3%
259,00	1,21	2,89	3,51	207,0%	20,52	15,56	75,9	23,2	64,5%	78,0%	50,3%
260,00	1,21	2,88	3,50	207,7%	20,52	15,58	75,7	23,4	64,5%	78,0%	50,3%
261,00	1,21	2,90	3,50	207,2%	20,52	15,57	75,3	23,4	64,4%	78,1%	50,3%
262,00	1,21	2,88	3,48	208,7%	20,52	15,60	75,1	23,4	64,4%	78,1%	50,3%
263,00	1,21	2,88	3,49	208,2%	20,52	15,59	74,7	23,3	64,4%	78,1%	50,4%
264,00	1,21	2,89	3,49	208,2%	20,52	15,59	74,6	23,4	64,4%	78,2%	50,4%
265,00	1,17	2,88	3,48	208,9%	20,52	15,60	74,2	23,3	64,4%	78,2%	50,3%
266,00	1,17	2,90	3,49	207,5%	20,52	15,58	74,0	23,3	64,4%	78,2%	50,4%
267,00	1,17	2,91	3,50	206,2%	20,52	15,56	73,8	23,3	64,3%	78,3%	50,4%
268,00	1,17	2,91	3,51	206,1%	20,52	15,55	73,4	23,4	64,4%	78,4%	50,4%
269,00	1,17	2,91	3,50	206,2%	20,52	15,56	73,2	23,4	64,3%	78,4%	50,4%
270,00	1,17	2,93	3,52	204,9%	20,51	15,53	72,9	23,3	64,3%	78,5%	50,5%
271,00	1,17	2,93	3,52	204,7%	20,51	15,53	72,6	23,4	64,3%	78,5%	50,5%
272,00	1,17	2,93	3,53	204,3%	20,51	15,52	72,4	23,4	64,3%	78,6%	50,5%
273,00	1,17	2,92	3,52	204,9%	20,51	15,53	72,1	23,4	64,3%	78,6%	50,6%
274,00	1,17	2,92	3,51	205,1%	20,51	15,54	71,4	23,3	64,3%	78,7%	50,6%
275,00	1,12	2,87	3,44	211,2%	20,52	15,65	70,6	23,3	64,3%	78,6%	50,5%
276,00	1,12	2,86	3,46	211,1%	20,52	15,64	69,9	23,2	64,4%	78,8%	50,8%
277,00	1,12	2,96	3,56	201,1%	20,51	15,47	69,2	23,3	64,3%	79,1%	50,9%
278,00	1,12	3,00	3,60	197,5%	20,50	15,40	68,9	23,3	64,3%	79,2%	50,9%
279,00	1,12	3,03	3,64	194,7%	20,50	15,35	68,4	23,3	64,3%	79,3%	51,0%
280,00	1,12	2,95	3,56	201,6%	20,51	15,47	68,1	23,3	64,4%	79,2%	51,0%
281,00	1,12	2,99	3,61	197,2%	20,50	15,39	67,9	23,3	64,4%	79,4%	51,1%
282,00	1,12	2,95	3,57	201,3%	20,51	15,47	67,6	23,2	64,4%	79,3%	51,1%
283,00	1,12	2,87	3,49	208,5%	20,52	15,59	67,6	23,2	64,6%	79,2%	51,1%
284,00	1,12	2,88	3,51	207,5%	20,52	15,57	67,6	23,1	64,6%	79,2%	51,1%
285,00	1,12	2,88	3,50	207,8%	20,52	15,58	67,1	23,1	64,5%	79,3%	51,1%
286,00	1,12	2,82	3,42	215,1%	20,53	15,70	66,2	23,1	64,5%	79,3%	51,1%
287,00	1,12	2,78	3,39	218,2%	20,53	15,75	65,7	23,1	64,6%	79,3%	51,3%
288,00	1,12	2,78	3,41	217,2%	20,53	15,73	65,3	23,1	64,7%	79,4%	51,4%
289,00	1,12	2,71	3,32	225,3%	20,54	15,86	64,9	23,1	64,7%	79,3%	51,3%
290,00	1,12	2,74	3,33	223,4%	20,54	15,84	64,7	23,1	64,5%	79,3%	51,2%
291,00	1,12	2,79	3,39	217,9%	20,53	15,75	64,5	23,1	64,6%	79,5%	51,3%
292,00	1,08	2,78	3,37	219,1%	20,53	15,77	64,1	23,2	64,5%	79,5%	51,3%
293,00	1,12	2,75	3,34	222,2%	20,54	15,82	63,6	23,2	64,6%	79,6%	51,4%
294,00	1,12	2,75	3,36	221,5%	20,54	15,80	63,5	23,2	64,6%	79,6%	51,4%
295,00	1,08	2,74	3,36	222,0%	20,54	15,81	63,1	23,3	64,7%	79,7%	51,5%
296,00	1,08	2,75	3,37	221,3%	20,54	15,80	62,9	23,3	64,7%	79,7%	51,6%
297,00	1,08	2,72	3,34	224,1%	20,54	15,84	62,8	23,3	64,7%	79,7%	51,6%
298,00	1,08	2,75	3,37	220,7%	20,54	15,79	62,5	23,3	64,7%	79,8%	51,7%
299,00	1,08	2,73	3,34	223,7%	20,54	15,84	62,3	23,2	64,7%	79,8%	51,6%
300,00	1,08	2,76	3,38	219,7%	20,53	15,77	62,0	23,3	64,7%	79,9%	51,7%
301,00	1,08	2,73	3,35	222,9%	20,54	15,82	61,6	23,3	64,8%	79,9%	51,8%
302,00	1,08	2,72	3,36	222,8%	20,54	15,82	61,5	23,1	64,8%	79,9%	51,8%
303,00	1,08	2,73	3,39	221,0%	20,54	15,78	61,4	23,2	64,9%	80,0%	52,0%
304,00	1,08	2,69	3,34	225,5%	20,54	15,85	61,2	23,2	65,0%	80,0%	52,0%
305,00	1,08	2,69	3,33	226,2%	20,54	15,86	60,8	23,3	65,0%	80,1%	52,0%
306,00	1,08	2,70	3,36	224,1%	20,54	15,83	60,6	23,1	65,0%	80,1%	52,0%
307,00	1,08	2,75	3,39	219,9%	20,53	15,77	60,4	23,3	64,9%	80,2%	52,0%
308,00	1,08	2,84	3,50	209,9%	20,52	15,60	60,5	23,3	64,8%	80,3%	52,0%
309,00	1,08	2,91	3,58	202,8%	20,51	15,48	60,5	23,3	64,7%	80,4%	52,0%
310,00	1,08	3,07	3,67	191,4%	20,49	15,29	60,5	23,2	64,2%	80,5%	51,7%
311,											



435,00	0,72	2,98	3,23	216,2%	20,53	15,81	41,8	22,6	62,4%	82,4%	51,4%
436,00	0,72	2,97	3,22	217,5%	20,53	15,83	41,8	22,5	62,4%	82,4%	51,5%
437,00	0,72	2,97	3,22	217,7%	20,53	15,83	41,7	22,6	62,4%	82,5%	51,5%
438,00	0,72	3,01	3,24	214,2%	20,53	15,78	41,7	22,5	62,3%	82,5%	51,4%
439,00	0,72	3,07	3,28	209,2%	20,52	15,70	41,6	22,5	62,1%	82,5%	51,2%
440,00	0,67	3,09	3,29	207,8%	20,52	15,68	41,5	22,5	62,1%	82,5%	51,2%
441,00	0,67	3,09	3,31	206,9%	20,52	15,66	41,5	22,3	62,1%	82,5%	51,3%
442,00	0,67	3,09	3,31	207,2%	20,52	15,67	41,5	22,6	62,2%	82,5%	51,3%
443,00	0,72	3,11	3,34	204,7%	20,51	15,62	41,6	22,6	62,2%	82,5%	51,3%
444,00	0,67	3,11	3,33	204,8%	20,51	15,63	41,6	22,4	62,2%	82,5%	51,3%
445,00	0,67	3,14	3,35	202,7%	20,51	15,59	41,6	22,6	62,1%	82,5%	51,3%
446,00	0,67	3,17	3,37	200,3%	20,51	15,55	41,6	22,6	62,0%	82,5%	51,2%
447,00	0,67	3,22	3,42	195,9%	20,50	15,47	41,5	22,6	62,0%	82,6%	51,2%
448,00	0,67	3,21	3,40	197,4%	20,50	15,50	41,4	22,6	61,9%	82,6%	51,1%
449,00	0,67	3,21	3,38	198,4%	20,51	15,53	41,4	22,6	61,8%	82,5%	51,1%
450,00	0,67	3,22	3,38	197,4%	20,50	15,51	41,4	22,6	61,8%	82,5%	51,0%
451,00	0,67	3,20	3,35	199,6%	20,51	15,55	41,4	22,6	61,7%	82,5%	51,0%
452,00	0,67	3,20	3,34	200,7%	20,51	15,57	41,4	22,6	61,7%	82,5%	50,9%
453,00	0,67	3,17	3,29	204,1%	20,51	15,64	41,4	22,7	61,6%	82,4%	50,8%
454,00	0,67	3,17	3,27	205,0%	20,51	15,66	41,6	22,6	61,5%	82,4%	50,6%
455,00	0,62	3,16	3,22	207,8%	20,52	15,72	42,0	22,6	61,3%	82,2%	50,4%
456,00	0,67	2,58	3,72	211,9%	20,52	15,52	42,2	22,5	67,7%	83,5%	56,5%
457,00	0,62	1,93	4,68	197,4%	20,50	14,86	42,3	22,6	76,7%	85,2%	65,4%
458,00	0,67	1,77	5,09	186,4%	20,49	14,51	42,6	22,5	79,4%	85,6%	68,0%
459,00	0,62	1,69	5,29	181,5%	20,48	14,35	42,8	22,6	80,6%	85,8%	69,1%
460,00	0,62	1,64	5,37	180,1%	20,48	14,29	43,3	22,5	81,2%	85,8%	69,7%
461,00	0,62	1,62	5,45	178,0%	20,47	14,22	43,6	22,5	81,7%	85,8%	70,1%
462,00	0,62	1,64	5,47	176,3%	20,47	14,18	43,9	22,6	81,5%	85,8%	69,9%
463,00	0,62	1,63	5,50	175,3%	20,47	14,15	44,3	22,6	81,7%	85,8%	70,1%
464,00	0,62	1,62	5,58	172,7%	20,46	14,07	44,7	22,5	82,0%	85,8%	70,4%
465,00	0,62	1,60	5,62	172,1%	20,46	14,04	45,1	22,5	82,2%	85,8%	70,5%
466,00	0,58	1,58	5,59	174,1%	20,47	14,09	45,4	22,5	82,4%	85,8%	70,6%
467,00	0,62	1,56	5,52	177,2%	20,47	14,17	45,7	22,5	82,3%	85,7%	70,6%
468,00	0,62	1,57	5,46	179,7%	20,48	14,24	46,0	22,5	82,2%	85,6%	70,3%
469,00	0,62	1,60	5,34	183,1%	20,48	14,34	46,3	22,4	81,6%	85,5%	69,7%
470,00	0,62	1,62	5,26	185,5%	20,49	14,42	46,8	22,5	81,2%	85,3%	69,3%
471,00	0,62	1,63	5,22	186,5%	20,49	14,45	46,9	22,4	81,0%	85,3%	69,1%
472,00	0,58	1,65	5,19	186,9%	20,49	14,47	47,0	22,5	80,7%	85,2%	68,8%
473,00	0,58	1,68	5,16	186,9%	20,49	14,48	47,2	22,5	80,3%	85,2%	68,4%
474,00	0,60	1,70	5,13	187,5%	20,49	14,51	47,3	22,5	80,1%	85,1%	68,1%
475,00	0,58	1,71	5,16	185,7%	20,49	14,47	47,6	22,5	80,1%	85,1%	68,1%
476,00	0,58	1,62	5,18	188,7%	20,49	14,50	47,4	22,4	80,9%	85,2%	68,9%
477,00	0,58	1,54	5,41	182,9%	20,48	14,31	47,3	22,3	82,3%	85,4%	70,3%
478,00	0,58	1,41	5,79	173,0%	20,46	13,97	47,6	22,4	84,3%	85,8%	72,3%
479,00	0,58	1,39	6,06	163,7%	20,45	13,70	47,5	22,4	85,0%	85,9%	73,1%
480,00	0,58	1,45	6,34	152,3%	20,43	13,36	47,7	22,4	85,1%	86,0%	73,2%
481,00	0,58	1,50	6,47	146,4%	20,41	13,19	47,7	22,4	84,8%	86,1%	73,0%
482,00	0,53	1,55	6,52	143,4%	20,41	13,11	47,8	22,4	84,5%	86,0%	72,7%
483,00	0,53	1,59	6,54	141,8%	20,40	13,07	48,0	22,4	84,3%	86,0%	72,5%
484,00	0,53	1,60	6,52	141,8%	20,40	13,08	48,1	22,3	84,1%	86,0%	72,3%
485,00	0,53	1,61	6,44	144,0%	20,41	13,16	48,2	22,4	83,9%	85,9%	72,1%
486,00	0,53	1,59	6,36	147,2%	20,42	13,26	48,2	22,4	83,9%	85,9%	72,1%
487,00	0,53	1,59	6,26	150,1%	20,42	13,37	48,3	22,4	83,7%	85,8%	71,8%
488,00	0,53	1,63	6,18	151,7%	20,42	13,44	48,4	22,4	83,2%	85,7%	71,4%
489,00	0,53	1,69	6,01	155,1%	20,43	13,58	48,5	22,4	82,4%	85,6%	70,5%
490,00	0,53	1,73	5,86	158,7%	20,44	13,71	48,5	22,3	81,7%	85,5%	69,8%
491,00	0,53	1,74	5,80	160,6%	20,44	13,78	48,6	22,4	81,5%	85,4%	69,6%
492,00	0,52	1,79	5,70	162,4%	20,45	13,85	48,6	22,3	80,8%	85,3%	69,0%
493,00	0,49	1,83	5,62	163,9%	20,45	13,92	48,6	22,3	80,3%	85,2%	68,4%
494,00	0,49	1,85	5,55	165,1%	20,45	13,97	48,7	22,3	79,9%	85,1%	68,1%
495,00	0,49	1,88	5,45	167,9%	20,46	14,06	48,8	22,3	79,5%	85,0%	67,6%
496,00	0,49	1,91	5,38	169,4%	20,46	14,12	48,7	22,3	79,1%	85,0%	67,2%
497,00	0,49	1,95	5,35	168,8%	20,46	14,13	48,7	22,3	78,6%	84,9%	66,7%
498,00	0,49	1,99	5,34	168,0%	20,46	14,12	48,7	22,3	78,2%	84,9%	66,4%
499,00	0,49	2,01	5,24	170,8%	20,46	14,21	48,7	22,3	77,8%	84,8%	65,9%
500,00	0,49	2,03	5,26	169,3%	20,46	14,18	48,7	22,2	77,7%	84,8%	65,8%
501,00	0,49	2,04	5,25	169,3%	20,46	14,18	48,7	22,2	77,6%	84,7%	65,8%
502,00	0,49	2,05	5,21	170,3%	20,46	14,22	48,5	22,2	77,4%	84,7%	65,6%
503,00	0,49	2,04	5,26	169,0%	20,46	14,18	48,6	22,2	77,6%	84,8%	65,8%
504,00	0,49	2,02	5,34	166,9%	20,45	14,10	48,6	22,2	78,1%	84,8%	66,3%
505,00	0,49	2,02	5,39	165,2%	20,45	14,05	48,4	22,2	78,2%	84,9%	66,4%
506,00	0,49	2,05	5,32	166,2%	20,45	14,10	48,4	22,2	77,7%	84,8%	65,9%
507,00	0,44	2,08	5,31	165,8%	20,45	14,10	48,4	22,2	77,4%	84,8%	65,7%
508,00	0,49	2,08	5,31	165,9%	20,45	14,11	48,4	22,1	77,5%	84,8%	65,7%
509,00	0,49	2,04	5,31	167,2%	20,45	14,12	48,5	22,2	77,8%	84,8%	66,0%
510,00	0,44	2,00	5,29	169,4%	20,46	14,17	48,4	22,1	78,1%	84,8%	66,2%
511,00	0,44	2,02	5,16	173,5%	20,47	14,29	48,3	22,1	77,5%	84,7%	65,7%
512,00	0,49	1,92	4,77	193,7%	20,50	14,77	48,3	22,2	77,2%	84,5%	65,2%
513,00	0,44	1,75	4,69	205,0%	20,51	14,95	48,2	22,2	78,4%	84,5%	66,2%
514,00	0,44	1,72	4,72	205,1%	20,51	14,93	48,1	22,2	78,8%	84,6%	66,6%
515,00	0,44	1,72	4,82	200,5%	20,51	14,83	48,1	22,2	79,1%	84,7%	67,0%
516,00	0,44	1,75	4,93	193,9%	20,50	14,69	48,1	22,1	79,1%	84,8%	67,1%
517,00	0,44	1,78	5,05	187,6%	20,49	14,55	48,1	22,1	79,2%	84,8%	67,2%
518,00	0,44	1,82	5,14	182,2%	20,48	14,43	48,0	22,1	79,2%	84,9%	67,2%
519,00	0,44	1,86	5,20	178,2%	20,47	14,35	48,0	22,2	78,9%	84,9%	67,0%
520,00	0,44	1,93	5,11	179,0%	20,48	14,40	48,0	22,2	78,1%	84,8%	66,2%
521,00	0,44	1,98	5,02	180,8%	20,48	14,47	48,0	22,1	77,4%	84,7%	65,5%
522,00	0,44	2,03	5,00	179,4%	20,48	14,46	48,0	22,2	76,9%	84,6%	65,1%
523,00	0,44	2,09	5,00	177,2%	20,47	14,43	48,0	22,1	76,4%	84,5%	64,6%
524,00	0,40	2,14	4,95	177,1%	20,47	14,45	48,1	22,2	75,9%	84,5%	64,1%
525,00	0,44	2,16	4,96	175,9%	20,47	14,43	48,1	22,0	75,8%	84,4%	64,0%
526,00	0,40	2,11	5,01	175,7%	20,47	14,40	48,2	22,2	76,3%	84,5%	64,5%
527,00	0,40	2,10	5,01	176,2%	20,47	14,41	48,0	22,2	76,4%	84,6%	64,6%
528,00	0,40	2,16	4,85	180,1%	20,48	14,55	48,0	22,2	75,4%	84,4%	63,6%
529,00	0,40	2,20	4,74	183,1%	20,48	14,64	48,0	22,1	74,7%	84,2%	62,9%
530,00	0,40	2,18	4,74	183,8%	20,48	14,65	47,9	22,1	74,9%	84,2%	63,1%
531,00	0,40	2,15	4,70	186,9%	20,49	14,72	47,9	22,2	75,0%	84,2%	63,2%
532,00	0,40	2,11	4,68	189,1%	20,49	14,75	47,8	22,2	75,3%	84,3%	63,4%
533,00	0,40	2,07	4,72	189,4%	20,49	14,74	47,7	22,1	75,7%	84,3%	63,9%
534,00	0,40	2,02	4,75	190,2%	20,49	14,73	47,6	22,2	76,3%	84,4%	64,4%
535,00	0,36	1,96	4,76	192,3%	20,50	14,76	47,5	22,2	76,7%	84,5%	64,8%
536,00	0,36	1,95	4,72	194,4%	20,50	14,80	47,4	22,1	76,7%	84,5%	64,8%
537,00	0,36	1,96	4,69	195,3%	20,50	14,83	47,3	22,1	76,5%	84,4%	64,6%
538,00	0,36	1,97	4,66	196,2%	20,50	14,86	47,3	22,1	76,3%	84,4%	64,4%
539,00											



549,00	0,30	1,67	4,85	201,2%	20,51	14,82	46,2	22,1	79,6%	85,0%	67,7%
550,00	0,36	1,70	4,77	203,2%	20,51	14,89	46,2	22,1	79,0%	84,9%	67,1%
551,00	0,36	1,72	4,74	203,9%	20,51	14,91	46,1	22,1	78,8%	84,9%	66,9%
552,00	0,35	1,71	4,79	201,9%	20,51	14,86	46,1	22,1	79,0%	84,9%	67,1%
553,00	0,36	1,68	4,76	205,0%	20,51	14,92	46,1	22,0	79,2%	84,9%	67,2%
554,00	0,30	1,69	4,79	203,0%	20,51	14,87	45,9	22,1	79,2%	85,0%	67,3%
555,00	0,30	1,72	4,76	203,1%	20,51	14,89	45,9	22,1	78,8%	84,9%	66,9%
556,00	0,30	1,73	4,81	200,5%	20,51	14,84	45,8	22,0	78,9%	84,9%	67,0%
557,00	0,30	1,71	4,86	199,2%	20,51	14,79	45,8	22,1	79,3%	85,0%	67,4%
558,00	0,30	1,75	4,81	199,7%	20,51	14,83	45,7	22,0	78,8%	84,9%	66,9%
559,00	0,30	1,77	4,73	202,5%	20,51	14,90	45,8	22,0	78,3%	84,8%	66,4%
560,00	0,30	1,78	4,64	205,9%	20,52	14,98	45,8	22,0	77,9%	84,8%	66,1%
561,00	0,30	1,77	4,60	208,7%	20,52	15,04	45,8	22,0	77,9%	84,7%	66,0%
562,00	0,30	1,78	4,39	218,2%	20,53	15,25	45,8	22,0	77,0%	84,5%	65,1%
563,00	0,30	1,83	4,15	228,5%	20,55	15,48	45,9	22,0	75,8%	84,2%	63,8%
564,00	0,30	1,89	4,06	230,5%	20,55	15,55	45,9	22,0	74,8%	84,0%	62,9%
565,00	0,30	1,95	4,05	227,3%	20,54	15,52	46,0	22,1	74,3%	83,9%	62,3%
566,00	0,26	1,99	4,04	225,3%	20,54	15,50	46,1	22,1	73,8%	83,9%	61,9%
567,00	0,26	2,02	4,02	225,2%	20,54	15,51	46,0	22,0	73,5%	83,8%	61,6%
568,00	0,26	2,05	4,02	223,4%	20,54	15,49	46,1	22,0	73,2%	83,8%	61,3%
569,00	0,26	2,09	3,97	224,3%	20,54	15,53	46,2	22,0	72,7%	83,7%	60,8%
570,00	0,26	2,30	3,78	223,0%	20,54	15,61	46,2	22,0	70,1%	83,2%	58,4%
571,00	0,30	2,41	3,65	224,1%	20,54	15,69	46,3	21,9	68,6%	82,9%	56,9%
572,00	0,26	2,46	3,65	221,3%	20,54	15,65	46,5	22,0	68,2%	82,8%	56,5%
573,00	0,26	2,39	3,92	211,2%	20,52	15,41	46,6	22,0	70,1%	83,3%	58,4%
574,00	0,26	2,32	4,29	197,5%	20,50	15,06	46,8	22,0	72,2%	83,8%	60,5%
575,00	0,26	2,28	4,40	194,1%	20,50	14,96	46,9	22,0	72,9%	83,9%	61,2%
576,00	0,26	2,25	4,45	193,4%	20,50	14,93	47,2	21,9	73,3%	83,9%	61,5%
577,00	0,26	2,20	4,61	188,6%	20,49	14,78	47,4	21,9	74,3%	84,1%	62,5%
578,00	0,26	2,15	4,73	185,3%	20,49	14,68	47,6	21,8	75,1%	84,3%	63,3%
579,00	0,26	2,10	4,85	182,7%	20,48	14,58	47,9	21,9	75,9%	84,4%	64,0%
580,00	0,21	2,10	4,85	182,6%	20,48	14,58	48,4	21,9	75,9%	84,3%	64,0%
581,00	0,21	2,08	4,94	179,8%	20,48	14,50	48,6	21,9	76,3%	84,4%	64,4%
582,00	0,21	1,91	5,25	174,0%	20,47	14,26	48,7	21,9	78,7%	84,8%	66,7%
583,00	0,22	1,84	5,47	168,9%	20,46	14,07	48,9	21,9	79,9%	85,0%	67,9%
584,00	0,22	1,81	5,47	169,9%	20,46	14,09	49,1	21,9	80,1%	85,0%	68,1%
585,00	0,22	1,77	5,47	171,4%	20,46	14,11	49,4	21,9	80,4%	85,0%	68,3%
586,00	0,22	1,76	5,45	172,3%	20,46	14,13	49,4	21,9	80,4%	85,0%	68,4%
587,00	0,22	1,75	5,42	174,0%	20,47	14,17	49,6	21,9	80,4%	85,0%	68,3%
588,00	0,22	1,73	5,37	176,6%	20,47	14,24	49,9	21,9	80,5%	84,9%	68,3%
589,00	0,19	1,73	5,35	177,5%	20,47	14,26	50,0	21,9	80,5%	84,9%	68,3%
590,00	0,22	1,75	5,32	178,1%	20,47	14,28	49,9	21,9	80,2%	84,9%	68,1%
591,00	0,22	1,75	5,32	177,7%	20,47	14,28	49,9	21,9	80,2%	84,8%	68,0%
592,00	0,22	1,72	5,30	179,5%	20,48	14,31	50,0	21,8	80,4%	84,8%	68,2%
593,00	0,21	1,72	5,27	181,2%	20,48	14,35	49,9	21,9	80,4%	84,8%	68,2%
594,00	0,21	1,70	5,19	185,2%	20,49	14,45	49,9	21,9	80,3%	84,8%	68,1%
595,00	0,17	1,68	5,14	188,1%	20,49	14,51	49,8	21,9	80,3%	84,8%	68,1%
596,00	0,17	1,66	5,16	188,1%	20,49	14,50	50,0	21,8	80,5%	84,8%	68,3%
597,00	0,17	1,65	5,17	187,7%	20,49	14,49	49,8	21,9	80,6%	84,8%	68,4%
598,00	0,17	1,64	5,18	188,0%	20,49	14,49	49,8	21,9	80,7%	84,8%	68,5%
599,00	0,17	1,66	5,14	188,7%	20,49	14,52	49,8	21,7	80,5%	84,8%	68,2%
600,00	0,17	1,68	5,06	191,5%	20,50	14,60	49,8	21,8	80,1%	84,7%	67,9%
601,00	0,17	1,67	4,99	194,9%	20,50	14,67	50,0	21,8	80,0%	84,6%	67,7%
602,00	0,17	1,67	4,96	196,3%	20,50	14,71	50,1	21,9	79,9%	84,6%	67,6%
603,00	0,17	1,70	4,96	194,9%	20,50	14,69	50,0	21,8	79,7%	84,6%	67,4%
604,00	0,17	1,74	5,01	190,7%	20,49	14,61	50,1	21,8	79,4%	84,6%	67,1%
605,00	0,17	1,76	4,96	192,2%	20,50	14,65	50,2	21,9	79,1%	84,5%	66,9%
606,00	0,13	1,72	4,87	198,3%	20,51	14,78	50,3	21,8	79,2%	84,4%	66,9%
607,00	0,13	1,70	4,72	206,0%	20,52	14,95	50,5	21,7	78,9%	84,3%	66,5%
608,00	0,17	1,73	4,65	207,6%	20,52	15,00	50,6	21,8	78,4%	84,2%	66,0%
609,00	0,13	1,77	4,62	207,5%	20,52	15,01	50,6	21,8	78,0%	84,1%	65,6%
610,00	0,13	1,79	4,69	203,5%	20,51	14,93	50,6	21,8	78,0%	84,2%	65,7%
611,00	0,13	1,85	4,67	201,1%	20,51	14,91	50,6	21,8	77,4%	84,1%	65,0%
612,00	0,13	1,85	4,80	195,5%	20,50	14,78	50,5	21,7	77,8%	84,2%	65,6%
613,00	0,13	1,89	4,88	190,3%	20,49	14,67	50,5	21,7	77,8%	84,3%	65,5%
614,00	0,13	1,89	4,90	189,4%	20,49	14,65	50,3	21,7	77,8%	84,3%	65,6%
615,00	0,13	1,88	4,86	191,4%	20,49	14,69	50,3	21,7	77,8%	84,3%	65,6%
616,00	0,13	1,91	4,81	192,1%	20,50	14,73	50,3	21,7	77,3%	84,2%	65,1%
617,00	0,13	1,90	4,77	194,6%	20,50	14,78	50,5	21,6	77,3%	84,1%	65,0%
618,00	0,13	1,87	4,87	191,6%	20,50	14,69	50,6	21,7	77,9%	84,3%	65,6%
619,00	0,08	1,79	4,92	192,7%	20,50	14,68	50,7	21,6	78,7%	84,4%	66,4%
620,00	0,08	1,83	4,90	192,1%	20,50	14,68	50,7	21,7	78,3%	84,3%	66,1%
621,00	0,13	1,86	4,80	194,9%	20,50	14,77	50,9	21,6	77,7%	84,1%	65,4%
622,00	0,08	1,85	4,74	198,1%	20,50	14,84	50,9	21,6	77,6%	84,1%	65,2%
623,00	0,08	1,87	4,63	201,8%	20,51	14,94	50,8	21,7	77,1%	84,0%	64,7%
624,00	0,08	1,97	4,50	203,3%	20,51	15,02	50,8	21,6	75,8%	83,8%	63,5%
625,00	0,08	1,98	4,54	201,2%	20,51	14,98	50,8	21,6	75,8%	83,8%	63,5%
626,00	0,08	1,92	4,67	198,4%	20,51	14,88	50,8	21,6	76,8%	84,0%	64,5%
627,00	0,08	1,88	4,76	195,5%	20,50	14,80	50,8	21,6	77,4%	84,1%	65,1%
628,00	0,08	1,90	4,73	196,2%	20,50	14,82	50,8	21,6	77,2%	84,1%	64,9%
629,00	0,08	1,95	4,70	195,5%	20,50	14,83	50,8	21,5	76,6%	84,0%	64,3%
630,00	0,08	1,96	4,65	197,2%	20,50	14,88	50,8	21,6	76,3%	83,9%	64,1%
631,00	0,08	2,00	4,57	198,9%	20,51	14,94	50,7	21,6	75,7%	83,8%	63,5%
632,00	0,08	2,10	4,38	203,2%	20,51	15,08	50,6	21,6	74,2%	83,5%	62,0%
633,00	0,04	2,08	4,47	199,7%	20,51	14,99	50,5	21,6	74,8%	83,7%	62,5%
634,00	0,08	2,09	4,59	194,2%	20,50	14,87	50,5	21,6	75,1%	83,8%	62,9%
635,00	0,04	2,12	4,68	188,9%	20,49	14,75	50,4	21,6	75,2%	83,9%	63,0%
636,00	0,04	2,16	4,62	189,8%	20,49	14,79	50,3	21,7	74,6%	83,8%	62,5%
637,00	0,04	2,03	4,75	189,6%	20,49	14,73	50,3	21,5	76,1%	84,0%	63,9%
638,00	0,04	2,00	4,86	186,6%	20,49	14,63	50,2	21,6	76,8%	84,2%	64,6%
639,00	0,04	1,98	4,89	185,8%	20,49	14,60	50,3	21,6	77,0%	84,2%	64,8%
640,00	0,04	2,02	4,92	182,8%	20,48	14,55	50,2	21,5	76,7%	84,2%	64,6%
641,00	0,04	2,03	4,92	182,5%	20,48	14,54	50,3	21,6	76,7%	84,2%	64,6%
642,00	0,04	1,82	5,29	176,2%	20,47	14,27	50,3	21,5	79,5%	84,7%	67,3%
643,00	0,04	1,59	5,89	162,8%	20,45	13,77	50,1	21,5	82,9%	85,3%	70,8%
644,00	0,04	1,59	5,96	160,2%	20,44	13,69	50,2	21,5	83,1%	85,4%	71,0%
645,00	0,04	1,63	5,88	161,7%	20,44	13,75	50,4	21,6	82,6%	85,3%	70,4%
646,00	0,04	1,70	5,70	165,2%	20,45	13,90	50,7	21,6	81,6%	85,1%	69,4%
647,00	0,04	1,82	5,59	165,0%	20,45	13,95	50,7	21,5	80,3%	84,9%	68,1%
648,00	0,04	1,75	5,57	168,5%	20,46	14,01	50,7	21,5	80,9%	84,9%	68,7%
649,00	0,04	1,75	5,56	168,8%	20,46	14,02	50,8	21,5	80,8%	84,9%	68,6%
650,00	0,04	1,84	5,48	168,6%	20,46	14,06	51,0	21,5	79,9%	84,7%	67,7%
651,00	0,00	1,94	5,39	167,8%	20,46	14,09	50,9	21,5	78,8%	84,6%	66,7%

Time acquisition minutes	Flue	Room	Tunnel	scale	Tunnel Velocity	Right	Back	bottom	Top	Left
	temp	temp	dry bulb		Pressure					
	°F	°F	°F	lbs	in. Wc	°F	°F	°F	°F	°F
1	74.63	69.24	72.27	31.01	0,0514	76.26	77.20	76.43	73.93	77.47
2	87.75	69.27	72.55	30.90	0,0512	76.35	77.16	76.52	79.63	77.39
3	97.70	69.17	72.50	34.85	0,0519	76.84	77.93	76.64	87.36	77.34
4	112.99	69.06	72.86	30.80	0,0514	77.38	79.03	76.76	96.05	77.35
5	132.07	69.06	73.39	30.80	0,0512	78.56	79.97	77.02	105,23	77.63
6	144.91	68.97	74.04	30.71	0,0514	80.34	80.83	77.46	113,35	78.09
7	149.50	69.10	74.20	30.70	0,0505	82.88	81.64	78.17	118,95	78.64
8	156.93	69.09	74.76	30.61	0,0510	85.70	82.46	79.08	127,14	79.05
9	166.75	69.04	75.22	30.51	0,0512	89.03	83.65	80.40	136,85	79.86
10	172.88	69.22	75.44	30.41	0,0505	92.35	85.22	81.86	146,53	80.88
11	183.41	68.94	76.05	30.31	0,0514	95.99	87.14	83.49	156,35	82.50
12	192.14	68.92	76.59	30.20	0,0510	99.85	89.44	85.37	165,06	84.12
13	206.43	68.94	77.39	30.01	0,0507	104.17	92.35	87.54	176,86	85.88
14	230.11	69.00	78.78	29.92	0,0509	109.02	95.95	90.09	193,46	88.08
15	243.66	69.07	79.74	29.71	0,0502	114.09	100.14	92.88	209,26	90.86
16	256.13	68.96	80.63	29.50	0,0505	119.08	104.94	96.03	222,94	94.12
17	270.69	69.00	81.92	29.40	0,0510	123.46	110.03	99.66	235,38	97.95
18	279.53	69.09	83.05	29.22	0,0500	127.33	115.34	103.71	241,55	102.04
19	292.18	69.00	84.26	29.01	0,0507	130.98	120.12	108.81	253,02	106.43
20	312.71	69.11	85.99	28.70	0,0485	134.31	124.93	115.09	269,88	111.69
21	328.37	69.18	87.29	28.51	0,0502	137.54	129.32	122.49	285,90	116.63
22	358.07	69.19	89.56	28.22	0,0498	140.90	134.23	131.22	308,59	123.69
23	370.55	69.28	91.52	27.91	0,0494	143.42	138.57	141.01	326,69	128.73
24	380.90	69.26	92.35	27.71	0,0485	146.04	142.43	152.43	338,90	135.22
25	385.73	69.49	93.12	27.42	0,0492	148.52	145.84	163.98	347,97	140.88
26	387.77	69.56	93.25	27.11	0,0500	148.43	138.05	172.25	332,35	147.31
27	393.75	69.58	95.56	26.84	0,0492	149.68	131.61	178.47	317,52	150.81
28	464.94	69.55	101.77	26.52	0,0487	153.64	129.29	186.04	335,32	152.43
29	531.54	69.77	109.06	26.11	0,0480	159.08	130.99	195.73	388,02	155.04
30	569.27	69.68	112.64	25.73	0,0487	165.79	134.45	207.86	440,85	159.70
31	599.91	69.74	115.72	25.32	0,0477	173.60	138.55	220.56	482,22	166.26
32	609.76	69.61	117.14	25.02	0,0475	183.96	143.81	235.25	504,43	174.60
33	607.52	69.90	116.43	24.62	0,0473	195.73	148.94	250.64	502,77	182.85
34	587.01	70.13	114.27	24.33	0,0480	206.52	153.37	266.05	472,89	189.69
35	579.39	70.11	113.93	24.02	0,0482	216.46	157.59	278.05	472,48	197.10
36	574.75	70.27	113.63	23.72	0,0480	225.85	159.77	290.85	467,60	203.67
37	664.88	70.34	118.12	23.33	0,0494	235.62	164.85	301.09	492,22	210.13
38	761.42	70.70	124.15	22.93	0,0494	244.15	167.89	307.36	586,07	216.19
39	718.53	70.99	120.66	22.54	0,0498	249.67	172.30	310.11	596,90	222.08
40	667.34	71.10	115.69	22.33	0,0500	253.41	179.13	311.99	560,77	225.98
41	599.46	71.25	110.85	22.13	0,0507	255.48	183.79	310.08	503,53	231.00
42	532.11	71.21	106.37	21.93	0,0510	257.37	185.49	309.55	442,24	233.76
43	490.62	71.13	104.02	21.72	0,0514	259.41	185.65	309.72	401,15	233.95
44	465.13	71.30	101.60	21.53	0,0514	260.90	184.46	312.52	372,01	233.91
45	447.91	71.36	100.47	21.43	0,0519	261.97	183.40	313.43	352,50	231.93
46	438.17	70.75	98.98	21.23	0,0510	262.45	182.79	314.03	340,40	230.96
47	428.95	71.04	98.29	21.04	0,0514	263.62	181.68	314.85	327,98	230.10
48	423.21	71.19	97.68	20.82	0,0510	264.36	181.34	316.31	319,63	230.03
49	418.44	71.01	97.33	20.73	0,0514	265.73	180.12	317.35	311,29	229.96
50	413.22	71.30	96.80	20.44	0,0519	267.15	180.37	318.81	304,88	230.93
51	410.86	71.30	96.42	20.34	0,0514	268.25	180.73	320.83	301,41	231.81
52	412.41	71.17	95.47	20.13	0,0514	269.30	180.79	323.50	299,33	232.41
53	414.59	71.41	95.62	19.93	0,0522	270.81	180.69	325.24	296,97	233.06
54	414.87	71.46	95.54	19.73	0,0522	272.56	180.91	327.45	296,07	233.28
55	413.54	71.52	95.56	19.54	0,0514	273.54	181.27	329.46	296,38	235.06
56	408.04	71.49	94.98	19.45	0,0519	275.05	181.47	331.97	299,79	236.02
57	402.40	71.68	94.96	19.13	0,0519	277.23	181.60	332.79	308,55	237.57
58	403.26	71.45	94.82	19.03	0,0522	279.02	181.77	335.49	333,77	239.09
59	425.21	71.60	96.02	18.74	0,0522	280.24	182.11	338.91	422,91	241.55
60	480.91	71.22	97.80	18.53	0,0526	281.71	183.71	343.45	570,08	244.18
61	544.19	71.46	100.34	18.33	0,0512	281.84	185.12	349.24	657,76	247.22
62	598.02	71.64	103.18	18.14	0,0522	283.59	187.22	353.75	708,76	251.08
63	634.16	71.89	105.72	17.73	0,0519	286.22	189.23	358.61	736,79	257.48
64	652.69	71.92	108.57	17.54	0,0512	287.94	191.50	364.45	754,59	263.16
65	696.19	72.14	112.70	17.24	0,0507	291.57	194.40	370.64	771,46	268.25
66	731.41	72.47	116.08	17.03	0,0505	295.02	197.02	376.02	789,57	273.19
67	762.03	72.13	117.98	16.74	0,0505	298.52	200.38	382.09	807,86	278.80
68	781.14	72.56	119.70	16.45	0,0498	301.46	202.70	388.14	812,96	283.10
69	772.68	72.81	118.75	16.23	0,0502	306.38	205.30	393.59	823,29	287.49
70	757.77	73.28	117.84	15.95	0,0498	311.16	207.66	397.41	826,30	291.28
71	751.17	72.77	117.64	15.75	0,0505	315.00	210.43	401.41	825,12	296.49
72	754.13	73.17	117.04	15.44	0,0500	319.37	212.74	404.64	829,90	300.93
73	759.63	73.24	118.15	15.25	0,0502	322.15	216.00	407.32	835,92	306.16
74	759.58	73.28	118.75	14.95	0,0502	326.27	218.89	409.52	840,71	311.18
75	763.24	73.42	119.33	14.73	0,0507	330.07	222.03	411.43	841,65	316.79
76	767.80	73.38	119.33	14.55	0,0502	334.19	225.67	414.12	842,08	321.52
77	775.23	73.69	120.04	14.25	0,0500	337.72	228.85	416.89	847,19	327.06
78	786.77	73.50	121.90	14.05	0,0505	342.46	232.42	420.90	850,44	331.54
79	795.39	73.68	122.31	13.84	0,0505	347.12	235.77	424.86	860,00	336.63
80	808.29	73.77	123.54	13.55	0,0498	351.82	239.54	430.11	873,31	340.79
81	820.10	74.00	125.47	13.36	0,0498	356.34	243.00	435.72	884,40	345.78
82	833.99	73.88	126.58	13.14	0,0500	360.90	248.02	443.08	892,49	350.54
83	854.34	74.19	128.75	12.75	0,0498	365.36	252.40	452.22	894,64	355.10

84	874.55	74.34	130.65	12.56	0,0487	370.51	257.56	461.04	899.85	360.14
85	881.62	74.32	131.50	12.25	0,0487	376.52	263.93	472.23	900.29	362.31
86	891.32	74.33	132.13	11.96	0,0493	383.31	269.91	482.66	898.00	368.16
87	894.69	74.88	133.46	11.76	0,0492	389.56	275.10	491.57	894.79	372.83
88	884.31	74.66	133.49	11.45	0,0492	394.77	280.31	502.33	897.10	378.88
89	876.35	74.83	133.27	11.26	0,0495	399.77	285.84	512.23	887.25	385.01
90	871.57	75.11	133.67	10.97	0,0495	405.95	291.72	520.63	881.01	390.50
91	872.72	74.90	132.93	10.75	0,0498	413.16	298.04	530.53	880.61	396.64
92	865.71	75.21	131.96	10.46	0,0492	419.63	305.44	539.39	877.81	403.91
93	864.91	75.09	132.17	10.26	0,0495	426.75	311.61	548.72	877.66	408.69
94	852.96	74.59	131.25	10.05	0,0500	433.90	317.80	557.28	869.16	413.60
95	842.40	74.29	131.96	9.85	0,0495	439.60	324.89	562.96	858.15	418.78
96	872.63	75.92	168.17	9.47	0,0473	446.34	333.39	572.88	834.29	426.15
97	877.45	75.72	143.30	9.16	0,0485	458.15	344.20	580.68	855.09	435.79
98	847.77	75.15	136.45	9.06	0,0487	465.63	352.30	587.60	850.55	446.59
99	808.06	75.94	131.72	8.77	0,0498	473.60	356.64	588.75	824.91	454.77
100	767.14	75.75	127.76	8.67	0,0502	480.36	360.12	587.29	780.72	463.38
101	738.16	75.98	125.84	8.46	0,0502	484.39	362.19	583.97	747.96	470.48
102	716.77	76.03	123.55	8.36	0,0495	486.46	362.53	581.54	719.44	476.31
103	699.28	75.02	121.59	8.17	0,0507	490.12	362.87	579.85	699.98	483.36
104	680.84	75.48	120.11	8.07	0,0510	492.16	362.42	577.43	684.79	488.88
105	664.17	75.65	118.10	7.97	0,0529	494.85	361.67	575.42	665.20	493.75
106	645.48	75.56	116.30	7.87	0,0522	498.06	361.22	570.74	642.31	498.53
107	625.79	75.31	113.97	7.77	0,0529	499.08	361.74	568.00	623.54	504.75
108	604.00	75.08	111.99	7.66	0,0526	500.41	361.17	565.44	601.04	505.77
109	559.73	78.10	149.00	7.56	0,0495	501.92	364.24	562.34	544.13	507.25
110	585.48	78.13	178.29	7.22	0,0498	502.23	370.75	566.84	542.28	510.08
111	610.55	75.69	125.09	7.17	0,0510	502.46	372.62	566.04	659.19	513.59
112	602.77	74.87	114.62	7.08	0,0526	503.22	375.68	566.33	676.72	517.07
113	593.76	74.91	111.32	6.96	0,0526	504.20	376.29	565.56	662.29	519.01
114	581.63	75.83	109.41	6.92	0,0529	504.77	374.82	564.46	634.70	519.07
115	572.56	75.61	107.59	6.86	0,0526	505.65	374.83	561.31	621.52	519.85
116	561.70	74.97	105.97	6.76	0,0529	505.09	374.75	558.27	607.55	519.36
117	548.82	75.86	104.87	6.67	0,0536	507.08	373.52	554.44	583.16	518.35
118	535.00	74.97	104.37	6.67	0,0536	505.57	372.52	551.64	560.48	517.48
119	522.33	75.40	103.50	6.57	0,0538	503.81	370.48	549.53	551.48	516.57
120	510.69	75.99	102.26	6.57	0,0541	501.94	368.34	544.77	532.15	513.10
121	497.14	75.30	101.33	6.47	0,0529	501.03	366.21	541.90	510.54	512.30
122	483.35	75.41	100.31	6.47	0,0538	500.31	365.28	538.42	489.22	509.65
123	469.26	75.41	99.33	6.38	0,0536	497.21	362.58	535.33	472.57	507.33
124	454.49	75.06	97.73	6.37	0,0541	495.24	361.19	534.14	453.87	505.96
125	440.21	75.05	96.55	6.37	0,0542	493.39	358.71	532.06	436.62	503.37
126	421.60	74.50	95.65	6.37	0,0538	489.87	356.67	528.71	414.52	500.58
127	403.73	74.11	94.41	6.28	0,0548	485.95	354.26	526.22	391.25	498.18
128	388.37	74.94	93.66	6.16	0,0538	482.47	350.49	523.44	372.92	493.74
129	375.35	74.57	92.57	6.41	0,0540	479.69	347.67	521.94	357.99	489.71
130	328.95	76.49	131.22	5.97	0,0514	480.33	349.90	516.66	310.51	485.26
131	332.03	75.45	114.67	5.97	0,0534	474.49	344.72	515.77	296.61	481.54
132	330.51	75.18	96.00	6.06	0,0536	470.32	339.19	517.13	305.14	477.60
133	321.04	75.15	91.48	6.06	0,0543	467.34	335.70	517.78	302.89	474.14
134	311.13	74.92	89.72	6.06	0,0548	462.78	333.91	517.28	294.73	470.17
135	302.34	74.36	88.25	5.97	0,0551	458.36	331.34	517.94	286.29	466.46
136	294.52	74.02	87.71	5.97	0,0548	455.62	329.88	514.70	280.33	461.93
137	287.19	74.69	86.96	6.04	0,0548	450.09	328.04	511.96	271.55	457.15
138	280.54	74.32	86.62	5.97	0,0541	446.07	324.70	507.55	262.11	454.68
139	274.88	74.46	85.91	6.04	0,0548	442.37	322.37	507.12	256.97	449.25
140	269.07	74.22	85.62	5.97	0,0555	438.31	319.61	504.49	256.38	444.45
141	263.85	74.11	85.01	5.97	0,0548	435.45	317.20	498.95	250.43	440.96
142	259.14	73.45	84.83	5.96	0,0548	431.96	313.89	495.87	242.34	436.60
143	254.72	74.15	84.52	5.96	0,0551	430.26	311.20	491.89	236.47	431.51
144	250.59	74.26	84.33	5.97	0,0543	426.38	307.32	490.38	232.03	427.11
145	246.62	74.09	84.18	5.97	0,0553	420.66	304.57	485.08	228.82	423.10
146	242.85	74.10	83.62	5.97	0,0555	418.52	302.42	480.96	225.78	419.69
147	239.10	73.33	83.52	5.77	0,0541	415.18	299.42	475.85	222.35	415.95
148	236.02	73.44	83.15	5.77	0,0558	411.59	296.45	471.62	220.13	411.07
149	233.05	73.49	82.53	5.81	0,0553	407.01	293.40	469.25	218.12	407.30
150	229.95	73.43	82.55	5.77	0,0543	403.79	290.52	465.14	214.98	403.28
151	227.00	73.51	82.56	5.77	0,0548	400.94	287.05	461.91	212.79	399.18
152	224.27	73.30	82.35	5.77	0,0555	396.38	282.56	460.84	210.71	393.88
153	221.48	73.35	82.02	5.77	0,0548	391.97	280.49	457.53	208.59	391.09
154	218.85	73.47	81.89	5.77	0,0553	388.32	278.30	453.92	205.64	387.65
155	216.00	73.29	81.85	5.67	0,0553	386.35	275.29	450.96	203.94	384.15
156	213.43	73.22	81.68	5.77	0,0553	382.64	271.94	448.99	203.86	380.34
157	211.12	73.02	81.49	5.67	0,0551	380.33	269.01	444.50	203.04	377.36
158	208.55	73.21	81.19	5.67	0,0551	374.94	265.78	440.44	202.87	373.42
159	206.19	73.14	81.21	5.77	0,0548	371.38	263.63	434.04	201.62	370.21
160	204.47	73.14	81.07	5.67	0,0558	368.38	261.51	430.60	198.74	366.46
161	202.47	73.12	80.84	5.67	0,0553	364.89	258.06	427.41	196.67	363.30
162	200.85	73.00	80.81	5.67	0,0551	363.43	255.01	421.90	194.94	359.77
163	198.96	73.18	80.56	5.67	0,0548	359.79	253.47	419.32	193.39	357.91
164	197.30	73.15	80.34	5.67	0,0555	357.31	252.16	414.49	191.60	353.77
165	195.71	73.12	80.21	5.67	0,0553	353.76	249.38	414.27	189.93	350.11
166	194.55	73.33	80.25	5.67	0,0555	351.46	246.79	410.64	188.39	347.37
167	193.63	73.27	79.99	5.67	0,0555	348.66	243.83	410.40	187.34	344.60
168	191.88	73.15	79.96	5.67	0,0553	345.70	242.47	407.41	187.57	341.63
169	190.31	73.11	79.85	5.67	0,0548	343.04	240.23	406.38	185.67	338.44
170	189.14	73.13	79.88	5.67	0,0555	340.81	238.02	404.50	184.53	334.99

171	187,80	73,16	79,75	5,67	0,0536	338,62	235,55	402,80	184,66	331,92
172	186,32	73,22	79,60	5,67	0,0541	335,14	233,86	398,84	184,20	329,73
173	185,90	73,14	79,55	5,57	0,0548	333,38	231,76	396,93	182,40	327,71
174	184,33	73,05	79,40	5,67	0,0555	330,79	230,08	395,67	182,75	324,65
175	182,49	73,23	79,21	5,58	0,0555	328,40	227,86	391,55	182,25	322,41
176	180,64	73,19	79,27	5,57	0,0543	325,81	226,37	391,03	182,10	320,24
177	178,87	73,23	79,25	5,57	0,0541	323,91	224,17	388,84	181,88	317,50
178	177,26	73,15	79,09	5,57	0,0553	322,41	222,90	384,88	181,20	314,77
179	175,54	73,13	79,01	5,57	0,0548	320,71	221,74	380,39	180,58	312,54
180	174,06	73,04	78,91	5,57	0,0538	318,55	219,39	376,92	179,60	309,74
181	172,74	73,15	78,96	5,57	0,0548	315,50	217,96	374,86	178,33	307,67
182	171,66	73,22	78,76	5,57	0,0543	312,37	216,27	371,22	177,13	305,49
183	170,56	73,05	78,68	5,57	0,0548	310,37	215,25	365,96	175,99	304,26
184	169,28	73,15	78,61	5,57	0,0555	308,69	214,43	361,57	175,55	301,82
185	168,04	73,23	78,49	5,48	0,0551	307,11	213,13	356,46	175,01	300,36
186	167,01	72,97	78,46	5,48	0,0553	304,85	211,27	354,77	174,37	297,44
187	179,38	73,55	91,02	5,88	0,0548	303,75	213,84	349,63	165,73	295,17

Date: 2018-03-14

Manufacturer: foga supreme

Model: 38 PSC

Project #: PI 20164

Run: 21 mm Tech: mm

Reviewer: DP

LEFT SETTING 0°

No kindling 30 3 LBS START FIRE Fan ON  
80% de la puissance maximum

At 30 8 LBS close Door

At 17 00 LBS close and inlet (Right) completed

At 9 8 LBS Brassier Feux

At 8 00 LBS Brassier de tapocher Feux

At 6 3 LBS tapocher de Feux preparation Feux (channel)

At 5 5 LBS open Door and inlet

- insert load
- close Door immediately

TEST LOAD CONFIGURATION



# PRE / POST CHECKS

Date: 2018-03-14

Manufacturer: Fogon Supreme

Model: 38 FSC

Project #: PI 20164

Run: K1  
mm

Tech: mm

Reviewer: DP

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
<u>EM-191</u>	<u>7:00</u>	<u>ok</u>	<u>ok</u>

### Facility Conditions:

Air Velocity from less than 2 feet .....

Smoke Capture Check.....

Picture.....

	Pre-Test	Post-Test
	<u>8</u> (max 50 Fpm)	<u>6</u> (max 50 Fpm)
	<u>ok</u>	<u>ok</u>
4 sides	<u>ok</u>	<u>ok</u>

### Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....

Date Dilution Tunnel Cleaned.....

Induced Draft Check (max 0.005 H2O).....

Traverse before ignition.....

Flow Rate 140 cfm ±10%.....

<u>2018-03-13</u>
<u>2018-03-13</u>
<u>ok</u>
<u>ok</u>

ok

### Temperature System:

Ambient (65°-90°F).....

Wood Heater Surface (±125°F).....

<u>ok</u>	°F
<u>ok</u>	°F

### Proportional Checks:

Thermocouple check.....

Pitot Clean.....

Pitot verification.....

<u>ok</u>
<u>ok</u>
<u>ok</u>

### Sampling Train ID Numbers:

Probe.....

Filter Front.....

Filter Back.....

Filter Thermocouple.....

Filter (<90°F).....

	Train 1 <sup>st</sup> hour	Train 1	Train 2
	<u>10</u>	<u>11</u>	<u>17</u>
	<u>08</u>	<u>10</u>	<u>12</u>
	<u>09</u>	<u>11</u>	<u>13</u>
	<u>11</u>	<u>11</u>	<u>12</u>
	<u>ok</u>	<u>ok</u>	<u>ok</u>

### SAMPLING EQUIPMENT CHECK OUT

 Date: 2018-03-14 Manufacturer: Fogco Systems Model: 38 FSC  
 Project #: PT 20164 Run: X1 Tech: mm Reviewer: DO

#### Leakage Checks Tunnel Samplers

Unplugged Flow Rate = .25cfm	System 1 <sup>st</sup> hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	63664835	64017854	63664855	64017868	58018276	58382821
Initial 1minute DGM (Liter)	63664831	64017848	63664850	64017866	58018270	58382891
Change © (Liter)	0.04	0.06	0.05	0.02	0.02	✓
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	OK	OK	OK	OK	OK	OK

#### Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	-5	-5
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	OK	OK

#### Leakage Checks Pitot

Plugged Probe	Pre Test 3 H <sub>2</sub> O static	Pre Test 0.4-0.5 H <sub>2</sub> O velocity	Post Test 3 H <sub>2</sub> O Static	Post Test 0.4-0.5 H <sub>2</sub> O velocity
Vacuum (inches Hg.)	3	.4	3	.5
Check OK (no change after 15 sec.)	OK	OK	OK	OK



**PRE-TEST SCALE AUDIT**

Date: 2018-03-14      Manufacturer: Foga Supreme      Model: 38 FSC  
 Project #: PI 20164      Run: 21      Tech: mm      Reviewer: NP

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	4.4 lbs, Class F	4.4 lbs
Wood	EM-090	4.4 lbs, Class F	4.4 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

**LIMITS OF WEIGHT RANGES**

**ANALYTICAL SCALE:** ..... 50%-150% of dry filter weight, ± 0.1 mg  
**PLATFORM SCALE:** ..... 20%-80% of ideal test load weight, ± 0.1 lbs or 1%  
**WOOD SCALE:** ..... 20%-80% of ideal test load weight, ± 0.01 lbs or 1%



Date: 2018-03-14 Manufacturer: foya supreme Model: 38 PSC  
 Project #: PJ 20164 Run: 1 Tech: mm Reviewer: DP

FOR TUNNELS < 12 in

Barometric pressure ( $P_{bar}$ ) 99.3 (KPa.) Static pressure ( $P_q$ ) 0.16 (inches w.c.)  
 Inside diameter: Port A \_\_\_\_\_ Port B \_\_\_\_\_  
 Tunnel cross sectional area: .1963Ft<sup>2</sup>  
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head $\Delta_p$ (inches H <sub>2</sub> O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0051	72.23
B - Centroid	3.00	3.50	4	0052	72.61
A-1	0.40	0.50	0.50	0041	72.29
A-2	1.50	1.75	2	0047	72.29
A-3	4.50	5.25	6	0054	72.36
A-4	5.60	6.5	7.5	0048	72.55
B-1	0.40	0.50	0.50	0049	72.51
B-2	1.50	1.75	2	0055	72.39
B-3	4.50	5.25	6	0050	72.46
B-4	5.60	6.5	7.5	0043	72.49
				AVERAGE	

$$v_s = K_p C_p (\sqrt{\Delta p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

Where,

$C_p$  = pitot tube coefficient, dimension less = 0.99 for standard pitot.

$\Delta_p$  = manometer reading (inches H<sub>2</sub>O)

$T_s$  = average absolute dilution tunnel temperature (°F + 460)

$P_s$  = absolute dilution tunnel gas pressure or  $P_{bar} + P_{qg}$

$P_q$  = static pressure in. H<sub>2</sub>O  
 { 13.6 }

$M_s$  = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)

$K_p$  = 85.49 pitot tube constant, (conversion factor for English units)

$\Delta_p, avg.$  = average of the square roots of the velocity heads ( $\Delta_p$ ) measured at each traverse point.

Date: 2018-03-14 Manufacturer: Fogor Supreme Model: 38 FSC  
 Project #: PI 2016 Run: 1 Tech: MM Reviewer: DP

**Pre-Test (Adjust and Record)**

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2998	3000	1009	100
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO <sub>2</sub>	0	0	1792	1800	969	1000
Tolerance CO <sub>2</sub>		+/- 0.02		+/- 0.5		+/- 0.5
O <sub>2</sub> informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

**Post Test (Record Only)**

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0	2991	1004	0	0.02	0.007	0.15	0.005	0.05	✓	
CO <sub>2</sub>	0	1785	973	0	0.02	0.07	0.5	0.09	0.5	✓	



Date: 2018-03-14 Manufacturer: Foga Supreme Model: 38 SFC  
 Project #: PI 20164 Run: 1 Tech: mn Reviewer: BP

**RAW DRY GAS METER READINGS**

	System 1	System 2	Blanck
Final (Liter)	640 177 38	583 827 92	0 41 25
Initial (Liter)	636 648, 58	580 196 38	986 43

**AMBIENT CONDITIONS**

	Before	After
Barometer (kPa):	99.3	99.1
Dry Bulb (F):	72.14	74.81
Humidity (%):	31.8	27.9

**Flow Meter**

	Start	End
Flow meter reading	N/A	N/A

**Flow Meter Verification**

	Before	After
Flow meter Check (liters)	N/A	N/A
Scale Weight ( Kg)	N/A	N/A

### FUEL DATA

Date: 2-18-03-14 Manufacturer: roya supreme Model: 38 PSC  
 Project #: PT 20164 Run: 1 Tech: mm Reviewer: BP

#### FUEL DESCRIPTION:

Type of wood:

#### PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
2 x 4 x 10 in.	1190 lbs.	22.0	22.6	22.4	22.8	22.4
2 x 4 x 10 in.	1178 lbs.	21.6	21.3	21.4	21.8	21.3
2 x 4 x 10 in.	1184 lbs.	21.5	21.4	21.8	21.7	21.2
2 x 4 x 10 in.	1388 lbs.	20.4	20.6	20.9	20.8	20.5
2 x 4 x 10 in.	1232 lbs.	20.0	20.4	20.6	20.5	20.3
2 x 4 x 10 in.	1392 lbs.	22.1	22.0	21.9	21.9	21.8
2 x 4 x 10 in.	1192 lbs.	21.6	21.4	21.3	21.2	21.6
2 x 4 x 10 in.	1180 lbs.	19.6	19.3	19.3	19.6	19.4
2 x 4 x 10 in.	1276 lbs.	19.9	20.0	20.3	19.9	19.8
2 x 4 x 10 in.	1318 lbs.	20.2	20.8	20.9	20.5	20.4
2 x 4 x 10 in.	1244 lbs.	20.9	20.6	20.3	20.3	20.4
2 x 4 x 10 in.	1274 lbs.	21.1	21.3	21.8	21.7	21.5
2 x 4 x 15 in.	1820 lbs.	22.0	22.1	22.3	22.4	22.6
2 x 4 x 15 in.	1726 lbs.	20.8	20.6	20.3	20.9	20.8
2 x 4 x 15 in.	1888 lbs.	19.9	19.8	19.8	19.6	19.7
2 x 4 x 15 in.	2020 lbs.	19.1	19.2	19.2	19.3	19.4
2 x 4 x 15 in.	1846 lbs.	20.1	20.4	20.4	20.3	20.3
2 x 4 x 15 in.	2124 lbs.	19.9	19.6	19.7	19.7	19.2
2 x 4 x 15 in.	1844 lbs.	20.0	20.3	20.2	20.4	20.3
2 x 4 x 15 in.	1888 lbs.	20.1	20.9	20.8	21.0	21.0
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: ~~3026~~ lbs  
 30.20 mm



**FUEL DATA**

Date: 2018-03-14 Manufacturer: foyer supreme Model: 38 FSC  
 Project #: PI 20164 Run: 71 Tech: mm Reviewer: DP

**FUEL DESCRIPTION:**

Type of wood :

**TEST LOAD**

Piece Size	Weight	Meter Moisture Content (% dry)*				
3 1/2 x 3 1/2 x 22 in.	4,536 lbs.	20.6	20.9	20.4	20.3	20.4
3 1/2 x 3 1/2 x 20 in.	4,588 lbs.	19.1	19.3	19.1	19.5	19.5
3 1/2 x 3 1/2 x 20 in.	4,600 lbs.	21.0	21.7	21.8	21.3	21.4
3 1/2 x 3 1/2 x 20 in.	5,372 lbs.	20.4	20.6	20.8	20.5	20.3
3 1/2 x 3 1/2 x 20 in.	5,372 lbs.	20.1	20.4	20.8	20.6	20.7
x x in.	lbs.			21		
1 1/2 x 3/4 x 5 in.	6,096 lbs.			21.6		
1 1/2 x 3/4 x 5 in.	6,100 lbs.			22		
1 1/2 x 3/4 x 5 in.	6,096 lbs.			21.3		
1 1/2 x 3/4 x 5 in.	6,100 lbs.			21.4		
1 1/2 x 3/4 x 5 in.	6,104 lbs.			21.6		
1 1/2 x 3/4 x 5 in.	6,098 lbs.			21.3		
1 1/2 x 3/4 x 5 in.	6,098 lbs.			21.3		
1 1/2 x 3/4 x 5 in.	6,092 lbs.			21.8		
1 1/2 x 3/4 x 5 in.	6,096 lbs.			21.3		
1 1/2 x 3/4 x 5 in.	6,104 lbs.			21.4		
1 1/2 x 3/4 x 5 in.	6,098 lbs.			21.2		
1 1/2 x 3/4 x 5 in.	6,096 lbs.			21.3		
1 1/2 x 3/4 x 5 in.	6,096 lbs.			21.5		
1 1/2 x 3/4 x 5 in.	6,108 lbs.			20.9		
1 1/2 x 3/4 x 5 in.	6,090 lbs.			20.6		
1 1/2 x 3/4 x 5 in.	6,096 lbs.			20.3		
1 1/2 x 3/4 x 5 in.	6,098 lbs.			20.9		
1 1/2 x 3/4 x 5 in.	6,108 lbs.			20.3		
1 1/2 x 3/4 x 5 in.	6,098 lbs.			21.1		
1 1/2 x 3/4 x 5 in.	6,098 lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 2645 lbs Min 20%: 5.29 Max 25%: 661



Date: 2018-03-13 Manufacturer: Fogson Supreme Model: 38 FSC

Project #: PT 20164 Run: 21 Tech: MM Reviewer: MP

Pre-test Weight Record		SYSTEM 1 - 1 <sup>st</sup> hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2018-03-13	18:00	946400	01269	01255	358612	937250	01255	01259	350090	937250	01255	01259	350090	01254
2018-03-14	10:00	946400	01270	01254	358613	937250	01255	<del>01259</del>	350089	937250	01255	<del>01259</del>	350089	01253

Post-test Weight Record		SYSTEM 1 - 1 <sup>st</sup> hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2018-03-14	23:00	946429	01396	<del>01255</del>	358643	937269	01262	01254	350122	937269	01262	01254	350122	01256
2018-03-24	8:00	946402	01374	01251	358632	937250	01262	01252	350113	937250	01262	01252	350113	01256
2018-03-30	8:00	946402	01374	01251	358632	937250	01262	01252	350113	937250	01262	01252	350113	01255



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2018-03-13 Manufacturer: fyu supreme Model: 38 fsc  
 Project #: PI 20164 Run: Z1 MN Tech: MR Reviewer: BP

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	17	12	13	19
2018-03-13	18:00	108 9496	01257	01246	35 0301
2018-03-14	10:00	108 9495	01257	01245 <del>01247</del>	35 0302

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	17	12	13	19
2018-03-14	23:00	108 9511	01376	01243	35 0336
2018-03-26	8:00	108 9501	01373	01240	35 0321
2018-03-30	8:00	108 9501	01373	01240	35 0321

## Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

### Description du test

Test standard	EPA
Run #	2
Date	15-03-2018
Technicien	m.m
Project #	pi 20164

### Description de l'unité

Manufacturier	foyer supreme	
Modèle	38 fsc	
Combustion system	Non-Cat	
Appliance type	fireplace	
Firebox volume	3,5	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

### Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category	1	
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

### Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,988	Dimensionless
Equipment number (DGM #1):	em 178	
Calibration Factor (DGM #2):	0,988	Dimensionless
Equipment number (DGM #2):	em 179	
Calibration Factor (DGM #3):	0,986	Dimensionless
Equipment number (DGM #3):	em 070	Dimensionless

### Tunnel

Targeted tunnel flow rate	300	scfm
Tunnel diameter	8	in.
Molecular weight	29	
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 20164
Date	15-03-2018
Technicien	<input type="text" value="m.m"/>

### Fuel data

Fuel type	Dimension	
Fuel specie	D. Fir	
HHV		19810,0 kJ/kg
%C		48,7
%H		6,9
%O		43,9
%Ash		0,5
HHV		8519,2 Btu/lb
LHV		7451,0 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480



	Start	End
Barometer (kPa):	99,1	99,5
Barometer (in.Hg):	29,264219	29,38233894
Dry Bulb (F):	71,78	75
Humidity (%):	29	28,9
Air velocity (ft/min)	4	12

DGM #1	Final:	22704,978	cuft
	Initial:	22607,778	cuft
DGM #2	Final:	20716,928	cuft
	Initial:	20617,844	cuft
DGM room			

	Final:	642933,365	Liter
	Initial:	640180,980	Liter
	Final:	586638,060	Liter
	Initial:	583832,300	Liter
	Final:	84,250	cuft
	Initial:	41,250	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

260

Autres données à rentrer: dans preload data, load data, traverse et filter set weight

<b>Project nu.</b>	pi 20164
<b>Date</b>	15-03-2018
<b>Technicien</b>	m.m



### FUEL LOAD DATA SHEET, CSA B415

Test Load Weight:  
 Lower Ideal Upper  
 22,1 24,5 27,0

\* For boilers, a loading density factor of 10 lb/ft3 is applied

Load Volume:  cu. ft      Loading Density: 7,4 lbs./ft3  
 Number of Spaces:       Load Density (wet): 31,0 lbs./ft3  
 Spacer weight:  lbs      Dry Wood Density: 25,8 lbs./ft3

Piece Size (in):			Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x	Volume	Ave. MC
Thick	Wide	Length							Weight	Cubic Inches	%
3,5	3,5	22	4,57	19,80	20,50	20,30	20,40	20,50	92,8522	269,50	20,3
3,5	3,5	22	5,17	19,30	20,40	19,60	20,40	20,30	103,32	269,50	20,0
3,5	3,5	22	4,59	19,10	19,90	19,70	20,00	20,00	90,6066	269,50	19,7
3,5	3,5	22	5,33	19,10	20,50	21,30	22,00	21,80	111,6102	269,50	20,9
3,5	3,5	22	4,50	19,10	19,20	19,30	19,90	20,00	87,75	269,50	19,5
										0,00	
1,5	0,75	5	0,09			20,10			1,8492	5,63	20,1
1,5	0,75	5	0,08			20,60			1,6892	5,63	20,6
1,5	0,75	5	0,09			21,00			1,89	5,63	21,0
1,5	0,75	5	0,09			19,90			1,8308	5,63	19,9
1,5	0,75	5	0,09			19,30			1,6598	5,63	19,3
1,5	0,75	5	0,09			20,60			1,8952	5,63	20,6
1,5	0,75	5	0,09			20,40			1,7544	5,63	20,4
1,5	0,75	5	0,08			21,00			1,638	5,63	21,0
1,5	0,75	5	0,14			21,60			3,024	5,63	21,6
1,5	0,75	5	0,08			20,30			1,7052	5,63	20,3
1,5	0,75	5	0,09			19,40			1,8236	5,63	19,4
1,5	0,75	5	0,09			19,90			1,8706	5,63	19,9
1,5	0,75	5	0,10			20,60			1,9776	5,63	20,6
1,5	0,75	5	0,08			20,30			1,7052	5,63	20,3
1,5	0,75	5	0,09			20,40			1,836	5,63	20,4
1,5	0,75	5	0,09			20,40			1,9176	5,63	20,4
1,5	0,75	5	0,10			21			2,058	5,63	21,0
1,5	0,75	5	0,10			19,9			1,9104	5,63	19,9
1,5	0,75	5	0,098			19,8			1,9404	5,63	19,8
1,5	0,75	5	0,128			20,2			2,5856	5,63	20,2
										0,00	
										0,00	
										0,00	
										0,00	
SUM MCx									524,6998		20,3 %

Test Load Weight:  lbs.      Dry Weight:  kg.

Average Moisture Content: %  
 Dry:  Dry(EPA) 20,14            Wet:   
                         Dry(B415) 20,14      **Must be 19-25**      **must be 15,2-22**

Coal Bed Range:  lbs.      to       lbs.

TEST CHARGE:      Coal bed weight:       lbs.

Project nu.	pi 20164
Date	15-03-2018
Technicien	<input type="text" value="m.m"/>

## Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,16 in. H2O  
 Barometer: 29,900 in. Hg

**Pour un tunnel de 12" et plus, prendre 6 lectures**

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=  
0,981

**Pour un tunnel moins de 12", prendre 4 lectures**

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,058	72,52	0,2408
B center	0,057	71,9	0,2387
A1	0,052	72,59	0,2280
A2	0,056	72,36	0,2366
A3	0,061	72,14	0,2470
A4	0,051	72,02	0,2258
B1	0,053	71,000	0,2302
B2	0,057	71,650	0,2387
B3	0,056	71,410	0,2366
B4	0,053	71,300	0,2302
AVERAGE	0,0554	71,8890	0,2353

<b>Project nu.</b>	pi 20164
<b>Date</b>	15-03-2018
<b>Technicien</b>	<span style="border: 1px solid red; padding: 2px;">m.m</span>

**Filter set weight**

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure	
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter			
Number	5	17	18	16	4	15	16	3	18	19	20	24	21			
Before (1)																
Before (2)																
Before (3)																
Before (4)																
Before (5)	61,5054	0,1260	0,1264	35,5896	61,3830	0,1267	0,1263	35,2010	108,9466	0,1265	0,1265	35,3251	0,1264	2018-03-14	19:00	
Before (6)	61,5054	0,1259	0,1264	35,5896	61,3831	0,1268	0,1264	35,2011	108,9467	0,1266	0,1264	35,3252	0,1263	2018-03-15	11:00	
After (1)	61,5070	0,1339	0,1226	35,5923	61,3842	0,1266	0,1265	35,2030	108,9487	0,1341	0,1256	35,3284	0,1265	2018-03-15	22:00	
After (2)	61,5059	0,1329	0,1261	35,5915	61,3833	0,1263	0,1264	35,2024	108,9474	0,1337	0,1253	35,3274	0,1265	2018-03-26	08:00	
After (3)	61,5059	0,1328	0,1261	35,5914	61,3833	0,1263	0,1264	35,2023	108,9474	0,1338	0,1253	35,3275	0,1264	2018-03-30	08:00	
After (4)																
After (5)																
After (6)	61,5059	0,1328	0,1261	35,5914	61,3833	0,1263	0,1264	35,2023	108,9474	0,1338	0,1253	35,3275	0,1264	2018-03-30	08:00	
Difference	0,0005	0,0069	-0,0003	0,0018	0,0002	-0,0005	0,0000	0,0012	0,0007	0,0072	-0,0011	0,0023	0,0001			
Total (mg)		8,9				9,8				9,1				0,1		
Total ajusté (mg)		<b>8,80</b>				<b>9,70</b>				<b>9,00</b>						

<b>Project nu.</b>	pi 20164
<b>Date</b>	15-03-2018
<b>Technicien</b>	m.m

# Demonstration purpose only not the real number, negative filter mass weight rounded to zero

## Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	5	17	18	16	4	15	16	3	18	19	20	24	21		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,5054	0,1260	0,1264	35,5896	61,3830	0,1267	0,1263	35,2010	108,9466	0,1265	0,1265	35,3251	0,1264	2018-03-14	19:00
Before (6)	61,5054	0,1259	0,1264	35,5896	61,3831	0,1268	0,1264	35,2011	108,9467	0,1266	0,1264	35,3252	0,1263	2018-03-15	11:00
After (1)	61,5070	0,1339	0,1226	35,5923	61,3842	0,1266	0,1265	35,2030	108,9487	0,1341	0,1256	35,3284	0,1265	2018-03-15	22:00
After (2)	61,5059	0,1329	0,1261	35,5915	61,3833	0,1263	0,1264	35,2024	108,9474	0,1337	0,1253	35,3274	0,1265	2018-03-26	08:00
After (3)	61,5059	0,1328	0,1261	35,5914	61,3833	0,1263	0,1264	35,2023	108,9474	0,1338	0,1253	35,3275	0,1264	2018-03-30	08:00
After (4)															
After (5)															
After (6)	61,5059	0,1328	0,1264	35,5914	61,3833	0,1268	0,1264	35,2023	108,9474	0,1338	0,1264	35,3275	0,1264	2018-03-30	08:00
Difference	0,0005	0,0069	0,0000	0,0018	0,0002	0,0000	0,0000	0,0012	0,0007	0,0072	0,0000	0,0023	0,0001		
Total (mg)		9,2				10,6				10,2			0,1		
Total ajusté (mg)		<b>9,10</b>				<b>10,50</b>				<b>10,10</b>					

<b>Project nu.</b>	pi 20164
<b>Date</b>	15-03-2018
<b>Technicien</b>	m.m

SFBA EPA EMISSION RESULTS

RESULTS

**Average emission rate:** 1,8 g/hr  
 Burn Rate : 1,180 Dry kg/hr

**Test Duration:** 500 min

PRESSURE FACTOR: DGM 1 0,95376  
 DGM 2 0,95368  
 DGM 3 0,98006

BAROMETRIC PRESSURE  
 Average: 29,323279 in Hg  
 Start: 29,264219 in Hg  
 End: 29,382339 in Hg

TEMPERATURE FACTORS DGM 1 0,99220  
 DGM 2 0,99117  
 DGM 3 0,99499

DGM CONTROLLER VALUES  
 DGM 1 Final: 22704,978 Cuft  
 Initial: 22607,778 Cuft

VOLUMES SAMPLED DGM 1 90,867 Scft  
 DGM 2 92,577 Scft  
 DGM 3 41,361 Scft

DGM 2 Final: 20716,928 Cuft  
 Initial: 20617,844 Cuft

DGM #3 Final: 84,250 Cuft  
 Initial: 41,250 Cuft

TOTAL TUNNEL VOLUME : 149423

TEMPERATURES  
 DGM 1 532,149 °R  
 DGM 2 532,706 °R

SAMPLE RATIOS  
 Sample Train 1: 1644,425  
 Sample Train 2: 1614,046

CALIBRATION FACTORS  
 DGM 1 0,9879  
 DGM 2 0,9884  
 DGM #3 0,9864

Paticulate concentration  
 Sample Train 1 **0,000108** g/dscf  
 Sample Train 2 **0,000098** g/dscf  
 Room **0,000002** g/dscf

TUNNEL FLOW RATE: 298,846 Dscfm

TOTAL EMISSIONS  
 Sample Train 1 **15,75** g  
 Sample Train 2 **14,33** g

PARTICULATE CATCH  
 Total Sample Train 1: 9,80 mg  
 Total Sample Train 2: 9,10 mg  
 Total Sample Train 1 1st hour: 8,90 mg

EMISSION RATES  
 Sample Train 1 **1,89** g/hr  
 Sample Train 2 **1,72** g/hr

1st hour emission rate **14,64** g/hr

DEVIATION: 4,75%

Cs Train 1 Train 2  
 0,0001079 9,82968E-05

Table with columns: Elapsed Time, Raw data row, Weight Remaining, CO, CO2, O2, \*1 Gas, \*2 Room Temp, \*3 Tunnel Dry Bulb, \*4 Unit Top, \*5 Unit Bottom, \*6 Unit R.Side, \*7 Unit L.Side, \*8 Unit Bottom, Mass flow 1, DGM 1, DGM 1, Filter 1, Mass flow 2, DGM 2, DGM 2, Filter 2, Tunnel Velo, Flue draft, Change in Surface. The table contains 95 rows of data, each representing a time interval from 0.00 to 95.00 minutes. Each row includes various flow and concentration measurements in different units.











500,0 760,0 0,0 2,0 6,2 190,5 138,4 69,4 71,7 144,8 172,9 182,8 175,1 277,0 0,18 70,40 70,96 70,21 0,19 70,76 71,53 70,14 0,06 0,02 -73,59336

Manufacturer: foyer supreme  
Model: 38 fsc

Run: 2  
Project #: pi 20164  
Test Duration: 500 min

Note: In the "Input data", "Calc. % O<sub>2</sub>", "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

Overall Heating Efficiency: 68,62%  
Combustion Efficiency: 93,59%  
Heat Transfer Efficiency: 73,31%

	HHV	LHV
Eff	68,62%	74,16%
Comb Eff	93,59%	93,59%
HT Eff	73,31%	79,24%
Output	16 050	kJ/h
Burn Rate	1,18	kg/h
Grams CO	876	g
Input	23 391	kJ/h
MC wet	16,76	

Ultimate CO<sub>2</sub>  
CO<sub>2-ult</sub> 19,64  
F<sub>0</sub> 1,062

Heat Output: 15 225 Btu/h  
Heat Input: 22 189 Btu/h  
Burn Duration: 8,33 h  
Burn Rate: 2,60 lb/h  
Stack Temp: 399,8 Deg. F

Averages			1,93	7,51	1,23	20,32	11,84	144,61	21,69	82,6%	75,4%	#DIV/0!
INPUT DATA			Oxygen Calculation					Input Data		Combust	Heat	Net
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO <sub>2</sub> [d]	Excess Air EA	Total O <sub>2</sub>	Calc. % O <sub>2</sub> [g]	Flue Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %	
0,00	11,82	0,38	3,66	385,9%	20,67	16,82	87,7	20,8	93,2%	78,1%	72,8%	
1,00	11,72	0,55	8,22	124,0%	20,36	11,86	106,6	20,9	95,1%	82,5%	78,5%	
2,00	11,62	0,65	3,69	353,3%	20,65	16,64	127,3	20,9	88,6%	71,4%	63,3%	
3,00	11,57	0,59	6,21	188,9%	20,49	13,99	159,3	20,7	93,3%	74,9%	69,8%	
4,00	11,49	0,78	7,53	136,5%	20,39	12,47	183,3	20,7	92,6%	74,9%	69,4%	
5,00	11,40	0,82	7,94	124,1%	20,36	12,01	202,4	20,9	92,5%	74,0%	68,4%	
6,00	11,31	0,77	8,02	123,4%	20,36	11,95	226,2	20,8	93,0%	72,1%	67,0%	
7,00	11,22	0,82	8,73	105,7%	20,31	11,17	246,4	20,9	93,2%	71,7%	66,8%	
8,00	11,08	0,75	9,23	96,9%	20,28	10,68	272,8	20,9	94,0%	70,5%	66,2%	
9,00	11,00	0,74	10,48	75,0%	20,20	9,35	295,4	20,9	94,7%	70,9%	67,1%	
10,00	10,85	0,71	11,09	66,4%	20,16	8,71	301,3	20,9	95,1%	71,3%	67,9%	
11,00	10,77	0,79	10,27	77,6%	20,21	9,54	289,3	20,9	94,2%	71,0%	66,9%	
12,00	10,68	0,86	9,00	99,1%	20,29	10,86	301,3	20,9	93,0%	67,8%	63,0%	
13,00	10,49	0,67	11,08	67,2%	20,16	8,75	340,7	20,9	95,4%	68,7%	65,5%	
14,00	10,40	0,53	12,83	47,1%	20,06	6,97	334,3	21,1	96,8%	71,5%	69,2%	
15,00	10,32	0,80	11,18	64,0%	20,15	8,57	315,8	21,0	94,6%	70,5%	66,7%	
16,00	10,23	1,01	9,68	83,8%	20,23	10,05	304,4	21,2	92,3%	68,8%	63,6%	
17,00	10,13	0,88	9,61	87,2%	20,25	10,19	297,2	21,1	93,2%	69,3%	64,6%	
18,00	10,04	0,90	9,53	88,3%	20,25	10,27	292,4	21,1	93,0%	69,5%	64,6%	
19,00	9,95	0,92	9,41	90,1%	20,26	10,39	286,1	21,2	92,8%	69,8%	64,7%	
20,00	9,86	1,04	9,05	94,6%	20,27	10,70	284,0	21,3	91,6%	69,2%	63,4%	
21,00	9,77	0,97	9,26	91,9%	20,26	10,51	283,9	21,2	92,3%	69,7%	64,3%	
22,00	9,68	0,87	9,71	85,7%	20,24	10,10	287,1	21,4	93,3%	70,2%	65,5%	
23,00	9,59	0,86	9,96	81,6%	20,23	9,84	287,8	21,4	93,6%	70,6%	66,1%	
24,00	9,49	0,87	10,02	80,3%	20,22	9,76	290,3	21,4	93,5%	70,5%	65,9%	
25,00	9,41	0,89	10,14	78,1%	20,21	9,63	295,0	21,4	93,5%	70,3%	65,7%	
26,00	9,32	0,84	10,68	70,5%	20,18	9,08	310,4	21,5	94,1%	70,1%	66,0%	
27,00	9,19	0,53	12,13	55,2%	20,10	7,71	332,1	21,4	96,7%	70,8%	68,4%	
28,00	9,09	0,48	13,42	41,3%	20,02	6,36	349,8	21,5	97,2%	71,3%	69,3%	
29,00	9,00	0,51	14,13	34,2%	19,97	5,59	361,6	21,5	97,2%	71,3%	69,3%	
30,00	8,87	0,48	14,38	32,2%	19,96	5,34	361,4	21,5	97,4%	71,6%	69,7%	
31,00	8,77	0,50	14,16	33,9%	19,97	5,56	357,5	21,5	97,2%	71,6%	69,6%	
32,00	8,68	0,45	13,88	37,1%	19,99	5,89	355,3	21,5	97,5%	71,5%	69,6%	
33,00	8,55	0,42	13,69	39,2%	20,01	6,11	350,3	21,6	97,6%	71,5%	69,8%	
34,00	8,45	0,48	13,81	37,4%	20,00	5,94	345,6	21,5	97,3%	71,9%	70,0%	
35,00	8,36	0,47	13,58	39,8%	20,01	6,19	342,0	21,6	97,3%	71,9%	70,0%	
36,00	8,32	0,46	13,42	41,5%	20,02	6,38	338,3	21,7	97,3%	71,9%	70,0%	
37,00	8,23	0,43	13,30	43,0%	20,03	6,51	335,5	21,6	97,5%	72,0%	70,2%	
38,00	8,14	0,41	13,22	44,1%	20,04	6,61	334,0	21,5	97,6%	72,0%	70,2%	
39,00	8,00	0,37	13,24	44,3%	20,04	6,62	332,5	21,5	97,8%	72,1%	70,5%	
40,00	7,91	0,35	13,22	44,7%	20,04	6,64	331,5	21,6	97,9%	72,2%	70,7%	
41,00	7,87	0,33	13,37	43,4%	20,04	6,50	331,3	21,7	98,1%	72,3%	71,0%	
42,00	7,78	0,32	13,54	41,8%	20,03	6,33	331,9	21,6	98,2%	72,5%	71,2%	
43,00	7,68	0,31	13,67	40,6%	20,02	6,20	332,4	21,6	98,3%	72,6%	71,3%	
44,00	7,55	0,31	13,82	39,1%	20,01	6,04	333,6	21,6	98,3%	72,7%	71,4%	
45,00	7,46	0,30	13,98	37,5%	20,00	5,86	337,0	21,7	98,3%	72,6%	71,4%	
46,00	7,37	0,30	14,19	35,5%	19,98	5,64	339,7	21,8	98,4%	72,7%	71,5%	
47,00	7,28	0,28	14,48	33,1%	19,97	5,35	343,1	21,8	98,5%	72,8%	71,7%	
48,00	7,19	0,28	14,82	30,1%	19,94	4,98	347,2	21,6	98,5%	72,9%	71,8%	
49,00	7,10	0,31	15,09	27,6%	19,92	4,68	351,0	21,7	98,4%	72,9%	71,7%	
50,00	7,00	0,31	15,23	26,4%	19,91	4,53	352,5	21,7	98,4%	72,9%	71,8%	
51,00	6,87	0,34	15,38	24,9%	19,90	4,35	354,0	21,7	98,3%	73,0%	71,7%	
52,00	6,83	0,36	15,45	24,3%	19,90	4,27	355,8	21,7	98,2%	72,9%	71,6%	
53,00	6,74	0,35	15,51	23,8%	19,89	4,21	357,0	21,7	98,2%	72,9%	71,6%	
54,00	6,60	0,34	15,53	23,7%	19,89	4,19	357,9	21,7	98,2%	72,9%	71,6%	
55,00	6,56	0,35	15,55	23,6%	19,89	4,17	360,3	21,7	98,2%	72,8%	71,5%	
56,00	6,44	0,38	15,66	22,5%	19,88	4,03	362,7	21,8	98,1%	72,8%	71,4%	
57,00	6,33	0,38	15,75	21,8%	19,87	3,94	366,0	21,8	98,1%	72,7%	71,3%	
58,00	6,25	0,39	15,69	22,2%	19,88	3,99	366,1	21,7	98,0%	72,6%	71,2%	
59,00	6,19	0,36	15,65	22,7%	19,88	4,06	366,9	21,6	98,2%	72,5%	71,2%	
60,00	6,06	0,35	15,62	23,0%	19,89	4,10	366,9	21,8	98,2%	72,5%	71,2%	
61,00	5,96	0,35	15,62	23,1%	19,89	4,10	367,3	21,7	98,2%	72,5%	71,2%	
62,00	5,88	0,33	15,63	23,1%	19,89	4,09	367,8	21,9	98,3%	72,5%	71,3%	
63,00	5,79	0,32	15,65	23,0%	19,89	4,08	367,0	21,6	98,4%	72,5%	71,4%	
64,00	5,70	0,30	15,65	23,2%	19,89	4,09	366,6	21,7	98,5%	72,6%	71,5%	
65,00	5,60	0,29	15,63	23,4%	19,89	4,11	367,5	21,8	98,5%	72,5%	71,4%	
66,00	5,56	0,30	15,68	22,9%	19,88	4,06	368,4	21,7	98,5%	72,5%	71,4%	
67,00	5,47	0,27	15,73	22,8%	19,88	4,02	368,6	21,8	98,6%	72,5%	71,6%	
68,00	5,34	0,27	15,68	23,1%	19,89	4,07	368,6	21,6	98,6%	72,5%	71,5%	
69,00	5,29	0,27	15,76	22,5%	19,88	3,99	368,2	21,6	98,7%	72,6%	71,6%	
70,00	5,19	0,27	15,72	22,9%	19,88	4,03	367,7	21,6	98,7%	72,6%	71,6%	
71,00	5,11	0,26	15,76	22,6%	19,88	3,99	367,6	21,7	98,7%	72,6%	71,7%	
72,00	5,02	0,26	15,74	22,7%	19,88	4,01	366,5	21,6	98,7%	72,7%	71,7%	
73,00	4,92	0,22	15,68	23,5%	19,89	4,10	366,8	21,8	98,9%	72,6%	71,8%	
74,00	4,83	0,21	15,71	23,3%	19,89	4,07	366,1	21,7	98,9%	72,7%	71,9%	
75,00	4,74	0,22	15,66	23,7%	19,89	4,12	364,3	21,8	98,9%	72,7%	71,9%	
76,00	4,70	0,22	15,60	24,2%	19,90	4,19	364,1	21,7	98,9%	72,7%	71,9%	
77,00	4,61	0,21	15,68	23,6%	19,89	4,11	364,4	22,0	99,0%	72,7%	72,0%	
78,00	4,52	0,22	15,73	23,2%	19,89	4,05	364,6	21,9	98,9%	72,8%	72,0%	
79,00	4,43	0,21	15,75	23,1%	19,89	4,03	363,8	22,0	98,9%	72,8%	72,1%	
80,00	4,34	0,21	15,70	23,5%	19,89	4,09	363,3	21,9	98,9%	72,8%	72,0%	
81,00	4,30	0,20	15,60	24,4%	19,90	4,20	361,8	22,0	99,0%	72,8%	72,1%	
82,00	4,20	0,17	15,58	24,7%	19,90	4,23	361,6	21,7	99,2%	72,8%	72,2%	
83,00	4,11	0,16	15,48	25,6%	19,91	4,34	360,6	21,8	99,2%	72,8%	72,2%	
84,00	4,02	0,15	15,48	25,7%	19,91	4,36	360,6	22,0	99,3%	72,8%	72,3%	
85,00	3,98	0,15	15,36	26,6%	19,92	4,48	360,6	21,7	99,3%	72,7%	72,1%	
86,00	3,89	0,14	15,40	26,4%	19,91	4,45	359,9	22,0	99,3%	72,8%	72,3%	
87,00	3,79	0,15	15,40	26,3%	19,91	4,44	360,4	22,0	99,3%	72,7%	72,2%	
88,00	3,75	0,15	15,50	25,6%	19,91	4,33	361,7	21,9	99,3%	72,7%	72,2%	
89,00	3,66	0,16	15,60	24,7%	19,90	4,22	362,1	22,0	99,2%	72,8%	72,2%	
90,00	3,57	0,17	15,60	24,6%	19,90	4,21	363,6	22,0	99,2%	72,7%	72,1%	
91,00	3,53	0,16	15,65	24,3%	19,90	4,17	362,2	21,9	99,2%	72,8%	72,3%	
92,00	3,43	0,13	15,40	26,5%	19,91	4,45	359,2	22,0	99,4%	72,8%	72,4%	

93,00	3,39	0,09	14,99	30,3%	19,94	4,91	353,9	22,0	99,6%	72,7%	72,4%
94,00	3,34	0,07	14,24	37,2%	19,99	5,72	348,5	21,8	99,7%	72,3%	72,1%
95,00	3,25	0,05	13,85	41,4%	20,02	6,15	344,8	22,0	99,9%	72,1%	72,0%
96,00	3,21	0,04	13,72	42,8%	20,03	6,29	341,2	22,2	99,9%	72,2%	72,1%
97,00	3,16	0,04	13,67	43,3%	20,03	6,35	338,9	22,2	99,9%	72,3%	72,2%
98,00	3,11	0,05	13,67	43,2%	20,03	6,34	336,6	21,8	99,8%	72,4%	72,3%
99,00	3,02	0,06	13,65	43,3%	20,03	6,36	335,1	22,0	99,8%	72,5%	72,3%
100,00	2,98	0,06	13,65	43,2%	20,03	6,35	333,2	22,0	99,8%	72,6%	72,4%
101,00	2,94	0,06	13,57	44,1%	20,04	6,44	331,7	21,9	99,8%	72,6%	72,4%
102,00	2,89	0,05	13,57	44,2%	20,04	6,45	329,8	22,1	99,8%	72,7%	72,6%
103,00	2,79	0,05	13,47	45,3%	20,05	6,55	327,3	21,8	99,8%	72,7%	72,6%
104,00	2,75	0,05	13,26	47,7%	20,06	6,78	325,5	22,1	99,9%	72,7%	72,6%
105,00	2,71	0,04	13,07	49,7%	20,07	6,98	322,6	22,2	99,9%	72,6%	72,5%
106,00	2,71	0,04	13,06	50,0%	20,08	7,00	321,1	22,2	99,9%	72,7%	72,6%
107,00	2,62	0,04	12,91	51,7%	20,08	7,16	319,5	21,9	99,9%	72,6%	72,5%
108,00	2,57	0,04	12,94	51,3%	20,08	7,12	318,6	21,9	99,9%	72,7%	72,6%
109,00	2,53	0,04	12,99	50,8%	20,08	7,07	316,9	21,8	99,9%	72,7%	72,8%
110,00	2,49	0,04	12,91	51,7%	20,08	7,16	315,1	22,2	99,9%	72,9%	72,8%
111,00	2,43	0,04	12,89	51,9%	20,09	7,18	313,5	22,1	99,9%	73,0%	72,9%
112,00	2,39	0,03	12,71	54,2%	20,10	7,37	310,5	21,9	100,0%	73,0%	72,9%
113,00	2,39	0,07	12,44	56,9%	20,11	7,63	305,9	21,9	99,7%	72,9%	72,7%
114,00	2,34	0,14	11,70	65,8%	20,16	8,38	298,7	22,0	99,2%	72,5%	71,9%
115,00	2,30	0,31	11,01	73,5%	20,19	9,03	292,4	21,9	97,9%	72,0%	70,5%
116,00	2,30	0,38	10,65	78,2%	20,21	9,38	286,0	22,0	97,3%	71,9%	70,0%
117,00	2,26	0,38	10,58	79,1%	20,22	9,44	280,5	22,2	97,3%	72,2%	70,3%
118,00	2,25	0,41	10,45	81,0%	20,22	9,57	275,2	22,1	97,1%	72,4%	70,3%
119,00	2,21	0,40	10,38	82,1%	20,23	9,64	270,5	22,1	97,1%	72,6%	70,5%
120,00	2,21	0,43	10,17	85,3%	20,24	9,85	265,5	22,3	96,8%	72,7%	70,4%
121,00	2,12	0,46	10,03	87,2%	20,25	9,98	260,7	22,0	96,6%	72,8%	70,3%
122,00	2,16	0,50	9,82	90,3%	20,26	10,19	256,5	22,2	96,2%	72,8%	70,0%
123,00	2,12	0,54	9,74	91,1%	20,26	10,25	251,9	22,2	95,9%	73,0%	70,0%
124,00	2,12	0,62	9,51	93,9%	20,27	10,45	246,7	21,8	95,1%	73,0%	69,4%
125,00	2,07	0,71	9,21	97,9%	20,28	10,72	242,0	22,0	94,3%	72,9%	68,8%
126,00	2,07	0,85	8,93	100,9%	20,29	10,94	236,6	22,2	93,0%	72,9%	67,8%
127,00	2,03	0,99	8,69	103,1%	20,30	11,12	232,1	22,2	91,8%	72,8%	66,8%
128,00	2,03	1,04	8,59	104,1%	20,30	11,20	226,7	22,2	91,3%	73,0%	66,7%
129,00	2,03	1,30	8,04	110,4%	20,32	11,64	221,2	21,8	88,8%	72,4%	64,3%
130,00	1,98	1,50	7,76	112,2%	20,33	11,82	215,7	22,0	86,9%	72,4%	62,9%
131,00	1,98	1,62	7,50	115,4%	20,34	12,03	210,5	21,8	85,6%	72,3%	61,9%
132,00	1,98	1,62	7,55	114,2%	20,33	11,98	205,7	22,1	85,7%	72,8%	62,4%
133,00	1,94	1,68	7,46	114,8%	20,34	12,03	201,6	21,7	85,1%	73,0%	62,1%
134,00	1,98	1,72	7,48	113,6%	20,33	11,99	197,9	22,1	84,9%	73,3%	62,3%
135,00	1,94	1,74	7,51	112,3%	20,33	11,95	193,8	21,9	84,8%	73,7%	62,5%
136,00	1,94	1,80	7,53	110,5%	20,32	11,89	190,3	22,0	84,4%	74,1%	62,5%
137,00	1,89	1,86	7,48	110,4%	20,32	11,91	187,3	22,0	83,9%	74,2%	62,3%
138,00	1,89	1,90	7,48	109,4%	20,32	11,89	183,9	22,0	83,6%	74,5%	62,3%
139,00	1,89	1,95	7,46	108,6%	20,32	11,88	181,0	21,8	83,2%	74,7%	62,2%
140,00	1,85	1,98	7,40	109,5%	20,32	11,93	178,3	21,8	82,9%	74,8%	62,0%
141,00	1,85	2,00	7,43	108,4%	20,32	11,89	175,8	22,0	82,9%	75,1%	62,2%
142,00	1,85	2,02	7,41	108,2%	20,32	11,89	173,6	22,1	82,7%	75,3%	62,2%
143,00	1,85	2,06	7,43	106,9%	20,31	11,85	171,1	21,8	82,4%	75,5%	62,2%
144,00	1,85	2,02	7,44	107,8%	20,32	11,87	168,7	22,0	82,7%	75,7%	62,6%
145,00	1,81	2,06	7,33	109,2%	20,32	11,96	166,6	22,0	82,2%	75,7%	62,3%
146,00	1,80	2,12	7,23	109,9%	20,32	12,03	164,2	21,9	81,6%	75,7%	61,8%
147,00	1,81	2,23	7,20	108,4%	20,32	12,01	162,1	22,0	80,9%	75,9%	61,4%
148,00	1,76	2,35	7,05	108,9%	20,32	12,09	160,1	21,8	79,8%	75,7%	60,4%
149,00	1,81	2,37	7,02	109,2%	20,32	12,12	157,6	21,8	79,6%	75,9%	60,4%
150,00	1,81	2,51	6,93	108,0%	20,32	12,13	155,5	21,7	78,6%	75,9%	59,6%
151,00	1,76	2,49	6,90	109,2%	20,32	12,18	153,4	21,7	78,6%	76,0%	59,8%
152,00	1,76	2,70	6,70	108,9%	20,32	12,27	151,3	21,9	76,9%	75,8%	58,3%
153,00	1,71	2,59	6,75	110,3%	20,32	12,28	149,4	21,8	77,7%	76,1%	59,2%
154,00	1,71	2,74	6,57	111,0%	20,33	12,39	147,1	21,8	76,3%	76,0%	58,0%
155,00	1,71	2,76	6,52	111,5%	20,33	12,42	145,3	21,9	76,1%	76,1%	57,9%
156,00	1,71	2,81	6,49	111,3%	20,33	12,43	143,4	21,8	75,7%	76,2%	57,7%
157,00	1,71	2,87	6,41	111,7%	20,33	12,48	141,8	22,1	75,1%	76,2%	57,3%
158,00	1,71	2,91	6,36	112,0%	20,33	12,52	140,2	21,9	74,8%	76,2%	57,0%
159,00	1,66	2,96	6,29	112,4%	20,33	12,56	138,7	22,0	74,4%	76,2%	56,7%
160,00	1,66	2,94	6,27	113,1%	20,33	12,59	137,2	21,6	74,4%	76,3%	56,8%
161,00	1,66	2,95	6,24	113,7%	20,33	12,62	135,6	21,7	74,3%	76,4%	56,8%
162,00	1,66	2,97	6,18	114,8%	20,34	12,68	134,1	22,2	74,0%	76,5%	56,6%
163,00	1,66	2,95	6,16	115,5%	20,34	12,70	132,5	22,0	74,0%	76,6%	56,7%
164,00	1,62	2,97	6,16	115,2%	20,34	12,69	131,4	21,8	73,9%	76,7%	56,7%
165,00	1,66	3,01	6,11	115,5%	20,34	12,73	130,0	22,1	73,6%	76,8%	56,5%
166,00	1,62	3,02	6,11	115,2%	20,34	12,72	128,9	22,2	73,5%	76,9%	56,5%
167,00	1,62	3,03	6,09	115,4%	20,34	12,73	127,8	22,4	73,4%	77,0%	56,5%
168,00	1,62	3,04	5,99	117,4%	20,34	12,83	126,4	22,4	73,1%	76,9%	56,2%
169,00	1,62	3,05	5,93	118,8%	20,35	12,89	124,9	22,0	72,8%	76,9%	56,0%
170,00	1,62	3,07	5,90	119,1%	20,35	12,92	123,7	21,8	72,6%	77,0%	55,9%
171,00	1,62	3,07	5,85	120,2%	20,35	12,97	122,6	21,9	72,4%	77,0%	55,8%
172,00	1,62	3,06	5,81	121,5%	20,35	13,01	121,5	21,9	72,4%	77,1%	55,8%
173,00	1,58	3,06	5,78	122,2%	20,36	13,05	120,3	21,9	72,3%	77,1%	55,8%
174,00	1,58	3,05	5,75	123,4%	20,36	13,09	119,3	21,7	72,3%	77,2%	55,8%
175,00	1,57	3,04	5,75	123,6%	20,36	13,09	118,2	21,5	72,4%	77,3%	55,9%
176,00	1,57	3,04	5,72	124,3%	20,36	13,13	117,8	21,4	72,2%	77,2%	55,8%
177,00	1,53	3,12	5,73	121,9%	20,36	13,06	117,4	21,3	71,8%	77,3%	55,5%
178,00	1,57	2,93	6,52	107,8%	20,32	12,33	116,6	21,3	75,1%	78,7%	59,1%
179,00	1,53	2,90	6,65	105,6%	20,31	12,20	116,0	21,6	75,6%	78,9%	59,7%
180,00	1,53	2,90	6,49	109,1%	20,32	12,38	115,4	21,8	75,2%	78,8%	59,2%
181,00	1,53	2,88	6,37	112,2%	20,33	12,51	115,1	21,8	75,0%	78,7%	59,0%
182,00	1,53	2,89	6,31	113,5%	20,33	12,58	114,7	21,8	74,8%	78,6%	58,8%
183,00	1,53	2,92	6,26	113,9%	20,33	12,61	114,7	21,5	74,5%	78,5%	58,4%
184,00	1,49	2,98	6,22	113,4%	20,33	12,62	114,5	21,9	74,1%	78,5%	58,1%
185,00	1,49	3,04	6,19	112,7%	20,33	12,62	114,1	21,5	73,6%	78,4%	57,7%
186,00	1,49	3,09	6,15	112,4%	20,33	12,63	113,8	22,2	73,2%	78,4%	57,4%
187,00	1,49	3,09	6,19	111,7%	20,33	12,59	114,1	21,8	73,4%	78,4%	57,5%
188,00	1,49	2,99	6,44	108,2%	20,32	12,38	114,1	21,9	74,5%	78,8%	58,8%
189,00	1,49	2,99	6,52	106,4%	20,31	12,29	114,2	21,8	74,7%	78,9%	59,0%
190,00	1,44	3,04	6,49	106,2%	20,31	12,30	114,0	22,1	74,4%	78,9%	58,7%
191,00	1,44	2,97	6,56	106,2%	20,31	12,27	113,8	22,3	74,9%	79,0%	59,2%
192,00	1,44	2,95	6,56	106,6%	20,31	12,28	113,4	22,0	75,1%	79,1%	59,4%
193,00	1,44	2,96	6,54	106,9%	20,31	12,29	113,2	21,6	75,0%	79,0%	59,3%
194,00	1,49	2,93	6,49	108,6%	20,32	12,37	112,7	21,6	75,0%	79,0%	59,3%
195,00	1,34	2,92	6,47	109,1%	20,32	12,38	112,2	21,5	75,0%	79,0%	59,3%
196,00	1,39	2,95	6,41	109,9%	20,32	12					

207,00	1,30	3,42	5,52	119,9%	20,35	13,13	101,4	21,6	69,5%	78,4%	54,5%
208,00	1,31	3,43	5,47	120,8%	20,35	13,17	100,6	21,8	69,3%	78,5%	54,4%
209,00	1,30	3,49	5,39	121,3%	20,35	13,22	99,9	22,0	68,7%	78,4%	53,9%
210,00	1,30	3,46	5,40	121,6%	20,35	13,22	99,4	22,0	68,9%	78,5%	54,1%
211,00	1,30	3,53	5,34	121,4%	20,35	13,25	98,9	22,0	68,3%	78,4%	53,6%
212,00	1,30	3,60	5,22	122,8%	20,36	13,34	98,2	21,9	67,6%	78,2%	52,9%
213,00	1,30	3,60	5,25	121,9%	20,36	13,31	97,8	21,9	67,7%	78,3%	53,0%
214,00	1,30	3,61	5,20	122,9%	20,36	13,35	97,0	21,8	67,5%	78,3%	52,8%
215,00	1,30	3,60	5,19	123,6%	20,36	13,38	96,4	22,0	67,5%	78,4%	52,9%
216,00	1,30	3,63	5,14	124,1%	20,36	13,41	95,8	21,6	67,2%	78,3%	52,6%
217,00	1,28	3,90	4,79	126,0%	20,37	13,62	95,4	21,7	64,6%	77,6%	50,1%
218,00	1,26	3,98	4,68	126,9%	20,37	13,70	94,7	21,8	63,7%	77,4%	49,3%
219,00	1,30	3,99	4,65	127,5%	20,37	13,73	94,3	21,8	63,6%	77,4%	49,2%
220,00	1,26	3,97	4,63	128,3%	20,37	13,75	93,7	21,6	63,6%	77,4%	49,2%
221,00	1,30	3,96	4,63	128,7%	20,37	13,76	92,9	21,5	63,6%	77,5%	49,3%
222,00	1,30	3,93	4,62	129,8%	20,38	13,79	92,5	21,6	63,7%	77,6%	49,4%
223,00	1,26	3,91	4,62	130,4%	20,38	13,81	92,3	21,7	63,8%	77,6%	49,5%
224,00	1,26	3,93	4,65	129,0%	20,37	13,76	91,8	21,7	63,9%	77,7%	49,6%
225,00	1,26	3,93	4,65	129,0%	20,37	13,76	91,4	21,8	63,9%	77,8%	49,7%
226,00	1,26	3,90	4,63	130,2%	20,38	13,79	90,9	21,3	63,9%	77,8%	49,7%
227,00	1,21	3,92	4,65	129,4%	20,37	13,77	90,6	21,8	63,9%	77,8%	49,8%
228,00	1,21	3,94	4,66	128,3%	20,37	13,74	90,2	21,2	63,9%	77,9%	49,7%
229,00	1,21	3,94	4,67	128,3%	20,37	13,74	89,7	21,7	63,9%	78,0%	49,8%
230,00	1,22	3,94	4,67	128,1%	20,37	13,73	89,2	21,5	63,8%	78,0%	49,8%
231,00	1,21	3,93	4,67	128,6%	20,37	13,74	88,8	21,6	63,9%	78,1%	49,9%
232,00	1,21	3,91	4,67	129,1%	20,37	13,75	88,5	21,5	64,0%	78,1%	50,0%
233,00	1,21	3,90	4,65	129,8%	20,38	13,77	88,2	21,5	64,0%	78,1%	50,0%
234,00	1,21	3,89	4,65	130,0%	20,38	13,78	87,6	21,4	64,0%	78,2%	50,1%
235,00	1,21	3,89	4,67	129,5%	20,37	13,76	87,1	21,3	64,1%	78,3%	50,2%
236,00	1,21	3,88	4,67	129,8%	20,38	13,77	86,7	21,8	64,2%	78,4%	50,3%
237,00	1,21	3,86	4,65	130,7%	20,38	13,80	86,3	21,6	64,2%	78,4%	50,3%
238,00	1,17	3,87	4,65	130,7%	20,38	13,79	86,0	21,6	64,2%	78,4%	50,3%
239,00	1,17	3,87	4,66	130,3%	20,38	13,78	85,4	21,6	64,2%	78,5%	50,4%
240,00	1,17	3,86	4,66	130,3%	20,38	13,78	85,0	21,4	64,2%	78,5%	50,4%
241,00	1,17	3,84	4,67	130,8%	20,38	13,79	84,8	21,5	64,3%	78,6%	50,6%
242,00	1,17	3,84	4,66	130,9%	20,38	13,79	84,3	21,5	64,3%	78,6%	50,6%
243,00	1,17	3,89	4,73	127,8%	20,37	13,69	83,9	21,5	64,3%	78,8%	50,7%
244,00	1,12	3,88	4,71	128,7%	20,37	13,72	83,6	21,5	64,3%	78,8%	50,7%
245,00	1,12	3,85	4,70	129,9%	20,38	13,76	83,1	22,2	64,4%	78,9%	50,8%
246,00	1,12	3,81	4,70	130,9%	20,38	13,78	82,6	22,3	64,6%	79,0%	51,0%
247,00	1,12	3,79	4,68	131,9%	20,38	13,81	82,3	21,8	64,6%	79,0%	51,1%
248,00	1,12	3,76	4,67	133,1%	20,38	13,84	82,0	22,0	64,8%	79,0%	51,2%
249,00	1,12	3,75	4,67	133,4%	20,38	13,84	81,7	21,4	64,8%	79,0%	51,2%
250,00	1,12	3,71	4,63	135,4%	20,39	13,90	81,7	21,9	64,8%	79,0%	51,2%
251,00	1,12	3,68	4,63	136,2%	20,39	13,92	81,3	21,8	65,0%	79,1%	51,4%
252,00	1,12	3,67	4,60	137,5%	20,39	13,96	81,0	21,5	64,9%	79,0%	51,3%
253,00	1,12	3,64	4,58	138,8%	20,40	13,99	80,7	21,7	65,0%	79,1%	51,4%
254,00	1,12	3,64	4,60	138,4%	20,40	13,97	80,6	21,7	65,1%	79,1%	51,5%
255,00	1,08	3,70	4,66	134,8%	20,39	13,87	80,4	22,1	65,0%	79,2%	51,5%
256,00	1,12	3,75	4,69	132,7%	20,38	13,82	80,2	21,5	64,9%	79,2%	51,4%
257,00	1,08	3,78	4,70	131,6%	20,38	13,79	80,0	21,4	64,8%	79,2%	51,3%
258,00	1,08	3,83	4,73	129,4%	20,37	13,73	79,8	21,4	64,6%	79,3%	51,2%
259,00	1,08	3,81	4,68	131,4%	20,38	13,79	79,8	21,4	64,5%	79,2%	51,1%
260,00	1,08	3,80	4,67	131,8%	20,38	13,81	79,5	21,2	64,6%	79,2%	51,1%
261,00	1,08	3,79	4,68	131,9%	20,38	13,81	79,7	21,5	64,6%	79,2%	51,2%
262,00	1,08	3,81	4,68	131,6%	20,38	13,80	79,5	21,4	64,6%	79,2%	51,1%
263,00	1,08	3,78	4,64	133,3%	20,38	13,85	79,1	21,3	64,6%	79,2%	51,2%
264,00	1,08	3,67	4,55	139,0%	20,40	14,01	78,9	21,4	64,7%	79,2%	51,2%
265,00	1,03	3,68	4,58	137,9%	20,39	13,98	78,7	21,3	64,8%	79,2%	51,4%
266,00	1,03	3,65	4,55	139,7%	20,40	14,03	78,6	21,4	64,8%	79,2%	51,4%
267,00	1,03	3,60	4,48	143,1%	20,41	14,13	78,2	21,3	64,8%	79,1%	51,3%
268,00	1,03	3,57	4,51	143,2%	20,41	14,11	77,8	21,3	65,1%	79,3%	51,6%
269,00	1,03	3,51	4,45	146,7%	20,41	14,21	77,1	21,3	65,2%	79,3%	51,7%
270,00	1,03	3,43	4,37	151,9%	20,43	14,34	77,2	21,3	65,3%	79,2%	51,7%
271,00	1,03	3,48	4,45	147,6%	20,42	14,22	77,1	22,9	65,3%	79,5%	52,0%
272,00	1,03	3,46	4,41	149,5%	20,42	14,28	76,8	21,8	65,3%	79,3%	51,8%
273,00	1,03	3,50	4,47	146,6%	20,41	14,20	77,0	21,7	65,3%	79,4%	51,8%
274,00	0,98	3,51	4,49	145,6%	20,41	14,17	76,7	21,6	65,4%	79,4%	51,9%
275,00	0,98	3,46	4,43	148,8%	20,42	14,25	76,8	21,5	65,4%	79,3%	51,9%
276,00	0,98	3,58	4,56	141,1%	20,40	14,05	76,8	21,5	65,2%	79,5%	51,9%
277,00	0,98	3,73	4,65	134,4%	20,39	13,87	76,0	21,4	64,8%	79,6%	51,6%
278,00	0,98	2,98	4,92	148,4%	20,42	14,00	74,6	21,4	70,0%	80,7%	56,5%
279,00	0,98	2,87	4,76	157,3%	20,44	14,24	73,6	21,3	70,1%	80,6%	56,5%
280,00	0,98	2,78	4,56	167,4%	20,46	14,50	72,9	21,2	69,9%	80,5%	56,3%
281,00	0,98	2,80	4,54	167,7%	20,46	14,52	73,2	21,3	69,7%	80,4%	56,0%
282,00	0,98	2,92	4,61	161,0%	20,44	14,38	73,4	21,3	69,2%	80,4%	55,7%
283,00	0,98	3,05	4,64	155,4%	20,43	14,27	73,6	21,3	68,5%	80,3%	55,0%
284,00	0,94	3,15	4,64	152,3%	20,43	14,21	73,6	21,2	67,9%	80,2%	54,5%
285,00	0,98	3,20	4,59	152,2%	20,43	14,24	73,7	21,3	67,5%	80,1%	54,1%
286,00	0,94	3,24	4,58	151,1%	20,42	14,22	73,8	21,1	67,2%	80,1%	53,8%
287,00	0,98	3,16	4,70	150,1%	20,42	14,15	73,7	21,2	68,1%	80,3%	54,7%
288,00	0,94	3,09	4,84	147,6%	20,42	14,03	73,7	21,1	69,1%	80,6%	55,6%
289,00	0,94	3,06	4,86	147,9%	20,42	14,02	73,5	21,2	69,3%	80,7%	55,9%
290,00	0,94	3,06	4,80	149,9%	20,42	14,09	73,5	21,2	69,1%	80,6%	55,7%
291,00	0,94	3,08	4,74	151,2%	20,42	14,14	73,4	21,2	68,7%	80,5%	55,3%
292,00	0,94	3,14	4,69	151,0%	20,42	14,17	72,7	21,1	68,2%	80,4%	54,8%
293,00	0,94	3,23	4,41	156,9%	20,44	14,41	72,2	23,3	66,5%	80,2%	53,4%
294,00	0,94	3,28	4,28	159,6%	20,44	14,52	71,8	21,9	65,7%	79,9%	52,5%
295,00	0,94	3,49	4,49	146,3%	20,41	14,18	72,1	21,6	65,4%	80,0%	52,3%
296,00	0,94	3,52	4,47	145,8%	20,41	14,18	71,8	21,5	65,2%	80,0%	52,2%
297,00	0,89	2,99	4,89	149,2%	20,42	14,03	70,6	21,6	69,8%	81,1%	56,6%
298,00	0,89	3,09	4,81	148,9%	20,42	14,07	70,9	21,5	69,0%	80,9%	55,8%
299,00	0,89	3,66	4,77	133,0%	20,38	13,78	71,6	21,4	65,6%	80,4%	52,8%
300,00	0,89	3,35	5,27	127,9%	20,37	13,43	71,9	21,5	69,1%	81,3%	56,1%
301,00	0,85	3,02	6,50	106,2%	20,31	12,29	72,3	21,4	74,5%	82,7%	61,7%
302,00	0,85	2,57	7,30	99,1%	20,29	11,71	72,5	21,4	79,0%	83,6%	66,0%
303,00	0,85	2,29	7,92	92,3%	20,27	11,20	72,6	21,2	81,8%	84,1%	68,9%
304,00	0,85	2,20	8,04	91,8%	20,26	11,12	72,8	21,3	82,6%	84,3%	69,6%
305,00	0,85	2,17	8,02	92,6%	20,27	11,16	72,6	21,3	82,7%	84,3%	69,7%
306,00	0,85	2,14	8,01	93,6%	20,27	11,20	73,4	21,4	82,9%	84,2%	69,8%
307,00	0,85	2,10	7,96	95,3%	20,28	11,27	73,5	21,3	83,0%	84,2%	69,9%
308,00	0,81	2,09	7,86	97,5%	20,28	11,38	74,1	21,3	83,0%	84,1%	69,8%
309,00	0,85	2,10	7,70	100,5%	20,29	11,55	74,4	21,2	82,6%	84,0%	69,4%
310,00	0,81	2,09	7,53	104,3%	20,31	11,73	74,9	21,3	82,4%	83,8%	69,1%
311,00											



321,00	0,76	1,93	7,05	118,7%	20,35	12,33	76,7	21,6	82,6%	83,4%	68,9%
322,00	0,72	1,90	7,07	119,0%	20,35	12,33	76,6	21,8	82,9%	83,5%	69,2%
323,00	0,72	1,89	7,02	120,5%	20,35	12,39	76,3	21,4	82,8%	83,5%	69,1%
324,00	0,72	1,88	6,95	122,4%	20,36	12,47	76,0	21,5	82,8%	83,4%	69,1%
325,00	0,72	1,86	6,90	124,2%	20,36	12,53	76,0	21,6	82,9%	83,4%	69,1%
326,00	0,72	1,84	6,80	127,4%	20,37	12,65	75,8	21,5	82,9%	83,4%	69,1%
327,00	0,72	1,85	6,57	133,3%	20,38	12,89	75,7	21,5	82,3%	83,2%	68,5%
328,00	0,72	1,90	6,49	134,2%	20,39	12,95	75,6	21,5	81,8%	83,1%	67,9%
329,00	0,66	1,89	6,46	135,2%	20,39	12,99	75,4	21,4	81,7%	83,1%	67,9%
330,00	0,67	1,86	6,46	136,0%	20,39	13,00	75,1	21,4	82,0%	83,1%	68,1%
331,00	0,70	1,86	6,41	137,5%	20,39	13,05	74,9	21,3	81,8%	83,1%	68,0%
332,00	0,66	1,88	6,39	137,5%	20,39	13,06	74,4	21,4	81,7%	83,1%	67,9%
333,00	0,66	1,84	6,06	148,6%	20,42	13,44	74,1	21,4	81,3%	82,9%	67,3%
334,00	0,67	1,88	5,56	164,2%	20,45	13,95	73,7	21,3	79,8%	82,4%	65,7%
335,00	0,67	1,92	5,57	162,2%	20,45	13,92	73,2	21,3	79,5%	82,4%	65,5%
336,00	0,66	1,96	5,67	157,7%	20,44	13,79	72,9	21,4	79,4%	82,5%	65,5%
337,00	0,66	1,96	5,70	156,5%	20,43	13,75	72,4	21,3	79,5%	82,6%	65,6%
338,00	0,66	1,93	5,68	158,0%	20,44	13,79	72,2	21,2	79,7%	82,6%	65,8%
339,00	0,67	1,90	5,71	158,0%	20,44	13,77	71,8	21,4	80,0%	82,7%	66,2%
340,00	0,67	1,89	5,65	160,4%	20,44	13,84	71,5	21,3	79,9%	82,7%	66,0%
341,00	0,62	1,87	5,63	161,8%	20,44	13,88	71,2	21,3	80,0%	82,7%	66,2%
342,00	0,62	1,90	5,63	160,9%	20,44	13,86	71,0	21,3	79,8%	82,7%	66,0%
343,00	0,66	1,90	5,60	162,0%	20,45	13,90	70,9	21,3	79,7%	82,7%	65,9%
344,00	0,66	1,92	5,63	159,9%	20,44	13,85	70,7	21,3	79,6%	82,7%	65,8%
345,00	0,62	1,92	5,63	160,0%	20,44	13,85	70,5	21,2	79,6%	82,7%	65,8%
346,00	0,62	1,94	5,66	158,3%	20,44	13,80	70,3	21,2	79,5%	82,8%	65,8%
347,00	0,62	1,94	5,63	159,4%	20,44	13,84	69,9	21,3	79,5%	82,8%	65,8%
348,00	0,62	1,98	5,59	159,7%	20,44	13,87	69,9	21,3	79,0%	82,7%	65,4%
349,00	0,62	2,01	5,58	158,8%	20,44	13,85	69,8	21,4	78,8%	82,7%	65,2%
350,00	0,62	2,02	5,49	161,8%	20,44	13,95	69,3	21,5	78,5%	82,7%	64,9%
351,00	0,62	2,04	5,53	159,3%	20,44	13,89	69,0	21,8	78,4%	82,8%	64,9%
352,00	0,62	2,06	5,44	162,0%	20,44	13,98	69,0	21,3	78,0%	82,6%	64,4%
353,00	0,58	2,05	5,37	164,9%	20,45	14,06	68,7	21,6	77,9%	82,6%	64,4%
354,00	0,58	1,96	5,36	168,6%	20,46	14,12	68,5	21,3	78,6%	82,6%	65,0%
355,00	0,58	1,94	5,55	162,2%	20,45	13,93	68,0	21,5	79,2%	82,9%	65,7%
356,00	0,58	1,94	5,54	162,7%	20,45	13,94	67,7	21,5	79,2%	82,9%	65,7%
357,00	0,58	1,92	5,50	164,8%	20,45	13,99	67,5	21,3	79,3%	82,9%	65,7%
358,00	0,58	1,93	5,53	163,3%	20,45	13,95	67,4	21,3	79,3%	83,0%	65,8%
359,00	0,58	1,96	5,50	163,4%	20,45	13,97	67,1	21,3	79,0%	82,9%	65,5%
360,00	0,58	1,96	5,50	163,3%	20,45	13,97	66,9	21,3	79,0%	83,0%	65,5%
361,00	0,58	1,92	5,55	162,8%	20,45	13,93	66,7	21,2	79,4%	83,1%	65,9%
362,00	0,58	1,91	5,60	161,4%	20,44	13,89	66,3	21,1	79,6%	83,1%	66,2%
363,00	0,53	1,96	5,53	162,3%	20,45	13,93	66,0	21,1	79,1%	83,1%	65,7%
364,00	0,53	1,99	5,45	164,0%	20,45	14,00	65,8	21,1	78,6%	83,0%	65,2%
365,00	0,53	2,15	5,29	164,2%	20,45	14,09	65,5	21,3	76,9%	82,8%	63,6%
366,00	0,53	2,21	5,12	167,7%	20,46	14,23	65,4	21,2	75,9%	82,5%	62,6%
367,00	0,53	2,21	5,11	168,2%	20,46	14,24	65,3	21,2	75,9%	82,5%	62,6%
368,00	0,53	2,24	5,07	168,6%	20,46	14,26	65,2	21,0	75,6%	82,4%	62,3%
369,00	0,53	2,24	5,01	170,8%	20,46	14,33	65,1	21,0	75,3%	82,4%	62,0%
370,00	0,53	2,27	4,96	171,4%	20,46	14,36	65,1	20,9	75,0%	82,3%	61,7%
371,00	0,53	2,32	4,93	171,2%	20,46	14,38	65,0	21,0	74,5%	82,2%	61,3%
372,00	0,53	2,39	4,85	171,4%	20,46	14,42	64,8	21,0	73,7%	82,1%	60,5%
373,00	0,53	2,56	4,67	172,0%	20,46	14,52	64,7	21,6	71,9%	81,8%	58,8%
374,00	0,53	2,51	4,70	172,5%	20,46	14,51	64,5	21,4	72,3%	81,9%	59,2%
375,00	0,53	2,53	4,70	171,7%	20,46	14,50	64,1	21,5	72,2%	81,9%	59,2%
376,00	0,49	2,40	4,69	177,1%	20,47	14,58	63,8	21,1	73,0%	82,0%	59,9%
377,00	0,49	2,35	4,67	180,1%	20,48	14,64	63,5	21,5	73,4%	82,1%	60,3%
378,00	0,49	2,36	4,54	184,8%	20,48	14,77	63,4	21,4	72,8%	81,9%	59,6%
379,00	0,49	2,47	4,32	189,2%	20,49	14,94	63,3	21,3	71,1%	81,5%	58,0%
380,00	0,49	2,49	4,29	189,5%	20,49	14,95	63,1	21,2	70,9%	81,5%	57,7%
381,00	0,49	2,51	4,31	188,1%	20,49	14,93	62,8	21,1	70,8%	81,5%	57,7%
382,00	0,49	2,55	4,33	185,9%	20,49	14,89	62,5	21,2	70,6%	81,5%	57,6%
383,00	0,49	2,56	4,28	187,4%	20,49	14,93	62,2	21,1	70,4%	81,5%	57,3%
384,00	0,49	2,53	4,29	188,4%	20,49	14,94	61,9	21,2	70,6%	81,6%	57,6%
385,00	0,49	2,42	4,38	188,7%	20,49	14,90	61,8	21,2	71,7%	81,8%	58,7%
386,00	0,46	2,34	4,45	189,2%	20,49	14,87	61,4	21,0	72,6%	82,0%	59,6%
387,00	0,49	2,13	4,67	188,9%	20,49	14,76	61,3	21,1	75,1%	82,5%	61,9%
388,00	0,49	1,99	4,79	189,9%	20,49	14,71	61,2	21,0	76,6%	82,8%	63,4%
389,00	0,47	2,01	4,64	195,4%	20,50	14,86	61,0	21,0	75,9%	82,6%	62,7%
390,00	0,49	2,04	4,49	200,7%	20,51	15,00	60,9	21,0	75,2%	82,4%	61,9%
391,00	0,44	2,03	4,49	201,3%	20,51	15,01	60,8	20,9	75,2%	82,4%	62,0%
392,00	0,49	2,01	4,50	201,5%	20,51	15,00	60,6	21,0	75,4%	82,4%	62,2%
393,00	0,44	2,01	4,49	202,4%	20,51	15,02	60,5	20,9	75,4%	82,4%	62,1%
394,00	0,44	1,75	4,68	205,4%	20,52	14,96	60,4	20,9	78,3%	82,9%	64,9%
395,00	0,44	1,43	5,34	190,3%	20,49	14,44	60,0	20,9	83,1%	83,9%	69,8%
396,00	0,44	1,34	5,62	182,1%	20,48	14,19	59,9	20,9	84,6%	84,3%	71,3%
397,00	0,40	1,33	5,64	182,0%	20,48	14,18	59,8	22,3	84,8%	84,5%	71,6%
398,00	0,40	1,32	5,57	184,9%	20,48	14,25	59,5	21,4	84,7%	84,3%	71,4%
399,00	0,40	1,32	5,62	183,0%	20,48	14,20	59,6	21,2	84,8%	84,4%	71,5%
400,00	0,44	1,37	5,49	186,3%	20,49	14,31	59,5	21,4	84,0%	84,2%	70,7%
401,00	0,40	1,24	5,44	193,7%	20,50	14,43	59,6	21,3	85,2%	84,3%	71,8%
402,00	0,40	1,00	5,67	194,4%	20,50	14,33	59,5	21,4	88,1%	84,7%	74,6%
403,00	0,40	0,94	5,87	188,3%	20,49	14,15	59,5	21,2	89,0%	84,9%	75,5%
404,00	0,40	0,94	5,93	185,7%	20,49	14,08	59,2	21,2	89,2%	84,9%	75,7%
405,00	0,40	0,95	5,95	184,7%	20,48	14,06	59,2	21,2	89,1%	84,9%	75,7%
406,00	0,40	0,94	5,93	185,9%	20,49	14,08	59,1	21,1	89,2%	84,9%	75,8%
407,00	0,40	0,94	5,89	187,6%	20,49	14,13	58,9	21,0	89,0%	84,9%	75,6%
408,00	0,40	0,99	5,84	187,5%	20,49	14,15	59,1	21,1	88,4%	84,8%	75,0%
409,00	0,40	1,05	5,81	186,5%	20,49	14,16	59,1	21,0	87,9%	84,7%	74,5%
410,00	0,38	1,06	5,77	187,3%	20,49	14,18	59,1	21,0	87,6%	84,7%	74,2%
411,00	0,40	1,08	5,74	188,0%	20,49	14,21	59,1	21,0	87,4%	84,7%	74,0%
412,00	0,36	1,07	5,74	188,2%	20,49	14,21	59,0	20,9	87,5%	84,7%	74,1%
413,00	0,36	1,08	5,76	187,4%	20,49	14,19	59,0	20,9	87,5%	84,7%	74,1%
414,00	0,40	1,09	5,78	186,2%	20,49	14,17	58,9	20,9	87,4%	84,7%	74,0%
415,00	0,36	1,10	5,79	185,3%	20,49	14,15	58,9	21,0	87,3%	84,7%	74,0%
416,00	0,36	1,11	5,79	184,5%	20,48	14,14	58,8	20,9	87,2%	84,7%	73,8%
417,00	0,36	1,10	5,79	185,2%	20,49	14,15	58,5	20,9	87,3%	84,7%	74,0%
418,00	0,36	1,10	5,79	185,0%	20,48	14,14	58,5	20,9	87,3%	84,7%	74,0%
419,00	0,36	1,13	5,63	190,5%	20,49	14,30	58,4	20,9	86,7%	84,6%	73,3%
420,00	0,36	1,18	5,58	190,8%	20,49	14,33	58,3	20,9	86,1%	84,5%	72,8%
421,00	0,36	1,20	5,56	190,3%	20,49	14,33	58,0	21,9	85,8%	84,6%	72,6%
422,00	0,36	1,23	5,51	191,3%	20,49	14,37	57,7	21,5	85,4%	84,6%	72,3%
423,00	0,30	1,27	5,53	189,0%	20,49	14,33	57,7	21,3	85,1%	84,5%	72,0%
424,00	0,30	1,29	5,53	188,0%	20,49	14,32	57,5	21,3	84,9%	84,5%	#DIV/0!
425,00											

435,00	0,26	1,53	5,40	183,4%	20,48	14,32	56,0	20,9	82,4%	84,4%	69,5%
436,00	0,26	1,55	5,46	180,2%	20,48	14,24	55,8	20,8	82,3%	84,4%	69,4%
437,00	0,26	1,62	5,42	178,9%	20,47	14,24	55,7	20,9	81,6%	84,3%	68,8%
438,00	0,26	1,57	5,54	176,5%	20,47	14,15	55,5	20,9	82,3%	84,5%	69,6%
439,00	0,26	1,56	5,65	172,3%	20,46	14,03	55,3	20,9	82,6%	84,6%	69,9%
440,00	0,26	1,63	5,56	173,5%	20,47	14,10	55,2	20,8	81,9%	84,5%	69,2%
441,00	0,26	1,63	5,44	177,8%	20,47	14,22	55,2	20,8	81,5%	84,4%	68,8%
442,00	0,26	1,64	5,31	182,9%	20,48	14,36	55,0	20,8	81,1%	84,3%	68,4%
443,00	0,21	1,66	5,24	184,6%	20,48	14,41	54,9	20,8	80,8%	84,2%	68,0%
444,00	0,21	1,69	5,17	186,1%	20,49	14,47	54,8	21,8	80,3%	84,3%	67,7%
445,00	0,21	1,72	5,14	186,3%	20,49	14,49	54,8	21,4	80,0%	84,2%	67,3%
446,00	0,21	1,74	5,19	183,3%	20,48	14,42	54,5	21,0	79,9%	84,2%	67,3%
447,00	0,21	1,78	5,19	181,6%	20,48	14,40	54,4	21,2	79,6%	84,2%	67,0%
448,00	0,21	1,81	5,16	181,9%	20,48	14,42	54,4	21,1	79,3%	84,1%	66,7%
449,00	0,21	1,88	5,05	183,6%	20,48	14,50	54,4	21,1	78,3%	84,0%	65,8%
450,00	0,21	1,90	5,09	180,7%	20,48	14,43	54,3	21,0	78,3%	84,0%	65,7%
451,00	0,21	1,90	5,21	176,4%	20,47	14,31	54,1	20,9	78,7%	84,1%	66,2%
452,00	0,21	1,87	5,33	172,8%	20,46	14,20	54,3	20,9	79,2%	84,2%	66,7%
453,00	0,21	1,86	5,44	169,3%	20,46	14,09	54,4	20,9	79,6%	84,3%	67,2%
454,00	0,21	1,83	5,54	166,6%	20,45	14,00	54,4	20,9	80,1%	84,4%	67,6%
455,00	0,21	1,85	5,59	164,1%	20,45	13,94	54,4	20,9	80,1%	84,4%	67,6%
456,00	0,21	1,85	5,54	166,1%	20,45	13,99	54,6	20,8	80,0%	84,4%	67,5%
457,00	0,21	1,87	5,50	166,2%	20,45	14,01	54,6	20,9	79,6%	84,3%	67,2%
458,00	0,21	1,88	5,45	167,9%	20,46	14,06	54,7	20,8	79,5%	84,3%	67,0%
459,00	0,17	1,91	5,46	166,8%	20,45	14,04	54,9	20,7	79,3%	84,2%	66,7%
460,00	0,21	1,94	5,39	167,9%	20,46	14,10	55,1	20,8	78,8%	84,1%	66,3%
461,00	0,17	1,96	5,34	169,0%	20,46	14,14	55,2	20,8	78,5%	84,1%	66,0%
462,00	0,21	2,00	5,32	168,2%	20,46	14,13	55,1	20,7	78,2%	84,0%	65,7%
463,00	0,17	1,98	5,37	167,1%	20,45	14,09	55,2	20,7	78,5%	84,1%	65,9%
464,00	0,17	1,95	5,42	166,4%	20,45	14,06	55,2	20,6	78,8%	84,1%	66,3%
465,00	0,17	1,95	5,41	167,0%	20,45	14,07	55,4	21,1	78,8%	84,1%	66,3%
466,00	0,17	1,94	5,42	166,6%	20,45	14,06	55,2	21,3	78,9%	84,2%	66,4%
467,00	0,17	1,95	5,45	165,3%	20,45	14,02	55,2	20,9	78,9%	84,2%	66,4%
468,00	0,13	1,98	5,41	165,7%	20,45	14,05	55,2	21,1	78,6%	84,1%	66,1%
469,00	0,13	2,05	5,27	168,1%	20,46	14,16	55,2	21,0	77,6%	83,9%	65,1%
470,00	0,13	2,11	5,24	167,1%	20,45	14,16	55,2	21,2	77,0%	83,9%	64,6%
471,00	0,13	2,12	5,18	168,9%	20,46	14,22	55,3	20,8	76,8%	83,8%	64,3%
472,00	0,13	2,14	5,15	169,5%	20,46	14,24	55,3	20,9	76,5%	83,7%	64,1%
473,00	0,13	2,09	5,18	170,3%	20,46	14,24	55,2	20,9	77,0%	83,8%	64,6%
474,00	0,13	1,99	5,49	162,6%	20,45	13,96	55,0	20,8	78,7%	84,2%	66,2%
475,00	0,13	2,02	5,62	157,3%	20,44	13,81	55,1	20,9	78,8%	84,3%	66,4%
476,00	0,13	2,02	5,62	157,3%	20,44	13,81	55,1	20,8	78,8%	84,3%	66,4%
477,00	0,13	1,99	5,54	160,9%	20,44	13,91	54,9	20,9	78,8%	84,2%	66,4%
478,00	0,08	1,86	5,54	165,7%	20,45	13,99	54,8	20,8	79,9%	84,3%	67,4%
479,00	0,08	1,90	5,70	158,3%	20,44	13,78	54,8	20,8	79,9%	84,5%	67,5%
480,00	0,08	1,95	5,83	152,6%	20,43	13,62	54,8	20,7	79,9%	84,5%	67,5%
481,00	0,08	1,96	5,85	151,6%	20,42	13,60	54,7	20,8	79,8%	84,5%	67,5%
482,00	0,08	1,95	5,83	152,4%	20,43	13,62	54,6	20,7	79,9%	84,5%	67,5%
483,00	0,08	1,93	5,81	153,7%	20,43	13,65	54,4	20,7	80,0%	84,5%	67,6%
484,00	0,12	1,90	5,80	155,3%	20,43	13,69	54,4	20,8	80,2%	84,6%	67,8%
485,00	0,08	1,86	5,80	156,5%	20,43	13,71	54,4	20,7	80,5%	84,6%	68,1%
486,00	0,08	1,86	5,80	156,6%	20,43	13,71	54,5	20,7	80,5%	84,6%	68,1%
487,00	0,08	1,88	5,78	156,4%	20,43	13,71	54,9	22,0	80,3%	84,6%	68,0%
488,00	0,08	1,89	5,83	154,5%	20,43	13,66	55,4	21,3	80,3%	84,6%	67,9%
489,00	0,08	1,84	6,13	146,5%	20,41	13,37	56,0	21,1	81,4%	84,7%	69,0%
490,00	0,04	1,78	6,33	142,3%	20,40	13,19	56,4	21,3	82,3%	84,9%	69,9%
491,00	0,08	1,79	6,42	139,1%	20,40	13,08	56,6	21,2	82,5%	84,9%	70,0%
492,00	0,04	1,74	6,26	145,6%	20,41	13,28	56,9	21,1	82,5%	84,8%	70,0%
493,00	0,04	1,79	6,16	147,2%	20,42	13,36	57,2	21,1	81,9%	84,7%	69,4%
494,00	0,04	1,78	6,24	144,8%	20,41	13,28	57,5	21,0	82,1%	84,7%	69,6%
495,00	0,04	1,82	6,31	141,8%	20,40	13,19	57,8	21,0	82,0%	84,7%	69,4%
496,00	0,04	1,89	6,36	138,2%	20,40	13,09	58,0	21,0	81,6%	84,6%	69,0%
497,00	0,04	1,90	6,32	138,8%	20,40	13,12	58,2	20,9	81,4%	84,6%	68,9%
498,00	0,04	1,93	6,32	138,0%	20,39	13,11	58,7	20,9	81,2%	84,5%	68,6%
499,00	0,04	1,98	6,33	136,5%	20,39	13,08	58,8	20,8	80,8%	84,5%	68,3%
500,00	0,00	2,02	6,24	137,7%	20,39	13,14	59,1	20,8	80,3%	84,3%	67,7%

Time acquisition minutes	Flue	Room	Tunnel	scale	Tunnel Velocity	Flue draft	Right	Back	bottom	Top
	temp	temp	dry bulb		Pressure	Pressure				
	°F	°F	°F	lbs	in. Wc	in. Wc	°F	°F	°F	°F
1	72,52	68,32	71,37	31,43	0,0541	0,00	75,80	75,68	74,69	72,14
2	82,12	68,22	71,53	31,32	0,0553	0,01	75,81	75,61	74,74	78,69
3	88,81	68,34	71,40	31,42	0,0541	0,01	76,26	76,62	74,89	84,72
4	90,54	68,23	71,30	31,36	0,0553	0,01	76,57	77,85	75,05	86,78
5	94,75	68,30	71,23	31,33	0,0538	0,01	76,79	78,62	75,27	92,68
6	98,00	68,22	71,29	31,32	0,0543	0,01	77,14	79,04	75,50	98,00
7	101,42	68,39	72,86	31,32	0,0548	0,01	77,27	79,43	75,80	100,89
8	109,60	68,25	73,08	31,23	0,0543	0,01	78,02	79,65	76,09	111,64
9	126,73	68,38	73,75	31,23	0,0551	0,02	78,73	79,96	76,50	137,02
10	183,34	68,27	76,06	31,02	0,0538	0,03	79,58	80,35	76,89	221,42
11	218,19	68,41	77,26	30,91	0,0548	0,04	80,67	80,89	77,39	280,30
12	210,71	68,36	76,83	30,92	0,0551	0,04	82,05	81,82	78,16	258,57
13	227,93	68,31	77,95	30,72	0,0548	0,04	83,75	83,12	79,23	260,86
14	232,97	68,28	78,30	30,63	0,0531	0,04	85,96	84,89	80,50	264,52
15	249,82	68,25	79,48	30,42	0,0553	0,04	88,41	87,30	81,81	275,28
16	296,51	68,29	82,25	30,32	0,0543	0,06	90,93	89,83	83,09	341,28
17	430,58	68,28	91,11	30,12	0,0536	0,07	94,05	93,43	84,39	571,28
18	490,43	68,26	97,41	29,83	0,0536	0,08	96,95	97,61	85,54	678,33
19	522,03	68,33	96,03	30,02	0,0538	0,08	100,61	102,89	86,53	691,78
20	612,96	68,36	107,90	29,41	0,0529	0,09	104,49	107,45	87,53	781,65
21	624,91	68,63	106,40	29,12	0,0537	0,09	110,36	113,01	88,55	800,27
22	640,30	68,56	109,17	28,93	0,0538	0,09	117,24	116,96	89,38	817,68
23	677,60	68,86	112,71	28,62	0,0541	0,09	123,45	120,52	90,45	834,79
24	711,61	68,83	118,24	28,43	0,0529	0,09	128,98	124,06	91,42	855,86
25	760,45	69,02	124,44	28,04	0,0534	0,10	134,87	128,51	92,43	903,20
26	796,26	69,01	130,07	27,82	0,0510	0,10	140,84	135,79	93,52	933,94
27	791,51	69,06	123,16	27,53	0,0512	0,10	144,93	143,07	94,78	931,69
28	726,61	69,20	116,46	27,34	0,0531	0,09	144,56	148,27	95,96	872,30
29	664,79	69,18	112,09	27,18	0,0531	0,09	143,24	146,88	97,17	796,41
30	630,22	69,15	110,38	27,02	0,0531	0,09	141,10	144,25	98,26	733,68
31	602,51	69,11	109,07	26,92	0,0529	0,09	140,50	142,52	99,43	693,32
32	457,53	69,07	149,25	26,92	0,0474	0,05	138,76	135,81	100,72	562,35
33	385,99	69,00	150,44	26,83	0,0463	0,05	133,83	127,32	101,98	465,30
34	353,62	69,01	147,98	26,73	0,0468	0,05	130,74	121,10	103,01	427,33
35	466,49	69,16	172,25	26,43	0,0458	0,06	130,19	116,58	104,45	525,35
36	613,60	69,23	142,28	26,13	0,0485	0,09	139,91	128,42	107,24	716,32
37	605,75	69,32	180,48	25,74	0,0453	0,08	136,23	131,90	110,13	673,00
38	792,70	69,45	152,78	25,43	0,0482	0,10	146,27	142,31	114,32	884,17
39	834,50	69,71	143,30	25,14	0,0482	0,10	153,25	151,21	118,32	950,10
40	897,65	69,65	142,44	24,82	0,0487	0,10	158,67	154,67	122,35	981,43
41	815,16	69,91	134,19	24,53	0,0500	0,10	163,09	156,04	125,86	945,50
42	778,79	69,58	129,91	24,33	0,0493	0,10	168,26	159,51	128,83	898,31
43	766,10	69,90	128,04	24,14	0,0502	0,10	173,10	163,12	131,51	881,82
44	762,12	69,97	126,03	23,93	0,0514	0,10	177,68	167,43	134,06	885,77
45	759,64	69,74	124,75	23,73	0,0512	0,10	181,16	165,78	135,36	862,03
46	751,83	69,83	124,43	23,54	0,0514	0,10	184,18	156,29	135,25	827,16
47	740,63	69,53	123,41	23,29	0,0519	0,10	186,41	151,75	134,55	813,94
48	730,67	69,66	121,77	23,13	0,0514	0,10	188,71	149,82	134,82	804,61
49	714,10	69,73	120,97	22,93	0,0514	0,10	191,33	149,22	135,20	788,65
50	706,08	69,97	120,12	22,74	0,0505	0,10	194,07	148,45	136,14	784,73
51	702,24	69,44	119,51	22,55	0,0519	0,09	197,15	148,26	136,72	786,56
52	699,00	69,83	119,00	22,33	0,0519	0,09	200,18	148,79	138,15	794,00
53	697,21	69,97	118,16	22,13	0,0512	0,09	202,72	149,17	138,99	798,51
54	699,94	69,86	117,75	21,94	0,0500	0,10	205,76	150,75	139,96	803,75
55	709,44	70,01	119,13	21,73	0,0512	0,10	209,76	151,95	141,43	801,46
56	725,52	69,96	120,50	21,53	0,0510	0,10	212,62	153,31	142,04	802,14
57	737,58	70,15	122,06	21,34	0,0514	0,10	216,65	154,42	143,12	801,36
58	750,08	70,22	123,31	21,15	0,0507	0,10	220,31	155,79	144,39	806,61
59	759,59	70,02	124,73	20,93	0,0510	0,10	224,49	157,19	145,84	813,22
60	761,53	70,24	123,92	20,63	0,0510	0,10	228,67	159,10	146,42	822,53
61	751,19	70,24	121,20	20,44	0,0512	0,10	233,53	161,19	147,71	822,03
62	741,81	70,46	120,74	20,25	0,0524	0,10	238,36	163,31	149,10	813,07
63	733,03	70,26	120,01	20,04	0,0514	0,10	242,82	165,11	149,86	804,76
64	725,57	70,19	119,58	19,84	0,0512	0,10	247,57	167,05	151,72	792,62
65	719,11	70,28	118,01	19,65	0,0507	0,10	251,85	169,10	152,97	787,37
66	708,66	70,37	117,64	19,45	0,0507	0,09	255,71	170,78	153,69	774,24
67	700,02	70,19	116,76	19,33	0,0507	0,09	259,91	172,57	155,28	765,44
68	693,54	70,24	116,23	19,14	0,0519	0,10	264,35	173,89	156,75	756,61
69	687,58	70,23	115,64	18,95	0,0512	0,09	267,72	176,16	157,67	755,58
70	680,49	70,10	115,28	18,84	0,0514	0,09	269,77	178,09	159,03	746,74
71	674,24	70,33	114,65	18,63	0,0512	0,09	273,07	180,20	160,13	734,43
72	661,78	70,23	113,59	18,44	0,0514	0,09	275,94	181,95	161,18	714,14
73	655,03	70,17	112,53	18,34	0,0524	0,09	277,27	183,47	162,55	691,76
74	646,63	70,17	111,80	18,24	0,0524	0,09	280,66	184,88	164,06	678,99
75	638,67	70,25	111,26	18,05	0,0514	0,09	283,05	186,06	164,58	664,95
76	627,84	70,31	110,42	17,95	0,0514	0,09	284,72	187,22	165,91	656,71
77	617,55	70,22	107,73	17,84	0,0526	0,09	286,91	188,18	167,41	649,26
78	605,85	70,57	107,12	17,74	0,0526	0,09	288,12	188,94	169,07	634,37
79	596,65	70,59	107,48	17,54	0,0519	0,09	290,29	189,63	169,19	630,23
80	586,55	70,57	107,35	17,45	0,0524	0,09	291,79	190,62	170,58	620,68
81	577,97	70,17	106,06	17,35	0,0522	0,08	293,58	192,00	171,38	614,60
82	570,74	70,28	105,56	17,15	0,0519	0,08	294,87	192,74	172,22	611,47
83	565,18	70,29	104,87	17,16	0,0514	0,08	295,53	193,61	173,33	606,61
84	555,71	70,43	104,10	16,94	0,0526	0,08	297,14	194,15	174,46	593,11
85	549,87	70,29	103,44	16,84	0,0522	0,08	298,41	195,16	175,73	573,10
86	549,25	70,18	103,26	16,75	0,0529	0,08	300,56	196,26	177,05	561,63
87	570,95	70,29	105,96	16,65	0,0524	0,09	301,82	197,96	178,42	573,63
88	583,80	70,24	107,16	16,45	0,0529	0,09	304,07	199,46	179,39	589,94
89	594,97	70,26	107,90	16,35	0,0526	0,09	307,39	200,75	181,33	605,42
90	597,59	70,22	108,31	16,14	0,0526	0,09	308,96	202,90	181,80	611,60

91	596,71	70,33	108,60	15,95	0,0522	0,09	312,11	204,02	181,72	608,92
92	597,13	70,46	108,93	15,85	0,0524	0,09	314,30	205,97	182,87	607,57
93	597,76	70,45	108,86	15,66	0,0524	0,09	317,00	207,49	184,34	600,76
94	600,46	70,31	108,72	15,56	0,0519	0,09	319,69	209,50	184,58	598,08
95	599,95	70,29	108,88	15,35	0,0526	0,09	322,32	211,70	186,43	604,42
96	602,94	70,30	108,68	15,25	0,0519	0,09	325,76	214,48	187,39	610,93
97	612,19	70,44	109,56	15,05	0,0512	0,09	328,34	216,42	188,96	621,80
98	617,08	70,56	109,39	14,86	0,0510	0,09	331,90	218,73	190,21	626,96
99	612,59	70,60	109,24	14,74	0,0522	0,09	335,11	221,15	191,26	618,88
100	610,01	70,45	109,29	14,65	0,0512	0,09	339,37	224,35	193,49	610,22
101	612,26	70,51	109,30	14,45	0,0519	0,09	343,45	226,94	197,27	626,96
102	616,68	70,64	109,13	14,26	0,0519	0,09	347,08	231,36	198,89	643,03
103	622,15	70,66	108,01	14,06	0,0524	0,09	350,91	234,96	202,71	662,97
104	617,60	70,24	106,98	13,94	0,0529	0,09	355,14	239,70	206,20	659,64
105	612,77	70,90	107,20	13,75	0,0512	0,09	360,41	242,40	208,86	661,42
106	603,83	70,95	106,84	13,65	0,0522	0,09	364,87	246,89	211,80	648,33
107	594,04	70,99	106,88	13,46	0,0541	0,09	368,74	250,95	215,46	599,69
108	596,01	70,64	106,48	13,36	0,0543	0,09	371,91	254,33	218,97	582,72
109	587,50	70,83	106,19	13,26	0,0538	0,09	375,35	257,79	222,60	572,25
110	589,18	70,77	105,80	12,56	0,0538	0,09	378,17	261,07	225,61	609,81
111	579,75	70,55	104,50	12,85	0,0543	0,08	380,25	264,40	230,06	610,84
112	572,28	70,88	104,05	12,75	0,0541	0,09	382,05	267,54	234,09	610,93
113	565,00	70,84	103,06	12,66	0,0543	0,08	383,56	268,99	238,56	606,28
114	561,02	71,00	102,84	12,56	0,0541	0,08	385,15	270,42	242,21	612,46
115	555,80	70,96	102,39	12,46	0,0548	0,08	385,73	273,12	246,63	620,50
116	551,42	70,90	101,98	12,25	0,0548	0,08	386,89	274,27	249,27	620,70
117	941,26	71,25	198,32	11,67	0,0498	0,10	391,38	281,52	257,01	727,17
118	785,11	71,19	133,48	11,45	0,0524	0,10	400,66	290,30	265,41	779,84
119	731,75	71,16	121,89	11,26	0,0524	0,10	409,83	298,59	273,48	760,68
120	697,98	71,07	116,02	11,11	0,0524	0,09	419,59	305,22	279,12	718,73
121	678,60	71,25	113,02	10,97	0,0534	0,09	427,57	310,49	284,46	689,97
122	660,94	71,25	110,34	10,85	0,0531	0,09	435,89	314,96	288,79	675,57
123	638,78	70,71	108,24	10,65	0,0536	0,09	443,00	319,05	293,56	647,06
124	618,86	70,86	106,65	10,56	0,0534	0,09	448,61	321,58	296,82	620,26
125	599,01	70,87	105,53	10,46	0,0538	0,09	453,54	323,94	300,70	597,32
126	581,79	70,83	103,50	10,36	0,0534	0,09	458,07	325,47	304,43	576,26
127	565,75	70,74	102,42	10,26	0,0538	0,08	461,32	326,79	308,53	561,26
128	551,48	70,58	101,10	10,17	0,0522	0,08	465,19	328,05	311,68	547,29
129	538,49	70,84	99,83	10,05	0,0541	0,08	468,20	329,01	315,17	530,84
130	525,85	70,53	99,26	9,95	0,0541	0,08	469,65	329,79	317,99	519,55
131	517,27	70,67	98,30	9,85	0,0536	0,08	470,41	329,95	320,23	502,84
132	509,67	70,47	98,03	9,76	0,0541	0,08	470,20	329,36	323,09	488,75
133	499,78	70,81	97,27	9,66	0,0541	0,08	469,90	329,34	325,34	484,42
134	492,06	70,58	96,57	9,66	0,0538	0,08	470,77	328,82	327,99	480,42
135	485,45	70,69	95,64	9,47	0,0543	0,08	470,87	328,75	330,89	474,61
136	481,62	70,44	94,92	9,47	0,0531	0,08	471,69	327,95	333,72	469,75
137	480,15	70,50	94,87	9,37	0,0548	0,08	472,03	328,36	336,13	467,63
138	476,49	70,51	94,12	9,25	0,0538	0,08	471,08	327,61	337,72	467,21
139	471,63	70,32	93,61	9,18	0,0538	0,08	470,15	328,38	339,97	473,76
140	467,64	70,71	93,15	9,15	0,0543	0,07	469,47	327,81	342,68	476,06
141	462,61	70,75	92,41	9,06	0,0551	0,07	468,87	327,87	345,18	477,45
142	458,09	70,58	92,23	8,96	0,0548	0,07	468,24	328,33	346,25	478,51
143	515,26	71,00	150,54	14,77	0,0502	0,07	467,35	327,88	345,74	453,88
144	626,60	71,09	155,72	8,36	0,0510	0,09	470,67	336,59	357,15	526,23
145	603,46	70,72	113,50	8,16	0,0531	0,09	474,26	342,17	359,12	643,26
146	579,60	70,85	104,97	8,07	0,0531	0,08	475,90	343,95	361,35	679,01
147	572,87	70,57	102,30	7,97	0,0531	0,08	478,43	344,93	364,29	673,11
148	564,04	70,74	100,42	7,77	0,0538	0,08	478,47	344,53	365,66	646,66
149	556,49	70,70	99,16	7,66	0,0538	0,08	480,13	343,72	367,34	631,98
150	546,15	70,87	98,57	7,66	0,0526	0,08	479,96	343,04	368,45	625,32
151	539,33	70,63	98,16	7,56	0,0536	0,08	480,31	342,27	369,79	617,64
152	534,89	70,71	97,74	7,46	0,0543	0,08	478,06	340,33	369,92	610,83
153	532,46	70,64	97,42	7,27	0,0538	0,08	476,96	338,87	371,28	610,41
154	528,66	70,56	96,63	7,27	0,0536	0,08	477,84	339,86	371,03	609,12
155	525,98	70,47	96,68	7,07	0,0538	0,08	477,32	339,56	371,98	609,49
156	517,34	70,35	96,28	6,96	0,0541	0,08	476,50	339,25	371,63	601,54
157	508,03	70,41	95,42	6,86	0,0536	0,08	476,58	339,48	372,43	589,45
158	499,60	70,45	94,94	6,76	0,0536	0,08	476,45	340,31	373,51	584,20
159	493,20	70,61	94,02	6,76	0,0551	0,08	475,70	340,92	374,45	580,37
160	487,82	70,59	92,49	6,66	0,0541	0,08	473,16	342,33	374,31	580,00
161	479,25	70,76	92,84	6,57	0,0538	0,07	471,19	341,20	374,84	563,08
162	468,44	70,98	92,66	6,56	0,0543	0,07	472,87	340,54	375,49	526,42
163	458,43	70,86	92,46	6,47	0,0543	0,07	471,87	339,17	376,92	491,89
164	450,02	70,76	91,64	6,38	0,0536	0,07	468,80	337,72	377,87	463,01
165	436,60	70,75	90,95	6,37	0,0541	0,07	468,50	336,71	379,39	437,62
166	426,75	70,72	90,30	6,37	0,0538	0,07	467,76	335,41	380,59	418,04
167	415,62	70,56	89,37	6,26	0,0548	0,07	465,90	333,04	382,27	401,44
168	404,32	70,54	88,60	6,16	0,0541	0,07	464,80	329,99	384,04	388,81
169	376,92	70,68	126,33	11,24	0,0500	0,05	466,33	332,74	383,54	360,20
170	371,51	71,01	139,88	5,87	0,0512	0,06	467,10	335,09	387,33	331,01
171	379,97	70,55	98,03	5,87	0,0536	0,06	461,99	328,95	390,27	358,69
172	368,79	70,49	90,78	5,96	0,0534	0,06	460,53	326,52	393,88	361,72
173	357,29	70,44	87,67	5,87	0,0531	0,06	457,70	326,54	397,87	356,51
174	347,88	70,39	86,13	5,87	0,0538	0,06	454,88	327,86	401,81	351,22
175	339,28	70,53	85,25	5,77	0,0543	0,06	452,57	328,15	404,86	339,74
176	332,00	70,25	84,53	5,77	0,0551	0,06	451,54	328,95	407,99	329,26
177	324,53	70,18	83,80	5,77	0,0541	0,06	449,23	328,52	410,79	321,07
178	317,86	70,10	83,30	5,77	0,0548	0,05	445,81	328,28	413,56	313,55
179	311,05	70,12	82,86	5,67	0,0548	0,05	443,17	327,16	415,64	306,13
180	305,10	70,29	82,30	5,70	0,0548	0,05	441,18	326,53	416,48	298,82
181	299,13	70,23	81,65	5,67	0,0536	0,05	439,88	324,68	415,63	289,91
182	292,81	69,87	81,17	5,67	0,0548	0,05	437,26	323,31	418,47	281,13
183	285,39	69,66	81,13	5,67	0,0543	0,05	434,81	321,57	419,54	277,16

184	279,00	70,11	80,46	5,67	0,0548	0,05	429,61	320,10	418,82	276,96
185	273,01	69,89	80,13	5,67	0,0538	0,05	427,18	316,62	419,72	275,43
186	267,25	69,95	80,12	5,67	0,0543	0,05	422,67	313,38	421,06	272,10
187	261,98	70,14	79,59	5,57	0,0551	0,05	420,19	309,76	420,78	268,71
188	256,74	69,86	79,29	5,57	0,0548	0,05	416,24	306,45	420,70	265,07
189	251,93	69,70	79,07	5,57	0,0531	0,04	412,35	303,32	420,69	261,93
190	247,23	69,69	79,05	5,57	0,0536	0,04	409,34	301,04	419,55	259,26
191	242,70	69,69	78,64	5,57	0,0548	0,04	405,50	297,91	419,43	255,68
192	238,53	69,66	78,43	5,57	0,0538	0,04	402,91	295,36	418,50	252,89
193	234,67	69,72	78,06	5,57	0,0548	0,04	398,57	292,30	418,24	249,51
194	230,90	69,78	77,84	5,57	0,0548	0,04	395,51	289,83	417,47	246,73
195	227,38	69,69	77,73	5,48	0,0541	0,04	391,96	287,06	416,24	243,59
196	224,03	69,71	77,45	5,57	0,0548	0,04	389,97	284,44	413,72	241,00
197	220,92	69,68	77,28	5,57	0,0551	0,04	385,18	281,39	412,72	238,31
198	217,92	69,60	77,57	5,48	0,0551	0,04	380,96	279,57	409,95	236,15
199	214,99	69,72	77,42	5,57	0,0541	0,04	377,68	276,17	406,84	234,89
200	212,48	70,00	77,25	5,48	0,0541	0,04	374,96	273,45	405,32	231,96
201	209,75	69,98	77,21	5,48	0,0536	0,04	371,57	271,09	403,77	230,61
202	207,35	69,81	77,06	5,48	0,0553	0,04	368,98	268,71	403,60	228,55
203	205,24	69,76	76,85	5,47	0,0543	0,04	366,29	266,53	402,44	227,00
204	203,32	69,63	76,55	5,48	0,0541	0,04	363,30	264,19	400,33	225,97
205	201,33	69,71	76,32	5,37	0,0543	0,03	360,00	261,79	399,32	224,71
206	199,15	69,79	76,17	5,48	0,0551	0,03	357,35	260,39	399,02	223,05
207	197,48	69,60	76,01	5,36	0,0548	0,03	357,08	258,61	397,14	221,90
208	195,89	69,57	76,00	5,36	0,0543	0,03	354,62	256,90	395,87	221,25
209	194,50	69,48	75,70	5,36	0,0553	0,03	351,87	255,15	394,48	220,52
210	192,92	69,50	75,67	5,36	0,0543	0,03	349,30	253,79	393,25	219,84
211	191,68	69,44	75,61	5,36	0,0543	0,03	346,83	251,98	392,90	218,98
212	190,37	69,53	75,47	5,36	0,0541	0,03	344,85	250,65	391,64	218,07
213	189,15	69,44	75,17	5,36	0,0551	0,03	342,70	250,31	388,13	217,65
214	187,81	69,65	75,15	5,36	0,0548	0,03	339,11	249,15	386,89	217,26
215	186,92	69,44	75,03	5,36	0,0548	0,03	336,68	247,33	387,39	217,08
216	185,81	69,26	74,90	5,36	0,0534	0,03	334,00	246,15	386,63	216,70
217	185,09	69,51	74,90	5,36	0,0548	0,03	331,92	245,03	385,40	215,82
218	183,88	69,31	74,78	5,26	0,0548	0,03	329,41	243,83	384,10	215,57
219	183,06	69,26	74,67	5,36	0,0536	0,03	326,52	243,06	383,36	214,84
220	182,19	69,27	74,53	5,32	0,0548	0,03	324,76	242,05	382,80	214,87
221	181,29	69,21	74,47	5,36	0,0548	0,03	323,47	241,18	381,15	213,95
222	180,67	69,42	74,38	5,26	0,0551	0,03	320,86	240,70	378,28	212,80
223	179,60	69,40	74,29	5,26	0,0543	0,03	319,92	238,91	375,75	211,64
224	178,74	69,58	74,05	5,26	0,0548	0,03	316,63	238,77	372,42	211,14
225	177,59	69,22	74,10	5,26	0,0558	0,03	314,80	236,93	370,97	210,52
226	176,61	69,43	74,15	5,26	0,0560	0,03	312,64	235,69	367,67	209,45
227	175,46	69,91	74,74	5,26	0,0553	0,03	309,16	235,22	364,06	208,72
228	174,82	69,74	74,73	5,26	0,0548	0,03	307,27	232,93	363,45	208,25
229	173,92	69,94	74,69	5,26	0,0553	0,03	305,69	231,41	361,04	207,12
230	172,67	69,65	74,61	5,26	0,0558	0,03	303,51	229,42	361,01	206,49
231	172,07	69,67	74,42	5,26	0,0553	0,03	300,70	227,99	359,23	205,78
232	171,69	69,66	74,26	5,16	0,0555	0,03	299,67	225,97	358,01	203,51
233	170,96	69,51	74,03	5,26	0,0552	0,03	297,42	224,66	356,16	202,43
234	186,80	69,52	88,26	5,98	0,0541	0,02	295,45	228,05	351,55	187,24

Left
°F
75,21
75,23
75,26
75,55
75,92
76,11
76,45
76,82
77,27
77,79
78,24
78,71
79,39
80,49
82,24
83,65
85,53
87,77
91,21
93,94
97,94
100,91
104,20
107,14
109,92
113,41
119,56
126,44
132,94
136,24
136,54
139,54
137,90
135,19
131,94
130,99
136,09
139,01
144,00
148,69
152,30
156,10
159,21
162,43
168,09
174,29
179,09
183,36
187,52
190,41
194,32
197,70
200,89
206,38
208,98
213,18
216,53
219,83
223,35
228,15
232,36
236,99
241,72
246,36
250,81
254,70
257,97
261,84
266,13
269,68
273,38
276,78
279,91
283,48
286,31
287,98
291,69
292,65
293,90
295,10
296,69
297,76
298,53
299,66
300,82
301,16
303,08
305,14
306,99
309,44

311,56  
313,93  
317,14  
320,25  
323,21  
325,79  
328,74  
332,09  
335,02  
338,79  
342,54  
345,57  
350,31  
353,76  
355,02  
356,25  
357,29  
359,62  
363,86  
366,42  
370,90  
374,30  
375,96  
377,82  
380,95  
383,00  
382,66  
387,39  
393,42  
402,21  
408,34  
412,95  
418,20  
420,75  
423,48  
425,39  
427,88  
429,86  
431,29  
433,58  
432,67  
432,65  
431,84  
432,34  
431,22  
431,93  
433,80  
432,34  
432,98  
431,77  
431,78  
432,51  
431,23  
433,73  
437,21  
441,17  
444,98  
448,04  
449,71  
452,25  
453,34  
454,95  
455,10  
457,39  
458,00  
460,86  
462,90  
464,91  
467,01  
471,05  
469,71  
468,01  
467,43  
465,04  
462,62  
460,90  
455,78  
452,09  
449,11  
444,14  
440,34  
438,07  
435,45  
434,11  
433,11  
431,27  
428,52  
426,60  
424,44  
422,29  
417,26  
414,30  
411,60

408,07  
405,13  
400,02  
396,69  
393,71  
390,78  
387,70  
384,14  
380,79  
377,18  
374,56  
371,97  
368,31  
363,45  
362,25  
358,63  
355,31  
352,22  
348,58  
344,80  
341,86  
338,89  
336,72  
334,25  
331,68  
329,47  
326,99  
324,36  
323,11  
321,30  
319,07  
316,63  
314,62  
312,50  
310,51  
308,33  
306,61  
304,79  
303,85  
301,60  
300,98  
298,85  
296,93  
296,37  
292,83  
291,71  
289,40  
287,68  
285,62  
283,13  
281,66



Date: 2018-03-15 Manufacturer: Foga Supreme Model: 38 FSC  
 Project #: PI 20169 Run: 2 Tech: MR Reviewer: SP

LEP<sup>d</sup> Selling<sup>o</sup> - No landing 314 LBS START FINE Faw a 80% de la puissance maximum  
 - AT 295 LBS close Door  
 - DJ 175 LBS close at rail ~~to~~ high completely  
 - DJ 1200 LBS Brasskn Feet  
 - DJ 88 LBS tapochu et Brasskn Feet  
 DJ 62 LBS tapochu et Rail channel  
 DJ 53 LBS instal load  
 Open an rail  
 close Door immediately

TEST LOAD CONFIGURATION

## PRE / POST CHECKS

Date: 2018-03-15 Manufacturer: Fager Supreme Model: 38 FSC  
 Project #: PI 20164 Run: 2 Tech: MM Reviewer: DP

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
EM-191	7:00	ok	ok

### Facility Conditions:

Air Velocity from less than 2 feet .....  
 Smoke Capture Check.....  
 Picture.....

Pre-Test		Post-Test	
4 (max50 Fpm)	5 (max50 Fpm)		
ok	ok		
4 sides	ok		ok

### Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....  
 Date Dilution Tunnel Cleaned.....  
 Induced Draft Check (max 0.005 H2O).....  
 Traverse before ignition.....  
 Flow Rate 140 cfm ±10%.....

2018-03-13	
2018-03-13	
ok	
ok	
	ok

### Temperature System:

Ambient (65°-90°F).....  
 Wood Heater Surface (±125°F).....

ok	°F
ok	°F

### Proportional Checks:

Thermocouple check.....  
 Pitot Clean.....  
 Pitot verification.....

ok
ok
ok

### Sampling Train ID Numbers:

Probe.....  
 Filter Front.....  
 Filter Back.....  
 Filter Thermocouple.....  
 Filter (<90°F).....

Train 1 <sup>st</sup> hour	Train 1	Train 2
09	05	18
15	13	19
16	14	20
11	11	12
ok	ok	ok



**SAMPLING EQUIPMENT CHECK OUT**

 Date: 2-18-03-15

 Manufacturer: Poyu Supreme

 Model: 38 FSC

 Project #: PT 20164

 Run: 2

 Tech: mm

 Reviewer: DP
**Leakage Checks Tunnel Samplers**

Unplugged Flow Rate = .25cfm	System 1 <sup>st</sup> hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	64018033	64293913	64018060	64293918	58383028	58663828
Initial 1minute DGM (Liter)	64018025	64293909	64018055	64293918	58383027	58663822
Change © (Liter)	008	004	005	∅	001	003
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

**Leakage Checks Flue Gas Sampler**

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	-5	-5
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	ok	ok

**Leakage Checks Pitot**

Plugged Probe	Pre Test 3 H <sub>2</sub> O static	Pre Test 0.4-0.5 H <sub>2</sub> O velocity	Post Test 3 H <sub>2</sub> O Static	Post Test 0.4-0.5 H <sub>2</sub> O velocity
Vacuum (inches Hg.)	3	.4	3	.5
Check OK (no change after 15 sec.)	ok	ok	ok	ok

Date: 2018-03-15      Manufacturer: foya supreme      Model: 38 FSC  
 Project #: PI 20164      Run: 2      Tech: MR      Reviewer: BO

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM 090	4.4 lbs, Class F	4.4 lbs
Wood	EM 090	4.4 lbs, Class F	4.4 lbs
Analytical	EM 128	100 mg, Class S	100 mg
Analytical	EM 129	200 g, Class S	200 g

**LIMITS OF WEIGHT RANGES**

**ANALYTICAL SCALE:** ..... 50%-150% of dry filter weight,  $\pm 0.1$  mg  
**PLATFORM SCALE:** ..... 20%-80% of ideal test load weight,  $\pm 0.1$  lbs or 1%  
**WOOD SCALE:** ..... 20%-80% of ideal test load weight,  $\pm 0.01$  lbs or 1%



Date: 2018-03-15 Manufacturer: Foga supreme Model: 38 FSL  
 Project #: PJ 20164 Run: 2 Tech: MM Reviewer: DP

FOR TUNNELS < 12 in

Barometric pressure ( $P_{bar}$ ) 99.1 (KPa.) Static pressure ( $P_q$ ) 0.16 (inches w.c.)  
 Inside diameter: Port A \_\_\_\_\_ Port B \_\_\_\_\_  
 Tunnel cross sectional area: .1963Ft<sup>2</sup>  
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head $\Delta_p$ (inches H <sub>2</sub> O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.058	72.52
B - Centroid	3.00	3.50	4	0.057	71.90
A-1	0.40	0.50	0.50	0.052	72.59
A-2	1.50	1.75	2	0.056	72.36
A-3	4.50	5.25	6	0.061	72.14
A-4	5.60	6.5	7.5	0.051	72.02
B-1	0.40	0.50	0.50	0.053	71.80
B-2	1.50	1.75	2	0.057	71.65
B-3	4.50	5.25	6	0.056	71.41
B-4	5.60	6.5	7.5	0.053	71.30
				AVERAGE	

$$v_s = K_p C_p (\sqrt{\Delta_p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

Where,

$C_p$  = pitot tube coefficient, dimension less = 0.99 for standard pitot.

$\Delta_p$  = manometer reading (inches H<sub>2</sub>O)

$T_s$  = average absolute dilution tunnel temperature (°F + 460)

$P_s$  = absolute dilution tunnel gas pressure or  $P_{bar} + P_{qg}$

$P_q$  = static pressure in. H<sub>2</sub>O  
 { 13.6 }

$M_s$  = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)

$K_p$  = 85.49 pitot tube constant, (conversion factor for English units)

$\Delta_p$  avg. = average of the square roots of the velocity heads ( $\Delta_p$ ) measured at each traverse point.

Date: 2018-03-15

 Manufacturer: Foxe Supreme

 Model: 38 Fsc

 Project #: PI 20164

 Run: 2

 Tech: MR

 Reviewer: DD
**Pre-Test (Adjust and Record)**

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2,995	300	1009	100
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO <sub>2</sub>	0	0	17,90	1800	972	1000
Tolerance CO <sub>2</sub>		+/- 0.02		+/- 0.5		+/- 0.5
O <sub>2</sub> informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

**Post Test (Record Only)**

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0	2,990	1001	0	0.02	0.005	0.15	0.008	0.05	✓	
CO <sub>2</sub>	0	17,83	970	0	0.02	0.07	0.5	0.02	0.5	✓	



### TEST DATA LOG

Date: 2018-03-15 Manufacturer: Poyu Supreme Model: 38 FSC  
 Project #: PT 20164 Run: 2 Tech: mm Reviewer: DP

#### RAW DRY GAS METER READINGS

	System 1	System 2	Blanck
Final (Liter)	642933.65	586638.06	084.23
Initial (Liter)	640180.98	583832.30	041.25

#### AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	99.1	99.8
Dry Bulb (F):	71.78	73.96
Humidity (%):	29	28

#### Flow Meter

	Start	End
Flow meter reading	N.A	N.A

#### Flow Meter Verification

	Before	After
Flow meter Check (liters)	N.A	N.A
Scale Weight ( Kg)	N.A	N.A

### FUEL DATA

Date: 2018-03-15 Manufacturer: Foyen SUPREME Model: 38 FSC  
 Project #: PI 20164 Run: 2 Tech: MM Reviewer: BP

#### FUEL DESCRIPTION:

Type of wood:

#### PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*					
2 x 4 x 10 in.	1242 lbs.	21.3	21.4	20.8	20.9	20.9	
2 x 4 x 10 in.	1104 lbs.	20.9	20.8	21.3	21.6	21.4	
2 x 4 x 10 in.	1276 lbs.	21.6	21.3	21.3	21.4	21.5	
2 x 4 x 10 in.	1268 lbs.	21.8	22.0	22.1	22.3	21.7	
2 x 4 x 10 in.	1356 lbs.	22.4	22.6	22.3	21.6	21.3	
2 x 4 x 10 in.	1266 lbs.	22.3	22.4	22.3	21.9	20.8	
2 x 4 x 10 in.	1296 lbs.	20.6	20.4	20.9	20.6	20.3	
2 x 4 x 10 in.	1364 lbs.	21.9	21.6	21.7	21.7	21.6	
2 x 4 x 10 in.	1230 lbs.	22.4	22.3	22.8	22.9	23.0	
2 x 4 x 10 in.	1304 lbs.	21.7	21.6	21.3	21.3	21.8	
2 x 4 x 10 in.	1192 lbs.	22.4	22.6	22.3	22.1	22.4	
2 x 4 x 10 in.	1274 lbs.	21.9	22.4	22.0	22.0	22.0	
2 x 4 x 15 in.	2010 lbs.	20.9	20.6	20.3	20.3	20.5	
2 x 4 x 15 in.	2010 lbs.	20.6	19.9	19.8	20.0	20.0	
2 x 4 x 15 in.	2018 lbs.	20.4	20.9	20.6	20.6	20.7	
2 x 4 x 15 in.	2028 lbs.	22.0	22.1	22.2	22.4	22.4	
2 x 4 x 15 in.	1850 lbs.	21.6	21.3	21.6	21.3	21.8	
2 x 4 x 15 in.	1982 lbs.	19.1	19.6	19.3	19.4	19.4	
2 x 4 x 15 in.	1906 lbs.	19.8	20.0	20.1	19.8	19.8	
2 x 4 x 15 in.	1910 lbs.	19.6	19.3	19.8	19.7	19.3	
<del>2 x 4 x 15 in.</del>	lbs.						
<del>2 x 4 x in.</del>	lbs.						
x x in.	lbs.						

TEST LOAD WEIGHT: ~~3065~~ lbs  
 30,98 mm



**FUEL DATA**

 Date: 2018-03-15 Manufacturer: Poly Supreme Model: 38 F50  
 Project #: PT 20164 Run: 2 Tech: mm Reviewer: 80
**FUEL DESCRIPTION:**

Type of wood :

**TEST LOAD**

Piece Size	Weight	Meter Moisture Content (% dry)*				
3 1/2 x 3 1/2 x 22 in.	54,574 lbs.	198	205	203	204	205
3 1/2 x 3 1/2 x 22 in.	5166 lbs.	193	204	196	204	203
3 1/2 x 3 1/2 x 22 in.	4,590 lbs.	191	199	197	200	200
3 1/2 x 3 1/2 x 22 in.	5,330 lbs.	191	205	213	220	218
3 1/2 x 3 1/2 x 22 in.	4,500 lbs.	191	192	193	199	200
1 1/2 x 3/4 x 5 in.	0092 lbs.			201		
1 1/2 x 3/4 x 5 in.	0082 lbs.			206		
1 1/2 x 3/4 x 5 in.	0090 lbs.			210		
1 1/2 x 3/4 x 5 in.	0092 lbs.			199		
1 1/2 x 3/4 x 5 in.	0086 lbs.			193		
1 1/2 x 3/4 x 5 in.	0092 lbs.			206		
1 1/2 x 3/4 x 5 in.	0086 lbs.			204		
1 1/2 x 3/4 x 5 in.	0078 lbs.			210		
1 1/2 x 3/4 x 5 in.	<del>0040</del> 0140 lbs.			206		
1 1/2 x 3/4 x 5 in.	0084 lbs.			203 mm		
1 1/2 x 3/4 x 5 in.	0094 lbs.			194		
1 1/2 x 3/4 x 5 in.	0094 lbs.			199		
1 1/2 x 3/4 x 5 in.	0096 lbs.			206		
1 1/2 x 3/4 x 5 in.	0084 lbs.			203		
1 1/2 x 3/4 x 5 in.	0090 lbs.			204		
1 1/2 x 3/4 x 5 in.	0094 lbs.			206		
1 1/2 x 3/4 x 5 in.	<del>0090</del> 0098 lbs.			210		
1 1/2 x 3/4 x 5 in.	0096 lbs.			199		
1 1/2 x 3/4 x 5 in.	0092 lbs.			198		
1 1/2 x 3/4 x 5 in.	<del>0090</del> 0148 lbs.			202		
x x in.	8 lbs.					
x x in.	8 lbs.					

 TEST LOAD WEIGHT: 26,048 lbs Min 20%: 521 Max 25%: 651



Date: 2018-03-14 Manufacturer: foya Supreme Model: 38 Fsc  
 Project #: PI 20144 Run: 2 Tech: MA Reviewer: BP

		SYSTEM 1 <del>1<sup>st</sup> hour</del> <i>hr.</i>				SYSTEM 1 <sup>1<sup>st</sup> hour</sup> <i>hr.</i>				
Pre-test Weight Record	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
		004	15	16	3	005	17	18	16	21
2018-03-14	19:00	613830	01267	01263	352010	615054	01260	<del>01264</del>	355896	01264
2018-03-15	11:00	613831	01268	01264	352011	615054	01259	01264	355896	<del>01263</del> 01263

		SYSTEM 1 - 1 <sup>st</sup> hour				SYSTEM 1				
Post-test Weight Record	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
		004	15	16	3	005	17	18	16	21
2018-03-15	22:00	613842	01266	01265	352030	615070	01339	01262	355923	01265
2018-03-26	0:00	613833	01263	01264	352024	615059	01329	01261	355915	01269
2018-03-30	8:00	613833	01263	01264	352023	615059	01328	01261	355914	01264



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2018-03-15 Manufacturer: Fogyn Supreme Model: 38 fsc  
 Project #: PI 20164 Run: 2 Tech: mm Reviewer: DL

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	18	19	20	24
2018-03-14	19:00	108-9466	01265	01265	35-3251
2018-03-15	11:00	108-9467	01266	01264	35-3252

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	18	19	20	24
2018-03-15	22:00	108-9487	M	01341	01256
2018-03-26	8:00	108-9474	01337	01337	35-3274
2018-03-26	8:00	108-9474	01338	01253	35-3275

## Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

### Description du test

Test standard	EPA
Run #	3
Date	19-03-2018
Technicien	m.m
Project #	pi 20164

### Description de l'unité

Manufacturier	foyer supreme	
Modèle	38 fsc	
Combustion system	Non-Cat	
Appliance type	fireplace	
Firebox volume	3,5	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

### Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category	3	
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

### Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,988	Dimensionless
Equipment number (DGM #1):	em 178	
Calibration Factor (DGM #2):	0,988	Dimensionless
Equipment number (DGM #2):	em 179	
Calibration Factor (DGM #3):	0,986	Dimensionless
Equipment number (DGM #3):	em 070	Dimensionless

### Tunnel

Targeted tunnel flow rate	300	scfm
Tunnel diameter	8	in.
Molecular weight	29	
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 20164
Date	19-03-2018
Technicien	<input type="text" value="m.m"/>

### Fuel data

Fuel type	Dimension	
Fuel specie	D. Fir	
HHV		19810,0 kJ/kg
%C		48,7
%H		6,9
%O		43,9
%Ash		0,5
HHV		8519,2 Btu/lb
LHV		7451,0 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480



	Start	End
Barometer (kPa):	101,5	101,3
Barometer (in.Hg):	29,972939	29,91387874
Dry Bulb (F):	73,04	74,84
Humidity (%):	19	18,3
Air velocity (ft/min)	2	3

DGM #1	Final:	22774,673	cuft
	Initial:	22705,099	cuft
DGM #2	Final:	20788,841	cuft
	Initial:	20717,491	cuft
DGM room			

	Final:	644906,900	Liter
	Initial:	642936,800	Liter
	Final:	588674,420	Liter
	Initial:	586654,000	Liter
	Final:	115,510	cuft
	Initial:	84,230	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

192

Autres données à rentrer: dans preload data, load data, traverse et filter set weight

<b>Project nu.</b>	pi 20164
<b>Date</b>	19-03-2018
<b>Technicien</b>	m.m





## Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,17 in. H2O  
 Barometer: 29,900 in. Hg

**Pour un tunnel de 12" et plus, prendre 6 lectures**

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

**PITOT CONSTANT=**  
0,979

**Pour un tunnel moins de 12", prendre 4 lectures**

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,056	65,09	0,2366
B center	0,056	70,31	0,2366
A1	0,051	67,88	0,2258
A2	0,056	68,13	0,2366
A3	0,061	68,99	0,2470
A4	0,048	69,36	0,2191
B1	0,051	71,050	0,2258
B2	0,058	71,990	0,2408
B3	0,054	72,810	0,2324
B4	0,047	72,670	0,2168
AVERAGE	0,0538	69,8280	0,2318

<b>Project nu.</b>	pi 20164
<b>Date</b>	19-03-2018
<b>Technicien</b>	<span style="border: 1px solid red; padding: 2px;">m.m</span>



## Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure	
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter			
Number	2	421	422	8	30	423	424	13	40	425	426	23	427			
Before (1)																
Before (2)																
Before (3)																
Before (4)																
Before (5)	61,1006	0,1271	0,1275	34,9220	110,2399	0,1282	0,1261	35,7053	110,1092	0,1300	0,1281	35,2014	0,1300	2018-03-15	17:00	
Before (6)	61,1006	0,1272	0,1274	34,9219	110,2398	0,1283	0,1261	35,7054	110,1091	0,1300	0,1282	35,2015	0,1301	2018-03-19	10:00	
After (1)	61,1014	0,1396	0,1272	34,9240	110,2410	0,1314	0,1259	35,7068	110,1104	0,1442	0,1277	35,2045	0,1303	2018-03-19	17:30	
After (2)	61,1009	0,1385	0,1272	34,9234	110,2402	0,1314	0,1259	35,7068	110,1100	0,1438	0,1276	35,2041	0,1303	2018-03-26	08:00	
After (3)	61,1009	0,1385	0,1272	34,9234	110,2402	0,1314	0,1259	35,7068	110,1100	0,1438	0,1276	35,2041	0,1303	2018-03-30	08:00	
After (4)																
After (5)																
After (6)	61,1009	0,1385	0,1272	34,9234	110,2402	0,1314	0,1259	35,7068	110,1100	0,1438	0,1276	35,2041	0,1303	2018-03-30	08:00	
Difference	0,0003	0,0113	-0,0002	0,0015	0,0004	0,0031	-0,0002	0,0014	0,0009	0,0138	-0,0006	0,0026	0,0002			
Total (mg)		12,9				17,6				16,7				0,2		
Total ajusté (mg)		<b>12,70</b>				<b>17,40</b>				<b>16,50</b>						

<b>Project nu.</b>	pi 20164
<b>Date</b>	19-03-2018
<b>Technicien</b>	m.m

# Demonstration purpose only not the real number, negative filter weight rounded to zero

## Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure	
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter			
Number	2	421	422	8	30	423	424	13	40	425	426	23	427			
Before (1)																
Before (2)																
Before (3)																
Before (4)																
Before (5)	61,1006	0,1271	0,1275	34,9220	110,2399	0,1282	0,1261	35,7053	110,1092	0,1300	0,1281	35,2014	0,1300	2018-03-15	17:00	
Before (6)	61,1006	0,1272	0,1274	34,9219	110,2398	0,1283	0,1261	35,7054	110,1091	0,1300	0,1282	35,2015	0,1301	2018-03-19	10:00	
After (1)	61,1014	0,1396	0,1272	34,9240	110,2410	0,1314	0,1259	35,7068	110,1104	0,1442	0,1277	35,2045	0,1303	2018-03-19	17:30	
After (2)	61,1009	0,1385	0,1272	34,9234	110,2402	0,1314	0,1259	35,7068	110,1100	0,1438	0,1276	35,2041	0,1303	2018-03-26	08:00	
After (3)	61,1009	0,1385	0,1272	34,9234	110,2402	0,1314	0,1259	35,7068	110,1100	0,1438	0,1276	35,2041	0,1303	2018-03-30	08:00	
After (4)																
After (5)																
After (6)	61,1009	0,1385	0,1274	34,9234	110,2402	0,1314	0,1261	35,7068	110,1100	0,1438	0,1282	35,2041	0,1303	2018-03-30	08:00	
Difference	0,0003	0,0113	0,0000	0,0015	0,0004	0,0031	0,0000	0,0014	0,0009	0,0138	0,0000	0,0026	0,0002			
Total (mg)		13,1				18				17,3				0,2		
Total ajusté (mg)		<b>12,90</b>				<b>17,80</b>				<b>17,10</b>						

<b>Project nu.</b>	pi 20164
<b>Date</b>	19-03-2018
<b>Technicien</b>	m.m

* Elapsed Time min	* Weight				* Flue Gas %	* Room Temp °F	* Tunnel Dry Bulb °F	* Unit Top °F	* Unit Back °F	* Unit R.Side °F	* Unit L.Side °F	* Unit Bottom °F	Mass flow 1 Reading cuft/min	DGM 1	DGM 1	Filter 1	Mass flow 2	DGM 2	DGM 2	Filter 2	Tunnel Velo	Flue draft	Change in										
	Raw data row	Remaining lbs	CO %	CO <sub>2</sub> %										O <sub>2</sub> %	Flue Gas %	Room Temp °F	Tunnel Dry Bulb °F	Unit Top °F	Unit Back °F	Unit R.Side °F	Unit L.Side °F	Unit Bottom °F	Reading	Inlet T	Outlet T	Temp	Reading	Inlet T	Outlet T	Temp	Pressure in wc	Pressure in wc	Surface Temp. °F
																							of	of	of	of	of	of	of	of	of	of	of
0,00	192,00	26,0	0,3	4,0	389,4	274,7	70,4	115,9	250,7	336,9	451,1	426,2	482,0	0,18	75,46	75,63	73,39	0,18	75,75	75,90	72,35	0,05	0,04	0,0									
1,0	193,0	25,0	0,3	1,0	380,9	275,3	70,9	111,2	229,3	331,0	444,0	420,6	479,6	0,18	75,15	75,84	73,28	0,18	75,69	75,69	72,27	0,05	0,05	-8,463651									
2,0	194,0	25,8	0,4	2,4	380,1	330,3	70,9	101,3	251,0	321,8	437,2	413,6	477,2	0,18	74,79	75,43	73,49	0,18	75,51	75,76	72,59	0,05	0,06	-9,224198									
3,0	195,0	25,7	0,4	4,1	379,9	374,3	71,2	102,1	277,1	313,8	428,2	405,8	474,4	0,18	74,47	75,18	73,63	0,18	75,35	75,65	72,81	0,05	0,07	-9,501834									
4,0	196,0	25,5	0,3	5,2	379,3	397,0	71,3	103,3	299,3	308,0	417,2	399,8	471,9	0,18	74,22	75,04	73,73	0,18	75,20	75,56	72,95	0,05	0,07	-10,117078									
5,0	197,0	25,3	0,3	5,6	381,9	434,4	72,5	105,2	325,8	315,4	406,2	380,8	469,6	0,18	74,08	74,82	73,80	0,18	75,09	75,91	73,09	0,05	0,09	-9,242956									
6,0	198,0	25,1	0,3	6,9	383,6	479,9	72,1	109,1	362,5	299,3	402,3	388,5	465,6	0,18	74,06	74,89	73,87	0,18	75,03	75,48	73,21	0,05	0,08	-5,7413									
7,0	199,0	24,9	0,4	8,1	388,6	528,8	72,2	113,5	401,3	295,8	399,3	383,0	463,5	0,18	74,21	74,87	74,04	0,18	75,12	75,50	73,42	0,05	0,08	-0,790266									
8,0	200,0	24,6	0,6	9,6	393,0	554,6	71,6	115,2	433,6	293,4	395,5	381,9	460,6	0,18	74,28	74,86	74,18	0,18	75,16	75,52	73,60	0,05	0,08	3,644583									
9,0	201,0	24,4	0,6	9,8	393,6	542,2	72,0	114,0	441,9	291,8	396,7	371,9	458,7	0,18	74,21	74,82	74,31	0,18	75,10	75,49	73,75	0,05	0,08	4,2735808									
10,0	202,0	24,2	0,6	8,2	412,3	605,3	71,3	117,3	541,6	290,5	393,3	378,3	457,9	0,18	74,15	74,79	74,49	0,18	75,08	75,49	73,98	0,05	0,09	22,947617									
11,0	203,0	23,9	0,6	12,1	431,0	644,9	71,5	118,7	638,3	289,9	393,2	378,1	455,6	0,18	74,06	74,73	74,67	0,18	75,00	75,48	74,12	0,05	0,09	41,668716									
12,0	204,0	23,7	0,6	10,1	416,8	593,2	72,1	115,1	569,8	289,7	392,2	378,4	453,8	0,18	74,00	74,71	74,86	0,18	74,94	75,47	74,30	0,05	0,09	27,418606									
13,0	205,0	23,5	1,0	8,5	407,1	566,3	71,4	112,6	526,4	288,5	388,6	379,5	452,2	0,18	74,00	74,79	75,03	0,18	74,93	75,45	74,45	0,05	0,08	17,691012									
14,0	206,0	23,4	0,9	8,0	403,7	560,1	72,0	113,2	513,9	287,7	387,4	378,9	450,9	0,18	74,16	74,73	75,23	0,18	75,05	75,48	74,67	0,05	0,09	14,369778									
15,0	207,0	23,1	0,8	8,4	403,2	569,8	71,4	114,6	517,3	287,4	385,6	378,9	447,1	0,18	74,28	74,75	75,42	0,18	75,11	75,53	74,89	0,05	0,09	13,877242									
16,0	208,0	22,9	0,8	10,2	423,1	665,9	71,9	119,1	615,8	287,5	386,8	380,6	445,1	0,18	74,34	74,75	75,63	0,18	75,14	75,54	75,14	0,05	0,10	33,777438									
17,0	209,0	22,5	1,1	14,8	443,4	740,6	72,2	123,3	713,6	289,2	388,8	382,9	442,5	0,18	74,35	74,77	75,85	0,18	75,13	75,56	75,37	0,05	0,10	54,014456									
18,0	210,0	22,3	1,8	15,5	442,7	696,2	71,4	120,0	704,7	290,9	391,3	385,4	441,2	0,18	74,28	74,75	76,09	0,18	75,07	75,56	75,57	0,05	0,10	53,317551									
19,0	211,0	22,2	1,6	12,1	429,0	630,6	71,7	114,5	632,9	292,7	393,5	387,7	438,4	0,18	74,20	74,76	76,24	0,18	75,02	75,57	75,73	0,05	0,09	39,663498									
20,0	212,0	22,1	1,1	7,7	411,4	570,5	71,8	109,8	547,3	292,7	393,4	387,2	436,6	0,18	74,09	74,73	76,39	0,18	74,94	75,57	75,85	0,05	0,09	22,055899									
21,0	213,0	21,9	1,0	5,9	398,4	530,1	72,4	108,3	488,9	292,9	391,4	383,1	435,8	0,18	74,14	74,75	76,55	0,18	74,98	75,59	75,99	0,05	0,08	9,0560454									
22,0	214,0	21,8	0,9	5,4	389,0	501,8	72,3	106,0	450,7	290,4	391,0	378,2	434,8	0,18	74,35	74,81	76,72	0,18	75,10	75,63	76,14	0,05	0,08	-0,354782									
23,0	215,0	21,7	0,9	5,6	393,4	479,7	71,3	105,3	423,5	288,3	389,7	375,7	431,0	0,18	74,49	74,84	76,86	0,18	75,17	75,68	76,31	0,05	0,07	-7,945011									
24,0	216,0	21,6	0,9	5,8	376,4	461,8	72,0	103,9	407,1	286,5	386,2	372,5	429,7	0,18	74,50	74,86	77,00	0,18	75,20	75,69	76,44	0,05	0,08	-12,9761									
25,0	217,0	21,4	0,9	5,9	372,3	448,8	71,6	102,4	394,4	284,1	386,5	368,8	428,0	0,18	74,42	74,85	77,09	0,18	75,13	75,69	76,47	0,05	0,08	-17,02978									
26,0	218,0	21,4	0,8	6,1	369,6	437,7	71,6	101,3	386,5	282,5	386,1	366,4	426,2	0,18	74,32	74,83	77,19	0,18	75,07	75,70	76,67	0,05	0,08	-19,80533									
27,0	219,0	21,2	0,8	6,3	367,1	430,9	70,9	100,2	383,2	280,4	384,6	363,1	424,3	0,18	74,21	74,81	77,28	0,18	74,98	75,66	76,75	0,05	0,07	-22,25208									
28,0	220,0	21,2	0,8	6,5	364,9	425,3	70,7	98,9	380,4	278,6	381,7	362,4	421,7	0,18	74,14	74,78	77,34	0,18	74,91	75,66	76,81	0,05	0,07	-24,43929									
29,0	221,0	21,0	0,9	6,6	363,2	419,9	70,8	99,6	379,5	277,0	380,6	358,8	420,1	0,18	74,27	74,46	77,45	0,18	74,97	75,67	76,91	0,05	0,07	-26,15428									
30,0	222,0	20,9	0,9	6,6	361,7	423,4	72,7	100,0	380,0	275,7	379,0	356,5	417,1	0,18	74,39	74,85	77,51	0,18	75,06	75,70	77,00	0,05	0,07	-27,716151									
31,0	223,0	20,8	0,8	6,3	362,2	432,5	71,4	100,6	388,9	274,7	376,2	356,4	413,9	0,18	74,42	74,86	77,60	0,18	75,08	75,72	77,04	0,05	0,07	-27,1334									
32,0	224,0	20,7	0,7	7,0	365,1	444,0	71,8	101,3	408,7	273,7	375,2	354,8	414,4	0,18	74,39	74,87	77,65	0,18	75,07	75,72	77,14	0,05	0,07	-24,2365									
33,0	225,0	20,5	0,8	8,0	376,8	470,5	71,4	102,7	471,3	272,3	374,7	355,3	410,5	0,18	74,33	74,85	77,70	0,18	75,00	75,70	77,24	0,05	0,08	-12,56414									
34,0	226,0	20,2	0,9	10,4	397,4	506,5	71,3	103,9	570,1	271,8	373,8	363,5	407,8	0,18	74,26	74,83	77,75	0,18	74,92	75,71	77,29	0,05	0,08	8,019583									
35,0	227,0	20,0	1,2	11,1	439,4	571,6	71,7	114,8	650,6	278,4	381,1	370,6	417,8	0,18	74,32	74,84	77,82	0,18	74,96	75,73	77,39	0,05	0,09	34,145911									
36,0	228,0	19,8	1,2	12,2	419,4	568,6	71,0	106,4	668,8	273,5	373,7	376,6	404,6	0,18	74,18	74,82	77,85	0,18	74,86	75,68	77,42	0,05	0,09	30,054648									
37,0	229,0	19,6	0,8	12,4	420,0	589,0	70,2	108,4	666,8	273,2	374,8	381,8	403,1	0,18	74,30	74,87	77,91	0,18	74,95	75,72	77,51	0,05	0,09	30,57885									
38,0	230,0	19,4	0,5	12,7	419,6	608,7	71,5	111,3	658,1	274,8	376,7	387,1	401,3	0,18	74,44	74,93	77,96	0,18	75,05	75,77	77,60	0,05	0,09	30,208291									
39,0	231,0	19,2	0,4	13,3	420,7	626,8	71,9	112,7	658,5	276,7	377,7	391,9	399,0	0,18	74,48	74,92	78,04	0,18	75,06	75,80	77,67	0,05	0,09	31,377316									
40,0	232,0	18,9	0,3	13,6	421,4	641,1	72,3	113,6	657,6	277,6	380,1	395,6	396,1	0,18	74,41	74,93	78,11	0,18	75,03	75,80	77,77	0,05	0,09	32,027499									
41,0	233,0	18,7	0,4	13,7	423,7	655,2	72,1	114,8	656,6	278,4	380,7	394,8	394,8	0,18	74,32	74,93	78,19	0,18	75,04	75,82	77,85	0,05	0,09	34,145911									
42,0	234,0	18,5	0,4	14,1	429,3	682,0	72,8	116,6	680,4	281,1	388,1	404,8	392,1	0,18	74,25	74,91	78,25	0,18	74,89	75,78	77,97	0,05	0,10	39,93782									
43,0	235,0	18,2	0,5	15,0	438,1	695,4	72,2	114,8	716,0	283,4	391,0	409,6	390,3	0,18	74,22	74,91	78,29	0,18	74,87	75,77	78,03	0,05	0,10	48,692453									
44,0	236,0	18,0	0,4	14,8	435,7	684,2	72,5	117,3	697,6	284,8	395,1	412,5	388,7	0,18	74,34	74,95	78,37	0,18	74,98	75,80	78,14	0,05	0,09	46,347635									
45,0	237,0	17,8	0,3	14,3	435,0	678,0	72,4	117,5	687,8	285,6	399,2	416,1	386,4	0,18	74,54	75,00	78,46	0,18	75,14	75,85	78,24	0,05	0,10	45,660647									
46,0	238,0	17,6	0,3	13,9	434,6	671,8	72,8	118,0	679,4	287,2	402,7	418,7	385,1	0,18	74,63	75																	

Table with 24 columns containing numerical data. The first 23 columns represent various identifiers or categories, and the 24th column represents a value. The data is organized in a grid format with multiple rows.

197,0	389,0	3,2	2,4	4,8	362,3	275,8	72,2	86,3	268,8	364,1	388,8	399,8	389,9	0,18	74,65	75,83	76,44	0,18	75,21	76,56	76,25	0,05	0,05	-27,09239
198,0	390,0	3,2	2,4	4,8	361,7	275,0	72,5	85,9	269,2	364,5	387,0	398,7	389,3	0,18	74,61	75,81	76,42	0,18	75,17	76,54	76,22	0,05	0,05	-27,62991
199,0	391,0	3,2	2,4	4,9	361,2	275,2	72,0	85,8	269,5	364,1	387,0	397,5	389,8	0,18	74,58	75,82	76,41	0,18	75,15	76,54	76,21	0,05	0,05	-28,16567
200,0	392,0	3,1	2,4	4,9	360,8	274,8	72,2	85,6	270,5	363,5	384,1	395,5	389,4	0,18	74,55	75,82	76,40	0,18	75,12	76,53	76,21	0,05	0,05	-28,57653
201,0	393,0	3,1	2,4	4,9	360,2	274,1	72,0	85,5	270,0	363,7	381,5	397,0	388,6	0,18	74,50	75,82	76,39	0,18	75,10	76,53	76,19	0,05	0,05	-29,21144
202,0	394,0	3,1	2,3	4,8	358,8	273,0	72,4	86,2	268,4	363,9	378,3	395,5	388,0	0,18	74,52	75,81	76,35	0,18	75,12	76,54	76,14	0,05	0,05	-30,57976
203,0	395,0	3,0	2,3	4,8	357,5	272,2	73,0	86,4	267,9	361,4	378,9	392,9	386,6	0,18	74,68	75,86	76,34	0,18	75,25	76,54	76,14	0,05	0,05	-31,84293
204,0	396,0	3,0	2,3	4,8	356,8	271,2	71,9	86,4	267,2	361,2	376,3	394,0	385,3	0,18	74,70	75,89	76,32	0,18	75,33	76,59	76,14	0,05	0,05	-32,56847
205,0	397,0	3,0	2,3	4,8	355,6	271,2	72,2	86,2	266,8	360,2	374,3	392,5	383,8	0,18	74,77	75,90	76,32	0,18	75,35	76,60	76,10	0,05	0,05	-33,77134
206,0	398,0	3,0	2,3	4,8	354,8	270,7	72,0	86,1	266,5	359,5	372,5	391,0	382,5	0,18	74,79	75,91	76,31	0,18	75,36	76,60	76,10	0,05	0,05	-34,83938
207,0	399,0	3,0	2,3	4,9	354,3	270,4	72,1	85,8	267,4	358,2	370,3	392,6	382,0	0,18	74,74	75,90	76,31	0,18	75,32	76,62	76,10	0,05	0,05	-35,08395
208,0	400,0	3,0	2,3	4,9	353,3	269,8	72,2	85,4	266,8	359,1	367,9	392,0	380,8	0,18	74,70	75,90	76,29	0,18	75,27	76,62	76,10	0,05	0,05	-36,06535
209,0	401,0	2,9	2,3	4,9	352,7	269,3	72,3	85,3	267,4	358,5	365,9	391,6	380,0	0,18	74,67	75,91	76,29	0,18	75,23	76,61	76,06	0,05	0,05	-36,67985
210,0	402,0	3,0	2,4	4,8	351,9	269,2	72,6	85,0	266,3	357,7	365,4	390,9	379,0	0,18	74,61	75,88	76,26	0,18	75,20	76,60	76,04	0,05	0,05	-37,49356
211,0	403,0	2,9	2,5	4,7	351,2	268,6	72,4	85,7	265,5	357,7	363,1	390,6	378,8	0,18	74,63	75,90	76,26	0,18	75,22	76,61	76,02	0,05	0,05	-38,22199
212,0	404,0	2,9	2,5	4,8	350,0	268,1	72,7	86,1	265,5	356,6	362,4	389,7	378,0	0,18	74,74	75,91	76,25	0,18	75,31	76,62	76,03	0,05	0,05	-39,38495
213,0	405,0	2,9	2,5	4,7	349,2	267,4	71,7	86,2	265,2	355,3	360,2	389,7	375,7	0,18	74,89	75,95	76,26	0,18	75,40	76,64	76,03	0,05	0,05	-40,16687
214,0	406,0	2,9	2,5	4,8	348,2	266,3	72,0	86,1	263,4	353,6	358,7	389,6	375,0	0,18	74,93	75,97	76,24	0,18	75,45	76,68	76,02	0,05	0,05	-41,19215
215,0	407,0	2,9	2,6	4,7	347,2	265,6	72,4	85,7	262,0	353,6	357,1	388,5	375,0	0,18	74,92	75,98	76,27	0,18	75,44	76,68	76,04	0,05	0,05	-42,12446
216,0	408,0	2,8	2,6	4,7	346,6	265,2	72,0	85,5	259,7	352,8	355,9	389,4	375,2	0,18	74,90	76,00	76,28	0,18	75,46	76,70	76,02	0,05	0,05	-42,76681
217,0	409,0	2,8	2,6	4,6	346,2	264,7	72,7	85,3	259,3	352,9	354,8	388,3	375,6	0,18	74,85	75,99	76,25	0,18	75,41	76,69	75,99	0,05	0,05	-43,18987
218,0	410,0	2,8	2,6	4,6	345,8	264,3	71,8	85,0	259,1	352,6	353,5	388,7	374,8	0,18	74,82	75,98	76,25	0,18	75,37	76,68	75,99	0,05	0,05	-43,61483
219,0	411,0	2,7	2,6	4,5	344,8	263,9	72,9	84,8	258,3	352,7	350,8	388,7	373,5	0,18	74,78	75,99	76,25	0,18	75,34	76,69	75,98	0,05	0,05	-44,58442
220,0	412,0	2,7	2,6	4,5	344,4	262,7	71,7	85,0	257,6	352,4	351,3	388,0	372,9	0,18	74,75	75,98	76,25	0,18	75,32	76,68	75,97	0,05	0,05	-44,93543
221,0	413,0	2,7	2,6	4,5	343,7	261,7	72,4	85,9	257,2	351,8	348,9	388,8	371,7	0,18	74,76	75,97	76,23	0,18	75,34	76,68	75,97	0,05	0,05	-45,70561
222,0	414,0	2,7	2,5	4,6	343,3	260,8	72,6	85,9	257,9	351,2	348,3	388,2	371,2	0,18	74,91	76,01	76,24	0,18	75,47	76,71	75,96	0,05	0,05	-46,02779
223,0	415,0	2,7	2,5	4,6	342,7	260,4	72,1	85,9	256,7	351,1	347,7	387,5	370,7	0,18	74,97	76,04	76,24	0,18	75,52	76,74	75,94	0,05	0,05	-46,71344
224,0	416,0	2,6	2,5	4,6	341,8	259,9	73,0	85,6	256,0	350,9	345,9	388,1	368,2	0,18	74,99	76,05	76,22	0,18	75,55	76,73	75,96	0,05	0,05	-47,53446
225,0	417,0	2,7	2,5	4,6	340,5	259,7	71,9	85,1	255,6	349,0	345,0	386,2	366,5	0,18	74,98	76,05	76,21	0,18	75,54	76,73	75,95	0,05	0,05	-48,91819
226,0	418,0	2,6	2,5	4,6	340,1	259,6	71,1	85,1	254,9	348,5	343,8	386,5	365,9	0,18	74,97	76,05	76,22	0,18	75,51	76,75	75,93	0,05	0,05	-49,27141
227,0	419,0	2,6	2,5	4,6	339,5	258,7	71,7	84,9	254,0	347,5	343,4	386,2	366,6	0,18	74,88	76,03	76,21	0,18	75,45	76,73	75,94	0,05	0,05	-49,85149
228,0	420,0	2,6	2,6	4,5	338,9	258,1	72,2	84,5	254,7	346,9	341,1	385,7	366,0	0,18	74,84	76,03	76,20	0,18	75,42	76,74	75,92	0,05	0,05	-50,50071
229,0	421,0	2,6	2,5	4,5	337,9	257,2	72,1	84,4	253,5	345,2	339,9	385,0	365,0	0,18	74,80	76,02	76,19	0,18	75,40	76,72	75,91	0,05	0,05	-51,49889
230,0	422,0	2,5	2,5	4,5	337,2	257,7	71,3	84,8	253,4	345,6	337,5	386,5	362,7	0,18	74,82	76,02	76,20	0,18	75,38	76,73	75,91	0,05	0,05	-52,20712
231,0	423,0	2,5	2,5	4,6	336,2	256,3	72,8	85,7	253,5	344,8	335,9	385,8	360,8	0,18	74,92	76,02	76,15	0,18	75,46	76,73	75,89	0,05	0,04	-53,2112
232,0	424,0	2,5	2,6	4,5	335,4	255,9	72,5	85,5	252,0	343,9	335,5	385,8	359,7	0,18	75,02	76,05	76,15	0,18	75,54	76,75	75,90	0,05	0,05	-53,98673
233,0	425,0	2,5	2,6	4,5	334,8	255,3	71,8	85,5	251,0	342,5	334,4	386,5	359,4	0,18	75,06	76,07	76,16	0,18	75,59	76,76	75,89	0,05	0,04	-54,61512
234,0	426,0	2,4	2,6	4,5	333,9	255,3	72,6	85,1	252,3	342,1	332,3	385,5	357,4	0,18	75,09	76,09	76,16	0,18	75,61	76,78	75,89	0,05	0,04	-55,42661
235,0	427,0	2,4	2,6	4,5	333,0	254,8	73,0	85,6	253,0	341,5	330,5	384,5	356,5	0,18	75,05	76,07	76,15	0,18	75,60	76,77	75,89	0,05	0,04	-56,3412
236,0	428,0	2,4	2,6	4,5	332,1	254,1	72,8	84,6	251,7	339,6	329,7	384,2	355,1	0,18	75,03	76,10	76,14	0,18	75,59	76,78	75,87	0,05	0,04	-57,23872
237,0	429,0	2,4	2,6	4,4	331,8	254,1	72,1	84,5	251,6	337,3	330,2	383,7	356,2	0,18	75,02	76,09	76,14	0,18	75,58	76,80	75,87	0,05	0,04	-57,55952
238,0	430,0	2,4	2,5	4,4	331,3	253,4	72,9	84,3	251,0	335,6	329,3	383,4	357,2	0,18	74,97	76,10	76,17	0,18	75,54	76,79	75,87	0,05	0,04	-58,06559
239,0	431,0	2,4	2,6	4,3	330,3	252,6	72,6	84,2	249,5	333,8	328,6	382,3	357,6	0,18	74,90	76,10	76,16	0,18	75,49	76,78	75,87	0,05	0,04	-59,02301
240,0	432,0	2,3	2,6	4,1	329,1	251,6	72,8	85,3	248,5	333,3	326,2	381,3	356,2	0,18	74,91	76,10	76,14	0,18	75,50	76,78	75,87	0,05	0,04	-60,28133
241,0	433,0	2,3	2,6	4,1	328,4	250,4	73,1	85,1	247,8	332,6	324,5	380,3	354,8	0,18	74,93	76,11	76,14	0,18	75,52	76,80	75,85	0,05	0,04	-61,7874
242,0	434,0	2,3	2,7	4,1	327,5	249,5	72,9	85,3	247,2	331,1	325,0	380,6	353,5	0,18	75,11	76,14	76,14	0,18	75,65	76,82	75,85	0,05	0,04	-61,90078
243,0	435,0	2,3	2,6	4,1	326,4	248,7	72,8	85,3	246,9	330,3	323,8	379,4	352,6	0,18	75,16	76,17	76,14	0,18	75,69	76,87	75,87	0,05	0,04	-62,97127
244,0	436,0	2,3	2,7	4,0	325,4	247,8	72,6	85,0	245,8	327,7	322,7	378,0	352,7	0,18	75,19	76,17	76,14	0,18	75,70	76,86	75,87	0,05	0,04	-63,95545
245,0	437,0	2,3	2,6	4,0	324,7	246,9	72,8	84,8	244,9	327,4	321,5	377,8	352,9	0,18	75,17	76,19	76,14	0,18	75,71	76,88	75,88	0,05	0,04	-64,66082
246,0	438,0	2,2	2,7	3,9	323,8	246,0	73,5	84,6	243,5	325,3	320,2	376,5	352,3	0,18	75,18	76,21	76,14	0,18	75,73	76,90	75,91	0,05	0,04	-65,6

298,0	490,0	1,3	2,4	4,0	285,6	226,1	72,7	82,2	219,1	297,8	293,6	315,0	302,4	0,18	75,21	76,45	76,15	0,18	75,65	77,09	75,77	0,05	0,04	-103,794
299,0	491,0	1,3	2,5	3,9	285,2	225,5	73,8	82,0	218,7	297,9	292,9	314,9	301,5	0,18	75,18	76,44	76,12	0,18	75,61	77,09	75,74	0,05	0,04	-104,1756
300,0	492,0	1,3	2,5	3,9	284,3	225,8	73,2	82,1	217,5	296,6	293,5	314,1	300,2	0,18	75,22	76,46	76,12	0,18	75,66	77,10	75,71	0,05	0,04	-105,0254
301,0	493,0	1,3	2,5	3,9	283,8	225,9	73,4	82,0	218,0	296,5	293,2	313,1	298,3	0,18	75,20	76,43	76,08	0,18	75,64	77,08	75,69	0,05	0,04	-105,611
302,0	494,0	1,3	2,5	3,9	283,2	225,4	72,5	82,0	217,9	295,3	293,9	311,6	297,4	0,18	75,19	76,42	76,08	0,18	75,64	77,06	75,70	0,05	0,04	-106,1311
303,0	495,0	1,3	2,5	3,8	282,6	225,5	75,8	82,0	217,7	294,2	293,1	311,0	296,9	0,18	75,16	76,42	76,05	0,18	75,62	77,07	75,68	0,05	0,04	-106,8006
304,0	496,0	1,2	2,5	3,9	282,1	225,4	74,7	81,8	217,9	293,5	292,8	310,2	295,9	0,18	75,14	76,41	76,05	0,18	75,60	77,06	75,65	0,05	0,04	-107,2832
305,0	497,0	1,2	2,4	3,9	281,3	225,1	74,8	81,9	217,7	292,9	291,3	310,0	294,4	0,18	75,15	76,38	76,05	0,18	75,60	77,03	75,65	0,05	0,04	-108,1082
306,0	498,0	1,2	2,3	4,0	281,0	224,4	74,2	81,9	216,6	292,6	291,7	309,5	293,6	0,18	75,14	76,39	76,02	0,18	75,58	77,02	75,64	0,05	0,04	-108,3639
307,0	499,0	1,2	2,4	3,9	280,5	223,7	72,7	81,9	217,1	292,0	292,1	308,9	292,4	0,18	75,12	76,38	76,01	0,18	75,56	77,01	75,63	0,05	0,04	-108,8737
308,0	500,0	1,2	2,3	3,9	280,2	223,7	72,9	81,8	216,0	291,0	292,7	308,0	291,1	0,18	75,10	76,38	76,00	0,18	75,56	77,01	75,59	0,05	0,04	-109,1363
309,0	501,0	1,1	2,3	3,8	279,5	223,2	72,1	81,7	215,9	289,6	292,6	307,5	292,1	0,18	75,11	76,39	76,01	0,18	75,55	77,01	75,59	0,05	0,04	-109,8237
310,0	502,0	1,2	2,3	3,9	279,1	223,2	73,1	81,8	216,0	289,3	291,8	307,1	291,1	0,18	75,09	76,37	75,98	0,18	75,51	77,01	75,59	0,05	0,04	-110,3174
311,0	503,0	1,1	2,3	3,8	278,7	223,2	74,2	81,7	215,4	288,8	291,4	306,1	291,7	0,18	75,07	76,36	75,98	0,18	75,50	77,00	75,58	0,05	0,04	-110,6892
312,0	504,0	1,1	2,4	3,8	278,0	222,5	72,5	81,7	214,6	288,2	290,5	306,3	290,3	0,18	75,03	76,34	75,95	0,18	75,47	76,97	75,55	0,05	0,04	-111,3889
313,0	505,0	1,1	2,4	3,8	277,7	222,0	73,2	81,7	214,2	287,9	290,4	305,3	290,5	0,18	75,03	76,34	75,94	0,18	75,46	76,96	75,53	0,05	0,04	-111,7182
314,0	506,0	1,1	2,4	3,7	276,8	221,9	72,7	81,6	214,6	287,3	288,9	304,4	288,7	0,18	75,04	76,35	75,93	0,18	75,48	76,96	75,51	0,05	0,04	-112,5652
315,0	507,0	1,0	2,4	3,7	276,6	221,5	74,4	81,6	214,8	286,8	289,4	303,9	288,0	0,18	75,03	76,33	75,91	0,18	75,46	76,94	75,50	0,05	0,04	-112,7863
316,0	508,0	1,0	2,4	3,7	275,8	221,5	73,1	81,6	214,5	285,6	288,6	303,7	286,6	0,18	75,01	76,32	75,92	0,18	75,46	76,94	75,51	0,05	0,04	-113,5696
317,0	509,0	1,0	2,4	3,8	275,3	221,6	73,0	81,5	214,4	285,2	288,7	302,9	285,2	0,18	75,00	76,31	75,90	0,18	75,45	76,91	75,49	0,05	0,04	-114,0828
318,0	510,0	1,0	2,4	3,8	274,8	221,8	73,2	81,4	214,5	284,4	288,3	301,7	285,3	0,18	75,00	76,31	75,90	0,18	75,44	76,90	75,47	0,05	0,04	-114,5426
319,0	511,0	0,9	2,5	3,9	274,8	222,0	72,5	81,5	215,1	283,5	289,4	301,9	284,3	0,18	74,99	76,31	75,86	0,18	75,43	76,91	75,45	0,05	0,04	-114,5719
320,0	512,0	0,9	2,5	3,9	274,8	222,0	72,8	81,2	215,3	283,4	288,5	302,0	284,6	0,18	74,97	76,30	75,84	0,18	75,42	76,89	75,46	0,05	0,04	-114,6008
321,0	513,0	0,9	2,5	3,9	273,9	222,2	72,8	81,3	214,6	282,5	287,7	301,5	283,4	0,18	74,91	76,28	75,83	0,18	75,38	76,87	75,45	0,05	0,04	-115,4305
322,0	514,0	1,0	2,5	3,8	274,0	221,9	72,5	81,2	214,5	282,4	288,4	301,3	283,6	0,18	74,86	76,27	75,81	0,18	75,33	76,86	75,43	0,05	0,04	-115,3456
323,0	515,0	0,9	2,4	3,9	273,8	221,3	72,3	81,2	215,4	282,9	287,1	301,2	282,2	0,18	74,82	76,24	75,78	0,18	75,29	76,85	75,39	0,05	0,04	-115,6065
324,0	516,0	0,9	2,4	3,9	273,2	221,4	72,5	81,1	214,6	281,7	287,5	300,2	281,9	0,18	74,79	76,23	75,75	0,18	75,27	76,82	75,36	0,05	0,04	-116,2025
325,0	517,0	0,9	2,4	3,9	272,7	221,4	72,5	81,1	214,8	281,6	286,1	300,6	280,5	0,18	74,77	76,21	75,73	0,18	75,28	76,81	75,34	0,05	0,04	-116,6593
326,0	518,0	0,9	2,4	4,0	272,4	221,2	73,3	81,1	215,7	280,9	286,1	300,5	278,8	0,18	74,78	76,20	75,71	0,18	75,26	76,79	75,33	0,05	0,04	-116,9797
327,0	519,0	0,9	2,4	3,9	272,3	220,9	73,3	81,0	216,4	280,9	286,1	299,7	278,8	0,18	74,75	76,18	75,67	0,18	75,21	76,77	75,28	0,05	0,04	-117,0292
328,0	520,0	0,8	2,4	3,9	272,3	221,0	73,2	80,9	216,4	281,1	285,5	300,7	277,8	0,18	74,74	76,18	75,66	0,18	75,20	76,77	75,28	0,05	0,04	-117,0619
329,0	521,0	0,8	2,4	4,0	272,0	221,1	72,6	81,0	216,8	280,9	285,1	300,4	276,8	0,18	74,70	76,14	75,64	0,18	75,15	76,73	75,28	0,05	0,04	-117,3564
330,0	522,0	0,8	2,3	4,1	272,0	221,3	72,6	80,9	217,9	280,9	285,8	299,7	275,7	0,18	74,67	76,13	75,63	0,18	75,12	76,71	75,24	0,05	0,04	-117,3302
331,0	523,0	0,8	2,3	4,0	271,4	221,2	72,9	80,9	216,6	281,2	284,7	299,3	275,3	0,18	74,67	76,08	75,63	0,18	75,11	76,69	75,24	0,05	0,04	-117,9472
332,0	524,0	0,7	2,2	4,0	271,1	221,2	72,8	81,0	216,3	281,2	284,3	299,0	274,8	0,18	74,63	76,08	75,61	0,18	75,07	76,65	75,21	0,05	0,04	-118,26
333,0	525,0	0,8	2,3	3,9	271,1	221,0	72,6	80,9	216,3	280,8	284,1	298,6	275,6	0,18	74,65	76,08	75,58	0,18	75,06	76,65	75,18	0,05	0,04	-118,3099
334,0	526,0	0,7	2,1	4,0	270,0	220,6	73,7	80,9	214,9	280,0	282,8	297,7	274,8	0,18	74,65	76,06	75,58	0,18	75,07	76,65	75,19	0,05	0,04	-119,3283
335,0	527,0	0,7	1,9	4,2	270,0	220,1	73,3	80,9	214,9	279,6	283,5	296,6	275,2	0,18	74,66	76,04	75,56	0,18	75,06	76,64	75,17	0,05	0,04	-119,4008
336,0	528,0	0,7	1,8	4,2	270,0	220,0	73,0	80,9	215,9	279,2	283,6	296,4	274,3	0,18	74,66	76,04	75,56	0,18	75,08	76,62	75,16	0,05	0,04	-119,6056
337,0	529,0	0,7	1,8	4,1	268,8	219,9	72,8	80,8	214,3	278,6	281,4	295,6	274,0	0,18	74,66	76,04	75,51	0,18	75,09	76,62	75,15	0,05	0,04	-120,5761
338,0	530,0	0,7	1,9	4,1	268,7	220,5	72,9	80,9	214,7	278,3	281,8	295,0	273,7	0,18	74,67	76,03	75,53	0,18	75,07	76,59	75,14	0,05	0,04	-120,6593
339,0	531,0	0,6	2,0	4,0	268,1	220,4	72,8	80,9	214,8	277,9	281,8	293,7	272,5	0,18	74,64	76,01	75,54	0,18	75,05	76,59	75,14	0,05	0,04	-121,2341
340,0	532,0	0,6	2,0	4,0	267,7	220,0	74,4	80,8	214,7	277,6	281,5	293,2	271,5	0,18	74,65	76,02	75,48	0,18	75,07	76,59	75,13	0,05	0,04	-121,6564
341,0	533,0	0,6	2,0	4,0	267,5	220,5	73,4	80,8	214,3	277,2	281,2	293,0	271,7	0,18	74,70	76,02	75,48	0,18	75,11	76,58	75,11	0,05	0,04	-121,8999
342,0	534,0	0,6	2,1	4,0	266,8	220,5	73,0	80,8	214,4	277,2	279,6	293,1	269,9	0,18	74,73	76,02	75,50	0,18	75,13	76,58	75,11	0,05	0,04	-122,5349
343,0	535,0	0,6	2,1	4,1	266,8	220,9	73,8	80,7	215,4	277,0	280,3	292,3	268,8	0,18	74,73	76,00	75,45	0,18	75,12	76,56	75,08	0,05	0,04	-122,6154
344,0	536,0	0,5	2,2	4,2	266,7	221,1	73,1	80,7	215,8	276,8	279,9	292,1	268,9	0,18	74,70	76,00	75,46	0,18	75,09	76,55	75,08	0,05	0,04	-122,6849
345,0	537,0	0,5	2,2	4,2	266,8	221,8	73,2	80,7	216,7	277,3	280,0	291,6	268,7	0,18	74,65	75,97	75,43	0,18	75,04	76,53	75,07	0,05	0,04	-122,5262
346,0	538,0	0,5	2,2	4,2	266,7	222,2	72,8	80,6	217,5	277,0	279,9	290,7	268,6	0,18	74,64	75,96	75,42	0,18	75,04	76,52	75,06	0,05	0,04	-122,6277
347,0	539,0	0,5	2,2	4,3	266,9	223,2	73,9	80,7	218,1	277,3	280,0	290,6	268,9	0,18	74,63	75,96	75,44	0,18	75,02	76,52	75,07	0,05	0,04	-122

SFBA EPA EMISSION RESULTS

RESULTS

**Average emission rate:** 4,3 g/hr

Burn Rate : 1,577 Dry kg/hr

**Test Duration:** 374 min

PRESSURE FACTOR: DGM 1 0,97524  
 DGM 2 0,97409  
 DGM 3 1,00078

BAROMETRIC PRESSURE  
 Average: 29,943409 in Hg  
 Start: 29,972939 in Hg  
 End: 29,913879 in Hg

TEMPERATURE FACTORS DGM 1 0,98649  
 DGM 2 0,98519  
 DGM 3 0,99122

DGM CONTROLLER VALUES

DGM 1 Final: 22774,673 Cuft  
 Initial: 22705,099 Cuft

VOLUMES SAMPLED DGM 1 66,122 SCft  
 DGM 2 67,680 SCft  
 DGM 3 30,608 SCft

DGM 2 Final: 20788,841 Cuft  
 Initial: 20717,491 Cuft

DGM #3 Final: 115,510 Cuft  
 Initial: 84,230 Cuft

TOTAL TUNNEL VOLUME : 106022

TEMPERATURES

DGM 1 535,233 °R  
 DGM 2 535,940 °R

SAMPLE RATIOS  
 Sample Train 1: 1603,422  
 Sample Train 2: 1566,520

CALIBRATION FACTORS

DGM 1 0,9879  
 DGM 2 0,9884  
 DGM #3 0,9864

Paticulate concentration  
 Sample Train 1 **0,000266** g/dscf  
 Sample Train 2 **0,000247** g/dscf  
 Room **0,000007** g/dscf

TUNNEL FLOW RATE: 283,481 Dscfm

TOTAL EMISSIONS  
 Sample Train 1 **27,53** g  
 Sample Train 2 **25,47** g

PARTICULATE CATCH  
 Total Sample Train 1: 17,60 mg  
 Total Sample Train 2: 16,70 mg  
 Total Sample Train 1 1st hour: 12,90 mg

EMISSION RATES  
 Sample Train 1 **4,42** g/hr  
 Sample Train 2 **4,09** g/hr

1st hour emission rate **20,68** g/hr

DEVIATION: 3,89%

Cs Train 1 Train 2  
 0,0002662 0,00024675

Manufacturer: foyer supreme  
Model: 38 fsc

Run: 3  
Project #: pi 20164  
Test Duration: 374 min

Note: In the "Input data", "Calc. % O<sub>2</sub>", "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

Overall Heating Efficiency: 65,25%  
Combustion Efficiency: 92,21%  
Heat Transfer Efficiency: 70,77%

	HHV	LHV
Eff	65,25%	70,53%
Comb Eff	92,21%	92,21%
HT Eff	70,77%	76,49%
Output	20 384	kJ/h
Burn Rate	1 58	kg/h
Grams CO	1 072	g
Input	31 239	kJ/h
MC wet	16,59	

Ultimate CO<sub>2</sub>  
CO<sub>2-ult</sub> 19,64  
F<sub>0</sub> 1,061

Heat Output:	19 337 Btu/h
Heat Input:	29 634 Btu/h
Burn Duration:	6,23 h
Burn Rate:	3,48 lb/h
Stack Temp:	428,2 Deg. F

Averages	1,69	6,86	1,56	20,38	12,67	194,04	22,54	83,5%	71,6%	58,3%	
INPUT DATA			Oxygen Calculation				Input Data		Combust Eff %	Heat Transfer %	Net Eff %
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO <sub>2</sub> [d]	Excess Air EA	Total O <sub>2</sub>	Calc. % O <sub>2</sub> [g]	Flue Gas (°C)	Room Temp (°C)			
0,00	11,78	0,27	4,00	359,3%	20,66	16,52	134,8	21,3	95,7%	71,8%	68,7%
1,00	11,77	0,34	1,04	1321,6%	20,85	19,64	135,1	21,6	83,4%	28,7%	24,0%
2,00	11,72	0,38	2,42	602,0%	20,76	18,15	165,7	21,6	90,4%	53,6%	48,4%
3,00	11,68	0,37	4,12	337,2%	20,64	16,34	190,1	21,8	94,1%	63,7%	59,9%
4,00	11,58	0,30	5,22	255,3%	20,58	15,20	202,8	21,8	96,1%	67,2%	64,6%
5,00	11,49	0,28	5,55	236,6%	20,55	14,86	221,7	22,5	96,6%	66,2%	64,0%
6,00	11,40	0,27	6,87	175,2%	20,47	13,46	248,9	22,3	97,4%	67,6%	65,8%
7,00	11,32	0,43	8,06	131,6%	20,38	12,11	276,0	22,4	96,1%	68,1%	65,4%
8,00	11,18	0,61	9,64	91,6%	20,26	10,32	290,3	22,0	95,3%	70,0%	66,7%
9,00	11,08	0,56	9,79	89,8%	20,26	10,19	283,4	22,2	95,7%	70,8%	67,8%
10,00	10,99	0,62	8,21	122,7%	20,36	11,84	320,7	21,8	94,5%	64,5%	60,9%
11,00	10,85	0,57	12,05	55,7%	20,11	7,77	340,5	22,0	96,4%	70,2%	67,7%
12,00	10,77	0,61	10,12	83,1%	20,23	9,81	311,8	22,3	95,5%	69,3%	66,1%
13,00	10,68	0,97	8,49	107,7%	20,32	11,34	296,8	21,9	91,7%	67,1%	61,6%
14,00	10,63	0,88	8,02	120,5%	20,35	11,89	293,4	22,2	92,0%	66,4%	61,1%
15,00	10,49	0,82	8,42	112,4%	20,33	11,49	298,8	21,9	92,9%	66,8%	62,1%
16,00	10,40	0,82	10,15	79,0%	20,22	9,65	352,2	22,2	94,0%	66,3%	62,3%
17,00	10,23	1,06	14,76	24,2%	19,90	4,61	393,7	22,4	94,5%	70,2%	66,3%
18,00	10,13	1,83	15,52	13,2%	19,79	3,36	369,0	21,9	91,2%	72,0%	65,7%
19,00	10,09	1,58	12,13	43,3%	20,03	7,11	332,6	22,0	90,5%	70,6%	63,9%
20,00	10,04	1,06	7,70	124,3%	20,36	12,13	299,2	22,1	90,2%	65,0%	58,6%
21,00	9,96	1,02	5,87	184,9%	20,48	14,10	276,7	22,5	88,2%	61,1%	53,9%
22,00	9,91	0,94	5,44	207,8%	20,52	14,61	261,0	22,4	88,3%	61,0%	53,9%
23,00	9,86	0,88	5,60	203,2%	20,51	14,47	248,7	21,8	89,3%	63,1%	56,3%
24,00	9,81	0,88	5,83	192,9%	20,50	14,23	238,8	22,2	89,7%	65,2%	58,5%
25,00	9,73	0,88	5,93	188,5%	20,49	14,12	231,5	22,3	89,8%	66,3%	59,6%
26,00	9,70	0,85	6,14	181,0%	20,48	13,91	225,4	22,0	90,4%	67,7%	61,2%
27,00	9,64	0,83	6,33	174,3%	20,47	13,72	221,6	21,6	90,8%	68,6%	62,3%
28,00	9,64	0,83	6,52	167,2%	20,45	13,52	218,5	21,5	91,1%	69,5%	63,3%
29,00	9,55	0,86	6,62	162,8%	20,45	13,40	215,5	22,1	90,9%	70,1%	63,7%
30,00	9,50	0,87	6,61	162,7%	20,45	13,40	217,4	22,6	90,8%	69,9%	63,5%
31,00	9,45	0,80	6,34	175,3%	20,47	13,73	222,5	21,9	91,2%	68,6%	62,6%
32,00	9,40	0,74	7,02	153,1%	20,43	13,04	228,9	22,1	92,4%	69,8%	64,5%
33,00	9,32	0,77	7,99	124,3%	20,36	11,99	243,3	21,9	93,0%	70,6%	65,7%
34,00	9,19	0,89	10,42	73,8%	20,19	9,33	263,6	21,9	93,6%	73,0%	68,4%
35,00	9,09	1,10	11,61	54,6%	20,10	7,95	281,9	22,0	92,9%	73,3%	68,1%
36,00	9,00	1,17	12,43	47,5%	20,06	7,33	298,1	21,7	92,8%	72,8%	67,6%
37,00	8,91	0,80	12,43	48,5%	20,07	7,23	309,5	22,2	95,1%	72,6%	69,0%
38,00	8,82	0,50	12,69	48,8%	20,07	7,12	320,4	21,9	96,9%	72,3%	70,0%
39,00	8,73	0,36	13,29	43,9%	20,04	6,57	330,5	22,1	97,9%	72,4%	70,8%
40,00	8,59	0,31	13,57	41,5%	20,02	6,30	338,4	22,4	98,2%	72,2%	70,9%
41,00	8,51	0,29	13,67	40,7%	20,02	6,20	346,2	22,3	98,3%	71,9%	70,7%
42,00	8,41	0,38	14,08	35,8%	19,99	5,71	361,1	22,7	97,9%	71,4%	69,9%
43,00	8,28	0,47	15,00	26,9%	19,92	4,68	368,6	22,3	97,5%	71,9%	70,1%
44,00	8,19	0,38	14,77	29,6%	19,94	4,98	362,3	22,5	98,0%	72,1%	70,6%
45,00	8,09	0,33	14,35	33,9%	19,97	5,46	358,9	22,5	98,2%	71,8%	70,6%
46,00	8,00	0,33	13,87	38,4%	20,00	5,97	355,4	22,7	98,2%	71,6%	70,2%
47,00	7,91	0,35	13,64	40,4%	20,02	6,20	354,3	22,5	98,0%	71,4%	69,9%
48,00	7,83	0,37	13,14	45,4%	20,05	6,72	349,1	22,8	97,8%	71,1%	69,6%
49,00	7,69	0,38	13,30	43,6%	20,04	6,54	346,9	22,7	97,8%	71,4%	69,9%
50,00	7,64	0,39	13,31	43,3%	20,04	6,53	345,1	22,7	97,7%	71,5%	69,9%
51,00	7,55	0,39	13,16	45,0%	20,05	6,70	342,0	22,5	97,7%	71,5%	69,9%
52,00	7,47	0,39	13,04	46,3%	20,05	6,82	339,7	22,6	97,7%	71,6%	69,9%
53,00	7,37	0,39	13,11	45,5%	20,05	6,75	338,5	22,3	97,7%	71,7%	70,0%
54,00	7,27	0,35	13,22	44,7%	20,04	6,65	338,2	22,7	97,9%	71,9%	70,4%
55,00	7,19	0,34	13,40	42,9%	20,03	6,46	339,6	22,8	98,0%	72,0%	70,6%
56,00	7,10	0,32	13,83	38,8%	20,01	6,01	343,3	22,7	98,2%	72,2%	70,9%
57,00	7,00	0,30	14,20	35,5%	19,98	5,64	346,8	22,3	98,4%	72,4%	71,2%
58,00	6,87	0,26	14,58	32,4%	19,96	5,25	350,7	22,8	98,6%	72,6%	71,5%
59,00	6,79	0,26	14,87	29,8%	19,94	4,94	354,8	22,4	98,7%	72,6%	71,6%
60,00	6,69	0,27	14,97	28,9%	19,93	4,83	359,5	23,2	98,6%	72,5%	71,4%
61,00	6,60	0,26	15,12	27,7%	19,92	4,67	362,0	22,6	98,7%	72,4%	71,5%
62,00	6,51	0,25	15,20	27,1%	19,92	4,59	366,2	22,5	98,7%	72,3%	71,4%
63,00	6,42	0,24	15,22	27,0%	19,92	4,58	369,0	22,9	98,8%	72,2%	71,3%
64,00	6,33	0,23	15,06	28,5%	19,93	4,76	369,8	22,6	98,8%	72,0%	71,1%
65,00	6,19	0,23	15,14	27,8%	19,93	4,68	371,4	22,6	98,8%	71,9%	71,1%
66,00	6,10	0,22	15,16	27,7%	19,92	4,65	373,0	23,1	98,9%	71,9%	71,1%
67,00	6,02	0,21	15,14	28,0%	19,93	4,69	373,3	23,0	98,9%	71,9%	71,1%
68,00	5,96	0,21	15,04	28,8%	19,93	4,79	375,4	23,2	98,9%	71,7%	70,9%
69,00	5,83	0,19	15,00	29,3%	19,94	4,84	374,8	23,0	99,1%	71,7%	71,0%
70,00	5,74	0,17	14,87	30,6%	19,95	4,99	373,5	22,9	99,1%	71,6%	71,0%
71,00	5,66	0,15	14,76	31,8%	19,96	5,12	372,7	23,1	99,2%	71,6%	71,0%
72,00	5,56	0,14	14,59	33,3%	19,97	5,31	371,5	22,8	99,3%	71,4%	70,9%
73,00	5,47	0,12	14,49	34,4%	19,98	5,42	368,7	22,5	99,4%	71,5%	71,1%
74,00	5,38	0,12	14,38	35,5%	19,98	5,55	367,7	22,5	99,4%	71,4%	71,0%
75,00	5,29	0,11	14,28	36,6%	19,99	5,66	365,9	22,9	99,5%	71,5%	71,1%
76,00	5,24	0,11	14,15	37,8%	20,00	5,80	364,4	23,4	99,5%	71,4%	71,1%
77,00	5,15	0,10	14,08	38,5%	20,00	5,87	363,1	22,6	99,5%	71,4%	71,1%
78,00	5,06	0,10	14,03	39,0%	20,01	5,93	361,0	22,7	99,5%	71,5%	71,1%
79,00	4,97	0,10	13,92	40,1%	20,01	6,05	359,7	23,1	99,5%	71,4%	71,1%
80,00	4,92	0,10	13,85	40,8%	20,02	6,12	358,9	22,8	99,5%	71,4%	71,1%
81,00	4,83	0,10	13,74	42,0%	20,03	6,24	355,6	23,1	99,5%	71,5%	71,1%
82,00	4,75	0,09	13,53	44,2%	20,04	6,46	353,6	23,0	99,6%	71,4%	71,1%
83,00	4,70	0,09	13,42	45,4%	20,05	6,58	353,1	22,7	99,6%	71,3%	71,0%
84,00	4,61	0,10	13,32	46,3%	20,05	6,68	351,1	23,3	99,5%	71,3%	71,0%
85,00	4,52	0,09	13,30	46,6%	20,06	6,71	350,4	22,8	99,5%	71,3%	71,0%
86,00	4,47	0,09	13,26	47,1%	20,06	6,75	348,9	23,2	99,6%	71,3%	71,0%
87,00	4,38	0,08	13,29	46,9%	20,06	6,73	349,6	23,0	99,6%	71,3%	71,1%
88,00	4,34	0,08	13,27	47,1%	20,06	6,74	348,8	23,0	99,6%	71,4%	71,1%
89,00	4,25	0,08	13,29	46,9%	20,06	6,73	348,4	22,8	99,6%	71,4%	71,1%
90,00	4,20	0,08	13,37	46,0%	20,05	6,64	349,2	23,2	99,7%	71,5%	71,2%
91,00	4,11	0,07	13,49	44,9%	20,04	6,52	349,9	22,6	99,7%	71,5%	71,3%
92,00	4,02	0,08	13,65	43,0%	20,03	6,34	351,5	23,1	99,6%	71,6%	71,4%



93,00	3,98	0,08	13,79	41,6%	20,02	6,20	352,0	23,0	99,6%	71,7%	71,5%
94,00	3,89	0,07	13,73	42,3%	20,03	6,26	352,0	22,7	99,7%	71,7%	71,4%
95,00	3,84	0,07	13,67	43,0%	20,03	6,33	353,6	23,3	99,7%	71,5%	71,3%
96,00	3,75	0,06	13,45	45,4%	20,05	6,56	352,5	22,5	99,8%	71,3%	71,2%
97,00	3,70	0,06	13,22	47,9%	20,06	6,81	349,8	22,7	99,8%	71,2%	71,1%
98,00	3,62	0,07	12,88	51,7%	20,09	7,17	347,0	23,0	99,7%	71,0%	70,8%
99,00	3,57	0,09	12,41	57,1%	20,11	7,66	343,3	22,8	99,6%	70,7%	70,4%
100,00	3,53	0,10	12,10	61,0%	20,13	7,98	340,7	23,3	99,5%	70,4%	70,1%
101,00	3,47	0,12	11,94	63,0%	20,14	8,15	336,7	23,6	99,4%	70,5%	70,1%
102,00	3,43	0,13	11,89	63,4%	20,15	8,19	334,1	23,0	99,3%	70,6%	70,0%
103,00	3,34	0,16	11,79	64,5%	20,15	8,29	331,5	23,1	99,1%	70,6%	70,0%
104,00	3,30	0,17	11,67	65,9%	20,16	8,40	328,6	23,3	99,0%	70,6%	69,9%
105,00	3,25	0,20	11,56	67,2%	20,16	8,51	326,9	23,5	98,8%	70,6%	69,7%
106,00	3,21	0,22	11,46	68,2%	20,17	8,60	324,9	23,5	98,6%	70,6%	69,6%
107,00	3,16	0,22	11,40	69,0%	20,17	8,66	323,0	23,4	98,6%	70,6%	69,6%
108,00	3,11	0,24	11,37	69,1%	20,17	8,68	320,7	22,8	98,5%	70,7%	69,6%
109,00	3,07	0,26	11,29	70,1%	20,18	8,76	318,1	23,4	98,3%	70,8%	69,6%
110,00	3,03	0,29	11,22	70,7%	20,18	8,81	315,8	22,7	98,1%	70,8%	69,5%
111,00	2,98	0,32	11,06	72,6%	20,19	8,97	313,8	22,9	97,8%	70,7%	69,2%
112,00	2,94	0,36	11,00	73,0%	20,19	9,02	311,7	23,3	97,6%	70,8%	69,0%
113,00	2,89	0,37	10,88	74,5%	20,20	9,13	309,9	22,6	97,4%	70,7%	68,9%
114,00	2,85	0,41	10,75	76,1%	20,20	9,25	307,1	22,3	97,1%	70,6%	68,6%
115,00	2,79	0,44	10,63	77,5%	20,21	9,36	303,9	22,2	96,9%	70,7%	68,6%
116,00	2,75	0,48	10,37	81,0%	20,22	9,61	298,8	22,6	96,5%	70,7%	68,2%
117,00	2,74	0,49	9,44	97,7%	20,28	10,59	293,0	22,9	96,1%	69,5%	66,8%
118,00	2,71	0,56	8,96	106,2%	20,31	11,07	288,5	22,8	95,4%	69,0%	65,8%
119,00	2,66	0,68	8,52	113,5%	20,33	11,47	283,6	22,8	94,1%	68,4%	64,4%
120,00	2,62	0,77	8,36	115,1%	20,34	11,59	278,7	23,1	93,2%	68,5%	63,8%
121,00	2,57	0,92	8,14	116,8%	20,34	11,74	273,3	22,9	91,9%	68,4%	62,9%
122,00	2,53	0,98	8,17	114,5%	20,34	11,67	270,9	22,9	91,4%	68,7%	62,7%
123,00	2,49	0,93	8,40	110,5%	20,32	11,46	267,9	23,1	92,0%	69,5%	63,9%
124,00	2,49	0,89	8,54	108,4%	20,32	11,34	264,9	23,0	92,4%	70,0%	64,7%
125,00	2,43	0,87	8,60	107,3%	20,31	11,27	260,2	22,9	92,6%	70,5%	65,3%
126,00	2,39	1,00	8,31	111,0%	20,33	11,52	256,3	23,4	91,3%	70,2%	64,1%
127,00	2,39	1,06	8,03	116,2%	20,34	11,78	254,6	23,3	90,6%	69,8%	63,2%
128,00	2,34	1,14	7,89	117,5%	20,34	11,88	252,0	23,0	89,9%	69,7%	62,6%
129,00	2,34	1,08	8,37	107,9%	20,32	11,41	250,5	22,9	90,8%	70,8%	64,3%
130,00	2,30	1,19	7,93	115,4%	20,34	11,81	245,6	22,4	89,4%	70,3%	62,8%
131,00	2,30	1,28	7,42	126,0%	20,37	12,31	242,5	22,3	88,1%	69,4%	61,1%
132,00	2,26	1,28	7,30	129,0%	20,37	12,44	237,8	22,5	88,0%	69,5%	61,2%
133,00	2,26	1,34	7,10	132,8%	20,38	12,61	233,5	22,7	87,2%	69,5%	60,6%
134,00	2,21	1,35	7,05	133,7%	20,39	12,66	229,5	22,7	87,0%	69,7%	60,7%
135,00	2,21	1,45	6,92	134,8%	20,39	12,75	226,4	22,6	86,1%	69,7%	60,0%
136,00	2,21	1,42	6,88	136,6%	20,39	12,80	222,8	22,6	86,3%	69,9%	60,3%
137,00	2,21	1,48	6,85	135,7%	20,39	12,80	219,6	22,7	85,7%	70,2%	60,1%
138,00	2,12	1,60	6,67	137,6%	20,39	12,93	217,6	22,6	84,4%	69,9%	59,0%
139,00	2,12	1,58	6,71	137,2%	20,39	12,90	215,1	22,8	84,7%	70,2%	59,5%
140,00	2,12	1,57	6,69	138,0%	20,40	12,92	212,6	22,4	84,7%	70,4%	59,6%
141,00	2,07	1,96	6,32	137,1%	20,39	13,09	211,0	22,7	81,0%	69,6%	56,3%
142,00	2,07	1,95	6,31	138,0%	20,39	13,11	209,0	22,7	81,0%	69,7%	56,5%
143,00	2,07	1,63	6,69	136,1%	20,39	12,89	206,9	22,9	84,2%	71,0%	59,8%
144,00	2,03	1,66	6,54	139,5%	20,40	13,03	204,8	22,8	83,7%	70,8%	59,3%
145,00	2,03	1,70	6,44	141,3%	20,40	13,11	203,6	22,7	83,2%	70,7%	58,8%
146,00	1,98	1,73	6,31	144,4%	20,41	13,24	201,1	22,4	82,7%	70,6%	58,3%
147,00	1,98	1,89	6,05	147,6%	20,42	13,43	197,6	22,0	80,9%	70,2%	56,7%
148,00	1,98	2,04	5,80	150,5%	20,42	13,60	194,8	21,9	79,1%	69,7%	55,1%
149,00	1,94	2,21	5,55	153,1%	20,43	13,77	192,6	22,6	77,2%	69,3%	53,4%
150,00	1,94	2,26	5,48	153,7%	20,43	13,82	189,5	21,7	76,6%	69,3%	53,1%
151,00	1,94	2,34	5,40	153,8%	20,43	13,86	186,6	21,9	75,8%	69,4%	52,6%
152,00	1,89	2,51	5,23	153,6%	20,43	13,94	183,9	22,2	74,1%	69,2%	51,3%
153,00	1,94	2,29	5,35	157,1%	20,44	13,94	181,2	22,4	76,0%	69,9%	53,2%
154,00	1,89	2,30	5,29	158,9%	20,44	14,00	179,1	22,6	75,7%	70,0%	53,0%
155,00	1,89	2,37	5,30	156,2%	20,43	13,95	176,9	22,2	75,3%	70,2%	52,9%
156,00	1,89	2,41	5,25	156,5%	20,43	13,98	175,4	22,0	74,9%	70,2%	52,6%
157,00	1,85	2,56	5,10	156,3%	20,43	14,05	173,3	22,0	73,3%	69,9%	51,3%
158,00	1,85	2,45	5,14	158,9%	20,44	14,08	171,4	21,8	74,2%	70,3%	52,2%
159,00	1,85	2,55	5,12	156,0%	20,43	14,04	169,2	22,2	73,5%	70,5%	51,8%
160,00	1,85	2,51	5,18	155,3%	20,43	13,99	167,7	22,5	74,0%	70,9%	52,4%
161,00	1,81	2,56	5,14	155,3%	20,43	14,02	166,3	22,0	73,5%	70,9%	52,1%
162,00	1,81	2,50	5,22	154,3%	20,43	13,96	165,0	22,5	74,1%	71,3%	52,9%
163,00	1,81	2,54	5,21	153,7%	20,43	13,95	163,8	22,5	73,9%	71,4%	52,7%
164,00	1,76	2,50	5,21	155,0%	20,43	13,98	162,7	22,2	74,1%	71,5%	53,0%
165,00	1,81	2,47	5,27	153,6%	20,43	13,92	161,8	22,0	74,5%	71,8%	53,5%
166,00	1,76	2,46	5,29	153,4%	20,43	13,91	160,4	22,4	74,6%	72,0%	53,8%
167,00	1,76	2,44	5,25	155,2%	20,43	13,96	159,2	22,2	74,6%	72,1%	53,8%
168,00	1,71	2,49	5,21	155,1%	20,43	13,98	158,1	22,6	74,1%	72,1%	53,5%
169,00	1,71	2,47	5,25	154,5%	20,43	13,94	157,7	22,3	74,5%	72,3%	53,8%
170,00	1,71	2,44	5,27	154,8%	20,43	13,94	156,6	21,9	74,7%	72,4%	54,1%
171,00	1,71	2,42	5,27	155,6%	20,43	13,96	155,9	22,2	74,9%	72,5%	54,3%
172,00	1,66	2,45	5,22	156,1%	20,43	13,99	155,0	22,2	74,5%	72,5%	54,0%
173,00	1,67	2,46	5,17	157,4%	20,44	14,03	153,8	21,9	74,3%	72,4%	53,8%
174,00	1,66	2,46	5,16	157,7%	20,44	14,05	152,8	22,2	74,2%	72,5%	53,8%
175,00	1,66	2,47	5,14	158,2%	20,44	14,06	151,9	21,8	74,1%	72,6%	53,8%
176,00	1,66	2,44	5,12	159,7%	20,44	14,10	150,6	22,4	74,2%	72,7%	54,0%
177,00	1,62	2,48	5,11	159,0%	20,44	14,09	149,8	22,3	73,9%	72,8%	53,8%
178,00	1,62	2,48	5,12	158,5%	20,44	14,08	148,6	22,0	74,0%	72,9%	53,9%
179,00	1,62	2,42	5,08	161,9%	20,44	14,16	147,8	22,4	74,2%	72,9%	54,1%
180,00	1,62	2,44	5,11	160,1%	20,44	14,11	147,1	22,4	74,2%	73,1%	54,3%
181,00	1,62	2,44	5,11	160,0%	20,44	14,11	146,6	22,0	74,2%	73,1%	54,2%
182,00	1,58	2,44	5,12	159,7%	20,44	14,10	146,1	22,1	74,2%	73,2%	54,3%
183,00	1,58	2,42	5,12	160,5%	20,44	14,11	145,3	21,9	74,4%	73,3%	54,5%
184,00	1,58	2,41	5,09	162,1%	20,45	14,15	144,3	22,2	74,3%	73,3%	54,5%
185,00	1,58	2,33	4,98	168,6%	20,46	14,31	143,1	22,6	74,6%	73,3%	54,7%
186,00	1,53	2,34	4,86	172,8%	20,46	14,43	141,8	22,3	74,1%	73,1%	54,2%
187,00	1,53	2,32	4,83	174,5%	20,47	14,47	141,1	22,3	74,1%	73,1%	54,2%
188,00	1,53	2,33	4,78	176,0%	20,47	14,52	140,0	22,4	73,9%	73,1%	54,0%
189,00	1,49	2,35	4,79	174,9%	20,47	14,50	139,5	22,0	73,8%	73,1%	54,0%
190,00	1,49	2,38	4,76	175,2%	20,47	14,52	138,8	22,2	73,5%	73,1%	53,7%
191,00	1,49	2,38	4,75	175,3%	20,47	14,52	138,2	21,9	73,4%	73,2%	53,7%
192,00	1,49	2,36	4,77	175,5%	20,47	14,52	137,4	22,0	73,6%	73,3%	53,9%
193,00	1,49	2,38	4,76	175,0%	20,47	14,52	136,7	22,4	73,5%	73,4%	53,9%
194,00	1,49	2,40	4,81	172,4%	20,46	14,45	136,2	22,6	73,5%	73,6%	54,1%
195,00	1,49	2,40	4,81	172,4%	20,46	14,45	135,4	22,2	73,5%	73,7%	54,1%
196,00	1,44	2,43	4,80	171,7%	20,46						

207,00	1,35	2,30	4,86	174,2%	20,47	14,45	132,4	22,3	74,4%	74,2%	55,2%
208,00	1,35	2,29	4,88	173,7%	20,47	14,44	132,1	22,3	74,5%	74,3%	55,4%
209,00	1,30	2,33	4,85	173,6%	20,47	14,45	131,8	22,4	74,2%	74,3%	55,1%
210,00	1,35	2,42	4,80	172,2%	20,46	14,46	131,8	22,6	73,3%	74,1%	54,4%
211,00	1,30	2,47	4,75	172,0%	20,46	14,48	131,4	22,5	72,7%	74,0%	53,8%
212,00	1,30	2,49	4,77	170,5%	20,46	14,45	131,2	22,6	72,7%	74,1%	53,9%
213,00	1,30	2,50	4,74	171,6%	20,46	14,48	130,8	22,1	72,5%	74,0%	53,7%
214,00	1,30	2,55	4,76	168,7%	20,46	14,42	130,2	22,2	72,3%	74,1%	53,6%
215,00	1,30	2,61	4,67	169,8%	20,46	14,49	129,8	22,5	71,5%	73,9%	52,8%
216,00	1,26	2,53	4,73	170,6%	20,46	14,46	129,6	22,2	72,3%	74,1%	53,6%
217,00	1,26	2,62	4,60	171,9%	20,46	14,55	129,3	22,6	71,1%	73,8%	52,5%
218,00	1,26	2,63	4,55	173,5%	20,47	14,60	129,1	22,1	70,9%	73,7%	52,3%
219,00	1,21	2,62	4,55	174,1%	20,47	14,61	128,8	22,7	71,0%	73,8%	52,4%
220,00	1,21	2,63	4,55	173,5%	20,47	14,60	128,1	22,1	70,9%	73,8%	52,3%
221,00	1,21	2,60	4,52	175,9%	20,47	14,65	127,6	22,5	71,0%	73,8%	52,4%
222,00	1,21	2,55	4,57	176,1%	20,47	14,63	127,1	22,6	71,6%	74,0%	53,0%
223,00	1,21	2,50	4,57	177,9%	20,47	14,66	126,9	22,3	71,9%	74,0%	53,2%
224,00	1,17	2,48	4,60	177,4%	20,47	14,63	126,6	22,8	72,2%	74,2%	53,6%
225,00	1,21	2,51	4,60	176,3%	20,47	14,62	126,5	22,2	71,9%	74,2%	53,4%
226,00	1,17	2,51	4,62	175,5%	20,47	14,60	126,4	22,3	72,0%	74,2%	53,4%
227,00	1,17	2,50	4,60	176,7%	20,47	14,62	125,9	22,1	72,0%	74,2%	53,5%
228,00	1,17	2,58	4,49	177,7%	20,47	14,69	125,6	22,3	71,0%	74,0%	52,5%
229,00	1,17	2,54	4,50	178,9%	20,47	14,70	125,7	22,3	71,4%	74,0%	52,8%
230,00	1,13	2,48	4,54	179,7%	20,48	14,69	125,4	21,9	71,9%	74,1%	53,3%
231,00	1,13	2,52	4,55	177,6%	20,47	14,66	124,6	22,7	71,7%	74,3%	53,3%
232,00	1,13	2,55	4,53	177,5%	20,47	14,67	124,4	22,5	71,4%	74,3%	53,0%
233,00	1,13	2,57	4,45	179,7%	20,48	14,74	124,0	22,1	71,0%	74,0%	52,5%
234,00	1,08	2,56	4,49	178,6%	20,47	14,70	124,1	22,6	71,2%	74,2%	52,8%
235,00	1,08	2,52	4,56	177,5%	20,47	14,66	123,8	22,5	71,7%	74,4%	53,3%
236,00	1,08	2,55	4,50	178,7%	20,47	14,70	123,4	22,9	71,2%	74,3%	53,0%
237,00	1,08	2,56	4,43	181,0%	20,48	14,77	123,4	22,3	70,9%	74,1%	52,6%
238,00	1,08	2,54	4,44	181,6%	20,48	14,77	123,0	22,7	71,1%	74,2%	52,8%
239,00	1,08	2,57	4,33	184,8%	20,48	14,87	122,6	22,5	70,5%	73,9%	52,1%
240,00	1,03	2,64	4,12	190,8%	20,49	15,06	121,9	22,7	69,1%	73,4%	50,7%
241,00	1,03	2,66	4,08	191,2%	20,49	15,08	121,4	22,9	68,8%	73,3%	50,4%
242,00	1,03	2,66	4,06	192,3%	20,50	15,11	120,8	22,7	68,7%	73,3%	50,4%
243,00	1,03	2,64	4,06	193,3%	20,50	15,12	120,4	22,7	68,9%	73,4%	50,5%
244,00	1,03	2,65	3,98	196,3%	20,50	15,20	119,8	22,6	68,4%	73,2%	50,1%
245,00	1,03	2,61	3,95	199,3%	20,51	15,25	119,4	22,7	68,6%	73,2%	50,2%
246,00	0,98	2,69	3,86	199,9%	20,51	15,30	118,9	23,0	67,5%	73,0%	49,3%
247,00	0,98	2,65	3,82	203,3%	20,51	15,36	118,5	23,2	67,9%	72,9%	49,3%
248,00	0,98	2,63	3,82	204,2%	20,51	15,37	117,9	22,9	67,8%	73,0%	49,5%
249,00	0,98	2,62	3,80	205,8%	20,52	15,40	117,5	23,4	67,8%	73,0%	49,5%
250,00	0,98	2,61	3,75	209,0%	20,52	15,47	116,8	24,2	67,7%	73,1%	49,5%
251,00	0,98	2,61	3,77	207,7%	20,52	15,44	115,9	23,4	67,7%	73,2%	49,5%
252,00	0,98	2,64	3,71	209,1%	20,52	15,49	115,4	22,6	67,2%	72,9%	49,0%
253,00	0,94	2,64	3,64	212,3%	20,52	15,56	114,9	22,7	66,9%	72,8%	48,7%
254,00	0,94	2,64	3,61	214,2%	20,53	15,59	113,9	22,5	66,8%	72,8%	48,6%
255,00	0,94	2,50	3,39	233,5%	20,55	15,91	113,3	23,0	66,6%	72,1%	48,0%
256,00	0,90	2,62	3,49	221,8%	20,54	15,74	113,0	22,4	66,3%	72,4%	48,0%
257,00	0,94	2,64	3,60	214,8%	20,53	15,61	112,8	22,8	66,7%	72,9%	48,6%
258,00	0,90	2,67	3,64	211,2%	20,52	15,55	112,0	22,8	66,7%	73,2%	48,8%
259,00	0,90	2,50	3,97	203,7%	20,51	15,29	112,0	22,4	69,5%	74,3%	51,6%
260,00	0,90	2,49	3,97	204,0%	20,51	15,30	111,8	22,3	69,5%	74,3%	51,6%
261,00	0,90	2,49	3,97	204,2%	20,51	15,30	111,4	22,6	69,5%	74,4%	51,7%
262,00	0,85	2,51	3,96	203,6%	20,51	15,29	111,1	23,0	69,4%	74,5%	51,7%
263,00	0,88	2,50	3,90	207,1%	20,52	15,37	111,0	22,6	69,2%	74,3%	51,3%
264,00	0,85	2,53	3,87	206,8%	20,52	15,38	110,7	22,7	68,7%	74,2%	51,0%
265,00	0,85	2,56	3,82	207,8%	20,52	15,42	110,6	22,4	68,3%	74,0%	50,6%
266,00	0,85	2,56	3,84	206,8%	20,52	15,40	110,3	22,9	68,4%	74,2%	50,7%
267,00	0,85	2,56	3,86	205,9%	20,52	15,37	110,3	22,5	68,6%	74,2%	50,9%
268,00	0,85	2,57	3,89	204,1%	20,51	15,34	110,3	22,7	68,6%	74,3%	51,0%
269,00	0,82	2,56	3,93	202,9%	20,51	15,31	110,3	22,4	68,8%	74,4%	51,2%
270,00	0,81	2,49	3,97	203,9%	20,51	15,29	110,2	22,2	69,5%	74,5%	51,8%
271,00	0,81	2,47	4,00	203,6%	20,51	15,28	110,0	23,3	69,8%	74,8%	52,2%
272,00	0,81	2,50	4,00	202,2%	20,51	15,26	109,7	23,1	69,6%	74,8%	52,1%
273,00	0,81	2,50	4,00	202,0%	20,51	15,26	109,7	23,1	69,6%	74,8%	52,1%
274,00	0,76	2,50	4,01	201,4%	20,51	15,24	109,6	23,6	69,6%	74,9%	52,2%
275,00	0,76	2,55	4,01	199,4%	20,51	15,22	109,6	23,0	69,2%	74,8%	51,8%
276,00	0,76	2,56	4,02	198,3%	20,51	15,20	109,6	22,7	69,2%	74,8%	51,8%
277,00	0,76	2,57	4,03	197,7%	20,50	15,19	109,7	22,6	69,3%	74,8%	51,8%
278,00	0,76	2,58	4,02	197,6%	20,50	15,19	109,8	22,4	69,1%	74,7%	51,7%
279,00	0,76	2,61	4,00	197,2%	20,50	15,20	109,9	22,9	68,8%	74,7%	51,4%
280,00	0,72	2,63	3,95	198,3%	20,51	15,24	109,8	22,4	68,4%	74,5%	51,0%
281,00	0,72	2,61	3,93	200,4%	20,51	15,27	109,9	22,8	68,5%	74,5%	51,0%
282,00	0,72	2,58	3,94	201,0%	20,51	15,28	109,8	22,4	68,7%	74,5%	51,2%
283,00	0,72	2,49	4,06	199,8%	20,51	15,20	109,9	22,7	69,9%	74,9%	52,4%
284,00	0,72	2,47	4,04	201,7%	20,51	15,24	109,7	22,4	70,0%	74,8%	52,4%
285,00	0,72	2,52	3,93	204,6%	20,51	15,32	109,6	22,7	69,2%	74,6%	51,6%
286,00	0,67	2,49	3,81	211,9%	20,52	15,47	109,4	22,4	68,8%	74,2%	51,0%
287,00	0,67	2,49	3,82	211,4%	20,52	15,46	109,2	22,9	68,8%	74,3%	51,1%
288,00	0,67	2,54	3,74	213,0%	20,53	15,52	108,9	23,1	68,1%	74,1%	50,4%
289,00	0,67	2,54	3,73	213,5%	20,53	15,53	108,7	23,0	68,1%	74,1%	50,4%
290,00	0,67	2,57	3,72	212,3%	20,52	15,52	108,7	22,5	67,8%	74,0%	50,2%
291,00	0,62	2,63	3,68	211,4%	20,52	15,53	108,6	22,4	67,8%	73,8%	49,6%
292,00	0,63	2,62	3,76	207,7%	20,52	15,44	108,2	22,6	67,6%	74,2%	50,1%
293,00	0,62	2,61	3,79	207,1%	20,52	15,42	108,0	22,3	67,8%	74,2%	50,4%
294,00	0,62	2,57	3,90	203,6%	20,51	15,33	107,9	22,6	68,6%	74,7%	51,2%
295,00	0,62	2,55	3,85	207,0%	20,52	15,40	107,8	22,6	68,5%	74,5%	51,0%
296,00	0,62	2,47	3,88	209,2%	20,52	15,41	107,9	22,8	69,2%	74,7%	51,7%
297,00	0,62	2,37	4,00	207,9%	20,52	15,33	107,9	22,6	70,5%	75,1%	52,9%
298,00	0,58	2,37	4,00	208,6%	20,52	15,34	107,8	22,6	70,6%	75,1%	53,0%
299,00	0,58	2,46	3,89	209,2%	20,52	15,40	107,5	23,2	69,4%	74,8%	51,9%
300,00	0,58	2,45	3,91	208,8%	20,52	15,39	107,7	22,9	69,5%	74,8%	52,0%
301,00	0,58	2,48	3,85	210,4%	20,52	15,43	107,7	22,4	69,1%	74,5%	51,5%
302,00	0,58	2,51	3,86	208,5%	20,52	15,41	107,4	22,5	68,9%	74,6%	51,4%
303,00	0,58	2,49	3,84	210,4%	20,52	15,44	107,5	24,3	68,9%	74,8%	51,6%
304,00	0,53	2,46	3,88	209,9%	20,52	15,41	107,4	23,7	69,3%	74,9%	51,9%
305,00	0,53	2,41	3,94	209,4%	20,52	15,38	107,3	23,8	70,0%	75,1%	52,5%
306,00	0,53	2,35	3,96	211,2%	20,52	15,38	106,9	23,5	70,6%	75,2%	53,1%
307,00	0,53	2,35	3,91	213,3%	20,53	15,43	106,5	22,6	70,3%	75,0%	52,7%
308,00	0,53	2,34	3,88	215,8%	20,53	15,48	106,5	22,7	70,3%	74,9%	52,7%
309,00	0,49	2,34	3,82	219,0%	20,53	15,55	106,2	22,3	70,0%	74,7%	52,3%
310,00	0,53	2									

321,00	0,41	2,50	3,90	207,0%	20,52	15,37	105,7	22,7	69,2%	75,0%	51,9%
322,00	0,45	2,48	3,85	210,6%	20,52	15,44	105,5	22,5	69,1%	74,9%	51,7%
323,00	0,40	2,45	3,87	211,0%	20,52	15,43	105,1	22,4	69,4%	75,0%	52,0%
324,00	0,40	2,38	3,94	210,9%	20,52	15,39	105,2	22,5	70,2%	75,2%	52,8%
325,00	0,40	2,39	3,93	210,9%	20,52	15,40	105,0	22,5	70,1%	75,2%	52,7%
326,00	0,40	2,43	3,96	207,4%	20,52	15,34	105,1	23,0	69,9%	75,3%	52,7%
327,00	0,40	2,44	3,93	208,3%	20,52	15,37	104,9	22,9	69,7%	75,3%	52,4%
328,00	0,36	2,45	3,92	208,6%	20,52	15,38	105,0	22,9	69,6%	75,2%	52,4%
329,00	0,36	2,38	3,95	209,9%	20,52	15,37	105,1	22,5	70,2%	75,3%	52,9%
330,00	0,36	2,30	4,08	207,5%	20,52	15,28	105,2	22,6	71,4%	75,7%	54,1%
331,00	0,36	2,30	3,97	213,2%	20,53	15,40	105,1	22,7	71,0%	75,4%	53,5%
332,00	0,31	2,25	3,96	216,2%	20,53	15,44	105,1	22,7	71,4%	75,4%	53,8%
333,00	0,36	2,27	3,92	217,3%	20,53	15,47	105,0	22,6	71,0%	75,3%	53,5%
334,00	0,30	2,07	3,96	225,6%	20,54	15,54	104,8	23,2	72,9%	75,6%	55,1%
335,00	0,30	1,85	4,18	225,8%	20,54	15,44	104,5	22,9	75,6%	76,3%	57,8%
336,00	0,30	1,84	4,16	227,6%	20,54	15,47	104,4	22,7	75,7%	76,3%	57,7%
337,00	0,30	1,84	4,10	230,7%	20,55	15,53	104,4	22,7	75,4%	76,1%	57,4%
338,00	0,30	1,87	4,06	231,1%	20,55	15,55	104,7	22,7	75,0%	75,9%	56,9%
339,00	0,26	1,97	3,98	230,5%	20,55	15,59	104,7	22,7	73,8%	75,7%	55,8%
340,00	0,26	2,01	3,99	227,1%	20,54	15,54	104,4	23,6	73,5%	75,8%	55,7%
341,00	0,26	2,03	4,02	224,6%	20,54	15,50	104,7	23,0	73,4%	75,8%	55,7%
342,00	0,26	2,06	4,03	222,8%	20,54	15,48	104,7	22,8	73,2%	75,8%	55,5%
343,00	0,26	2,09	4,05	219,5%	20,53	15,43	104,9	23,2	73,0%	75,8%	55,4%
344,00	0,22	2,19	4,16	209,6%	20,52	15,27	105,1	22,8	72,6%	76,0%	55,2%
345,00	0,22	2,20	4,19	207,6%	20,52	15,23	105,5	22,9	72,7%	76,0%	55,3%
346,00	0,22	2,23	4,22	204,9%	20,51	15,18	105,7	22,6	72,6%	76,0%	55,2%
347,00	0,22	2,21	4,27	203,0%	20,51	15,13	106,2	23,3	73,0%	76,2%	55,6%
348,00	0,22	2,07	4,37	204,7%	20,51	15,10	106,3	23,0	74,4%	76,5%	56,9%
349,00	0,22	2,09	4,28	208,6%	20,52	15,20	106,3	23,2	74,0%	76,3%	56,4%
350,00	0,17	2,22	4,07	212,4%	20,52	15,35	106,1	22,9	72,0%	75,6%	54,5%
351,00	0,17	2,26	3,97	215,0%	20,53	15,42	106,1	22,6	71,3%	75,3%	53,7%
352,00	0,21	2,34	3,86	216,5%	20,53	15,50	106,2	22,7	70,1%	74,9%	52,5%
353,00	0,17	2,40	3,81	216,3%	20,53	15,52	106,1	22,7	69,5%	74,7%	51,9%
354,00	0,17	2,41	3,85	213,9%	20,53	15,48	106,0	23,1	69,5%	74,9%	52,1%
355,00	0,17	2,37	3,91	212,8%	20,53	15,43	106,0	23,1	70,1%	75,1%	52,7%
356,00	0,13	2,36	3,91	213,2%	20,53	15,44	106,1	23,0	70,2%	75,1%	52,7%
357,00	0,13	2,36	3,93	212,2%	20,52	15,41	105,9	22,5	70,3%	75,1%	52,8%
358,00	0,13	2,35	3,93	212,5%	20,53	15,42	106,2	22,5	70,4%	75,1%	52,9%
359,00	0,13	2,29	4,02	211,0%	20,52	15,35	106,6	22,6	71,2%	75,3%	53,7%
360,00	0,08	2,29	4,11	206,7%	20,52	15,26	106,7	22,8	71,6%	75,6%	54,1%
361,00	0,13	2,22	4,13	209,2%	20,52	15,28	106,5	22,6	72,3%	75,7%	54,7%
362,00	0,08	1,84	4,28	221,2%	20,54	15,34	106,3	22,7	76,1%	76,3%	58,1%
363,00	0,08	1,79	4,31	221,8%	20,54	15,33	106,0	23,1	76,7%	76,5%	58,7%
364,00	0,08	1,81	4,30	221,9%	20,54	15,34	106,1	22,9	76,5%	76,5%	58,5%
365,00	0,08	1,80	4,26	224,2%	20,54	15,38	106,0	22,4	76,4%	76,3%	58,3%
366,00	0,08	1,75	4,24	228,0%	20,54	15,43	106,2	22,7	76,8%	76,3%	58,5%
367,00	0,04	1,73	4,22	230,2%	20,55	15,46	106,3	22,6	76,9%	76,2%	58,6%
368,00	0,04	1,73	4,20	231,5%	20,55	15,49	106,5	22,6	76,9%	76,1%	58,5%
369,00	0,04	1,77	4,13	232,9%	20,55	15,54	106,4	23,2	76,2%	76,0%	57,9%
370,00	0,04	1,79	4,07	235,1%	20,55	15,59	106,7	22,7	75,8%	75,7%	57,4%
371,00	0,04	1,83	4,03	235,3%	20,55	15,61	106,6	22,4	75,2%	75,6%	56,8%
372,00	0,04	2,04	3,81	236,0%	20,55	15,73	106,4	22,8	72,4%	74,9%	54,2%
373,00	0,04	2,12	3,84	229,6%	20,55	15,65	106,8	22,6	71,8%	74,8%	53,7%
374,00	0,00	2,28	4,26	200,4%	20,51	15,11	107,6	22,5	72,4%	75,9%	54,9%

Time acquisition minutes	Flue		Room		Tunnel		scale		Tunnel Velocity		Flue draft		CO		CO2		Right		Back		bottom		Top		Left	
	temp °F	temp °F	dry bulb °F	lbs	in. Wc	Pressure	Pressure	%	%	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F
1	66.18	65.31	79.20	29.73	0.0543	0.00	0.00	0.07	62.25	62.29	62.33	64.26	62.12													
2	74.08	65.21	79.81	29.73	0.0551	0.00	0.00	0.05	62.58	62.79	62.53	70.20	62.22													
3	73.92	65.24	78.78	29.73	0.0543	0.00	0.00	0.07	63.09	63.92	62.71	74.06	62.37													
4	72.51	65.16	77.53	29.73	0.0551	0.00	0.00	0.04	63.48	64.80	62.89	73.75	62.67													
5	72.04	65.24	76.79	29.73	0.0548	0.00	0.00	0.02	63.80	65.38	63.05	73.27	62.98													
6	72.46	65.18	77.56	29.72	0.0551	0.00	0.00	0.09	64.03	65.80	63.23	73.91	63.24													
7	72.78	65.52	78.82	29.72	0.0548	0.00	0.00	0.05	64.36	66.16	63.45	74.54	63.51													
8	76.09	65.51	80.01	29.73	0.0538	0.00	0.00	0.02	64.70	66.36	63.69	75.43	63.83													
9	90.65	65.81	80.13	29.72	0.0531	0.00	0.00	0.02	65.23	66.70	63.99	85.84	64.13													
10	97.00	65.78	79.83	29.52	0.0543	0.01	0.00	0.02	65.98	67.04	64.33	87.87	64.52													
11	204.20	65.99	92.76	29.33	0.0529	0.03	0.00	0.02	68.32	68.01	65.03	136.40	64.99													
12	332.41	66.01	114.04	29.23	0.0507	0.05	0.00	0.02	75.63	70.46	66.75	253.75	66.45													
13	430.55	65.95	136.16	28.72	0.0482	0.06	0.00	0.02	88.15	76.15	70.56	388.40	70.48													
14	510.33	66.18	157.50	28.33	0.0463	0.07	0.00	0.02	102.60	86.97	76.99	490.73	78.01													
15	512.73	66.18	136.68	27.92	0.0480	0.07	0.00	0.02	115.31	101.61	86.76	523.02	89.33													
16	433.35	66.17	110.04	27.82	0.0505	0.07	0.00	0.07	125.25	112.60	96.07	461.30	102.10													
17	402.06	66.08	101.48	27.62	0.0510	0.07	0.00	0.02	129.52	119.87	104.88	425.13	113.69													
18	385.53	66.34	97.66	27.53	0.0524	0.06	0.00	0.02	131.07	125.13	113.30	404.96	122.78													
19	376.93	66.29	96.43	27.23	0.0519	0.06	0.00	0.00	134.66	129.79	121.35	392.73	129.73													
20	376.06	66.07	96.60	27.12	0.0526	0.06	0.00	0.00	137.34	133.40	128.85	385.54	134.15													
21	385.47	66.29	97.64	26.93	0.0519	0.06	0.00	0.00	140.66	136.67	136.22	384.87	137.88													
22	393.53	66.52	97.19	26.73	0.0524	0.07	0.00	0.02	145.09	139.31	143.38	386.25	140.30													
23	399.50	66.30	96.94	26.54	0.0514	0.07	0.00	-0.01	149.76	141.65	150.49	391.06	142.71													
24	405.78	66.21	97.03	26.29	0.0529	0.07	0.00	0.02	153.73	141.84	156.74	387.18	145.62													
25	413.74	66.86	99.94	26.03	0.0526	0.07	0.00	-0.01	154.65	133.59	159.40	359.18	150.00													
26	424.12	66.16	102.20	25.83	0.0524	0.07	0.00	-0.01	157.35	129.50	164.20	365.98	155.05													
27	426.63	66.66	104.44	25.61	0.0522	0.07	0.00	-0.01	160.47	128.74	170.39	372.99	162.78													
28	430.72	67.51	104.67	25.32	0.0522	0.07	0.00	-0.01	164.91	129.28	177.00	377.47	169.70													
29	438.21	67.32	104.97	25.14	0.0526	0.07	0.00	-0.01	169.14	130.98	184.69	384.87	176.90													
30	454.75	69.98	106.28	24.82	0.0514	0.07	0.00	-0.01	173.60	133.53	193.86	401.43	184.74													
31	498.86	68.50	109.43	24.53	0.0519	0.08	0.00	0.04	178.34	137.28	203.18	449.58	193.03													
32	527.55	67.98	112.66	24.14	0.0519	0.08	0.00	0.04	184.83	141.06	214.01	484.36	200.46													
33	568.54	69.78	117.29	23.83	0.0519	0.08	0.00	0.07	192.20	146.05	224.21	531.21	209.72													
34	693.95	68.44	124.94	23.44	0.0512	0.10	0.00	0.32	199.27	152.24	232.81	642.34	218.27													
35	699.61	63.37	125.33	23.13	0.0502	0.09	0.00	0.05	203.97	157.07	238.13	621.65	225.52													
36	620.53	64.81	119.74	22.94	0.0512	0.08	0.00	0.08	209.12	161.69	244.22	557.81	229.63													
37	545.77	64.88	115.20	22.74	0.0514	0.08	0.00	0.35	214.08	165.38	249.45	482.25	233.48													
38	570.15	66.80	117.73	22.33	0.0519	0.08	0.00	0.58	220.45	169.73	258.79	454.36	237.27													
39	605.73	66.65	120.42	22.04	0.0514	0.09	0.25	2.50	227.57	174.71	268.95	471.63	242.97													
40	649.39	66.18	122.83	21.73	0.0522	0.09	0.59	17.27	235.92	180.26	279.53	554.45	249.37													
41	618.72	66.65	120.46	21.43	0.0505	0.09	0.60	17.85	242.47	184.75	289.33	520.89	254.28													
42	567.38	67.72	116.40	21.24	0.0514	0.08	0.60	17.89	248.06	186.89	297.74	459.39	258.16													
43	528.29	68.80	111.81	21.05	0.0514	0.08	0.60	17.93	253.06	187.99	303.17	426.97	262.07													
44	501.53	67.85	110.88	20.84	0.0531	0.08	0.60	17.93	256.71	188.77	310.00	413.19	262.04													
45	475.60	68.99	109.79	20.59	0.0531	0.07	0.60	17.94	260.77	188.58	314.51	358.97	258.97													
46	458.19	67.80	107.98	20.44	0.0519	0.08	0.60	17.95	263.40	187.82	318.14	372.15	258.26													
47	443.69	68.03	105.94	20.25	0.0514	0.07	0.60	17.93	265.18	186.99	320.97	360.10	257.49													
48	430.60	67.44	104.65	20.03	0.0529	0.07	0.22	10.20	267.66	186.12	323.36	346.57	256.59													
49	423.85	66.96	103.46	19.84	0.0529	0.07	0.20	9.77	269.73	185.57	326.32	340.82	257.19													
50	417.28	67.78	102.59	19.75	0.0536	0.07	0.20	9.72	271.74	185.16	330.06	334.95	257.86													
51	415.27	68.40	103.43	19.55	0.0536	0.07	0.20	9.72	273.42	185.34	332.01	328.14	257.84													
52	413.57	68.48	103.14	19.33	0.0526	0.07	0.20	9.71	274.31	185.22	334.14	323.28	258.61													
53	423.37	67.05	102.79	19.14	0.0529	0.07	0.20	9.71	275.35	185.62	334.94	316.40	258.99													
54	443.32	69.06	103.13	18.94	0.0524	0.07	0.05	2.31	275.93	185.63	336.13	314.76	259.32													
55	455.73	67.84	103.14	18.84	0.0526	0.08	0.01	3.35	276.02	185.85	337.56	317.41	259.26													
56	495.35	68.16	104.61	18.64	0.0538	0.08	0.00	0.12	278.17	186.07	338.32	379.37	260.06													
57	527.10	68.81	106.96	18.44	0.0526	0.08	0.00	0.08	278.93	186.58	340.01	488.84	260.14													
58	542.30	69.41	108.12	18.25	0.0522	0.08	0.00	0.10	279.78	186.60	340.99	539.84	260.55													
59	561.66	67.88	109.81	17.96	0.0477	0.09	0.00	0.05	280.70	187.78	339.88	619.86	262.38													
60	589.40	69.29	112.08	17.83	0.0480	0.09	0.00	0.03	281.43	188.78	339.71	684.81	263.17													
61	620.78	68.84	114.20	17.55	0.0470	0.09	0.00	0.02	282.78	189.87	339.85	735.42	264.87													
62	657.02	68.59	116.50	17.35	0.0470	0.09	0.00	0.02	284.60	191.98	338.61	771.97	267.23													
63	687.72	69.34	120.51	17.16	0.0475	0.09	0.00	0.02	286.50	194.59	338.72	793.62	268.80													
64	710.33	69.50	123.92	16.94	0.0473	0.10	0.00	0.00	289.66	196.84	339.17	807.47	270.95													
65	719.70	68.66	123.25	16.74	0.0465	0.10	0.00	0.02	293.32	199.20	340.06	811.66	273.66													
66	722.97	68.78	122.37	16.45	0.0465	0.10	0.00	0.03	295.95	201.29	340.13	818.01	276.13													
67	721.21	69.16	121.92	16.24	0.0470	0.10	0.00	0.05	299.55	202.84	340.15	823.40	280.24													
68	718.64	69.22	120.69	16.04	0.0468	0.10	0.00	0.08	303.03	204.87	341.66	828.62	284.48													
69	714.05	68.76	120.07	15.85	0.0470	0.10	0.00	0.03	306.85	207.30	342.64	829.44	289.45													
70	711.03	69.48	120.27	15.66	0.0475	0.10	0.00	0.00	310.47	209.31	344.94	827.59	293.24													
71	710.94	68.57	120.48	15.44	0.0463	0.10	0.00	0.02	313.98	210.92	345.33	828.48	299.70													
72	713.81	69.10	120.67	15.25	0.0465	0.10	0.00	0.00	317.57	213.69	345.58	829.58	304.70													
73	719.34	68.40	120.37	15.05	0.0468	0.10	0.00	0.00	320.78	215.78	346.79	828.95	307.31													
74	724.48	69.03	121.46	14.86	0.0465	0.10	0.00	0.03	324.08	217.88	348.63	829.84	308.92													
75	731.94	68.57	120.75	14.65	0.0468	0.10	0.00	0.03	327.57	220.74	349.49	836.59	312.74													
76	740.43	69.07	122.97	14.45	0.0465	0.10	0.00	0.00	331.48	223.22	351.17	842.30	315.41													
77	751.71	69.37	124.62	14.25	0.0468	0.10	0.00	0.00	334.93	225.66	354.02	843.75	319.27													
78	760.68	68.93	126.30	13.95	0.0470	0.10	0.00	0.03	338.76	228.81	355.57	846.54	324.74													
79	771.54	69.06	126.47	13.84	0.0465	0.10	0.00	0.02	344.37	231.49	357.53	850.98	329.36													
80	783.26	69.72	127.50	13.56	0.0502	0.10	0.00	0.02	348.40	235.13	361.09	855.55	334.22													
81	797.55	69.65	128.75	13.36	0.0458	0.10	0.00	0.03	352.50	238.66	363.48	861.10	339.22													
82	813.65	69.26	130.23	13.05	0.0465	0.10	0.00	0.02	357.54	243.67	367.67	868.84	344.83													
83	827.88	70.23	131.85	12.86																						

105	599,19	70,99	119,00	8,15	0,0468	0,09	0,00	0,00	502,30	340,60	523,68	569,16	465,74
106	581,10	71,20	117,20	7,97	0,0480	0,09	0,00	0,00	503,10	341,89	528,15	550,31	468,19
107	661,48	71,20	209,14	8,36	0,0446	0,09	0,00	0,00	508,50	345,93	532,04	504,73	468,80
108	669,86	71,34	135,75	7,47	0,0465	0,09	0,00	0,00	512,80	349,85	541,24	605,03	462,17
109	659,71	71,24	124,89	7,47	0,0463	0,09	0,00	0,05	515,90	352,44	548,45	628,73	462,67
110	645,61	71,07	120,04	7,27	0,0473	0,09	0,00	0,02	518,62	355,45	552,73	618,15	464,26
111	632,18	72,30	117,33	7,17	0,0473	0,09	0,00	0,02	521,45	358,19	555,80	599,12	465,94
112	622,87	71,65	117,68	7,08	0,0470	0,09	0,00	0,08	524,02	361,36	555,82	586,28	469,98
113	610,29	70,86	117,00	6,96	0,0477	0,09	0,00	0,05	525,10	363,11	556,75	572,91	474,57
114	597,64	71,84	115,24	6,86	0,0477	0,09	0,00	0,18	526,06	364,21	557,16	556,86	478,07
115	580,94	71,95	113,19	6,77	0,0482	0,08	0,00	0,08	529,03	365,33	557,70	537,37	479,71
116	564,08	72,14	112,14	6,67	0,0482	0,08	0,00	0,03	528,99	366,03	557,91	516,83	483,14
117	548,51	71,56	109,38	6,57	0,0480	0,08	0,00	0,12	529,57	367,81	558,53	498,98	486,06
118	532,99	72,21	108,98	6,48	0,0475	0,08	0,00	0,13	530,47	366,56	558,69	483,50	486,52
119	519,34	71,08	108,75	6,47	0,0477	0,08	0,00	0,03	530,97	366,90	557,99	468,95	489,29
120	504,17	71,52	107,52	6,38	0,0480	0,08	0,00	0,03	528,93	367,66	556,26	456,16	491,82
121	483,88	72,05	163,12	11,22	0,0436	0,06	0,00	0,03	525,89	369,30	554,52	423,33	489,04
122	480,80	72,24	159,46	6,07	0,0456	0,07	0,00	0,02	524,12	372,65	554,92	403,67	489,89
123	496,82	71,53	118,04	5,97	0,0473	0,08	0,00	0,15	526,49	373,98	554,86	439,21	491,52
124	486,74	71,68	108,49	5,97	0,0482	0,08	0,00	0,08	528,46	379,31	553,66	440,94	494,60
125	477,45	71,83	105,74	5,97	0,0485	0,08	0,00	0,12	528,78	384,31	552,82	433,42	496,27
126	470,64	72,22	104,11	5,77	0,0475	0,07	0,00	0,03	531,43	387,45	550,16	424,56	495,47
127	462,92	71,35	103,42	5,77	0,0477	0,07	0,00	0,03	532,75	390,92	547,65	416,66	496,90
128	455,96	71,23	102,06	5,77	0,0480	0,07	0,00	0,05	531,82	393,27	545,88	410,13	497,06
129	447,21	71,47	101,02	5,68	0,0487	0,07	0,00	0,05	532,32	394,70	542,81	403,14	495,46
130	439,06	72,02	99,91	5,67	0,0492	0,07	0,00	0,12	530,33	394,44	539,08	396,47	494,85
131	429,25	71,96	98,89	5,68	0,0494	0,07	0,79	5,01	527,03	393,40	535,86	387,58	493,81
132	417,25	71,14	97,31	5,58	0,0492	0,07	0,66	5,55	523,81	392,14	532,77	377,24	491,69
133	405,54	71,87	97,30	5,58	0,0480	0,07	0,85	5,11	522,47	388,32	530,45	364,84	486,73
134	396,15	71,95	97,25	5,58	0,0475	0,07	0,96	4,86	517,92	386,23	527,07	353,37	486,29
135	386,64	72,71	96,50	5,58	0,0492	0,06	0,21	4,85	513,51	383,92	523,04	343,91	483,30
136	377,90	71,70	95,52	5,48	0,0494	0,06	0,22	4,74	512,61	379,34	519,32	333,72	477,49
137	369,90	71,45	94,76	5,48	0,0482	0,06	0,23	4,66	506,09	376,05	515,09	325,29	473,98
138	362,03	71,58	93,53	5,48	0,0485	0,06	0,25	4,55	502,72	371,63	511,57	317,93	469,24
139	354,89	71,20	92,66	5,48	0,0485	0,06	0,26	4,44	496,98	367,60	508,50	309,66	466,91
140	348,30	72,14	93,27	5,48	0,0494	0,06	0,26	4,32	492,88	364,50	506,64	303,99	461,84
141	342,25	71,51	93,14	5,47	0,0492	0,06	0,26	4,41	489,29	359,75	504,73	299,53	458,09
142	337,97	70,83	92,70	5,48	0,0475	0,06	0,25	4,49	484,90	357,73	502,09	296,28	454,32
143	333,03	71,59	91,84	5,36	0,0492	0,06	0,25	4,52	479,07	353,84	497,63	291,28	450,86
144	328,48	71,36	91,36	5,36	0,0485	0,06	0,25	4,45	475,23	350,14	495,09	287,09	447,21
145	324,89	70,57	90,62	5,36	0,0492	0,06	0,25	4,46	470,65	348,24	491,80	284,26	444,06
146	319,77	70,68	89,83	5,36	0,0492	0,06	0,25	4,47	466,84	344,29	489,92	280,77	439,94
147	314,72	71,29	89,66	5,36	0,0498	0,06	0,27	4,03	461,96	341,72	487,64	278,71	436,25
148	311,39	70,91	90,14	5,27	0,0477	0,05	0,28	3,99	457,50	337,85	484,81	278,34	431,02

Date: 2018-03-19 Manufacturer: Foyer Supreme Model: 38 FSC  
 Project #: PJ 2014 Run: 3 Tech: M m Reviewer: DP

Left	Setting	- No kindling	29.7 LBS	SLANT FIRE	Fan 80% of maximum
		- DJ	28 LBS	close DOOR	
		- Setting	High (by metal)	15°	
		- DJ	99 LBS	BRASSER FEVE	
		DJ	700 LBS	tapochu d BRASSER FEVE	
		DJ	64 LBS	tapochu d Fair preparation FEVE	
		(channel)			
		DJ	53 LBS	metal load	
				close DOOR immediately	
				open air hole	

TEST LOAD CONFIGURATION

### PRE / POST CHECKS

 Date: 2018-03-19

 Manufacturer: Polymer Systems

 Model: 38<sup>FSC</sup> SFM

 Project #: PI 20164

 Run: 3

 Tech: MR

 Reviewer: DP

Moisture Meter Calibration Check:

**Facility Conditions:**

Air Velocity from less than 2 feet .....

Smoke Capture Check.....

Picture.....

**Wood Heater Conditions:**

Date Wood Heater Stack Cleaned.....

Date Dilution Tunnel Cleaned.....

Induced Draft Check (max 0.005 H2O).....

Traverse before ignition.....

Flow Rate 140 cfm ±10%.....

**Temperature System:**

Ambient (65°-90°F).....

Wood Heater Surface (±125°F).....

**Proportional Checks:**

Thermocouple check.....

Pitot Clean.....

Pitot verification.....

**Sampling Train ID Numbers:**

Probe.....

Filter Front.....

Filter Back.....

Filter Thermocouple.....

Filter (&lt;90°F).....

Equipment #	Time	12%	22%
EM-191	7:15	ok	ok

Pre-Test

Post-Test

2 (max50 Fpm)	3 (max50 Fpm)
ok	ok
4 sides ok	ok

2018-03-13
2018-03-13
ok
ok

ok
----

ok	°F
ok	°F

ok
ok
ok

Train 1 <sup>st</sup> hour	Train 1	Train 2
002	30	40
421	423	425
422	424	426
11	11	12
ok	ok	ok



### SAMPLING EQUIPMENT CHECK OUT

 Date: 2018-03-19

 Manufacturer: Fogon Supreme

 Model: 38 FSC

 Project #: PI 20164

 Run: 3

 Tech: MR

 Reviewer: BP

#### Leakage Checks Tunnel Samplers

	System 1 <sup>st</sup> hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Unplugged Flow Rate = .25cfm						
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	642936.44	644902.83	642926.70	644902.94	586651.01	588675.38
Initial 1minute DGM (Liter)	642936.41	644902.83	642936.63	644902.93	586651.01	588675.38
Change © (Liter)	0.03	∅	0.07	0.01	∅	∅
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	OK	OK	OK	OK	OK	OK

#### Leakage Checks Flue Gas Sampler

	Pre Test	Post Test
Plugged Probe		
Vacuum (inches Hg.)	-5	-5
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	OK	OK

#### Leakage Checks Pitot

	Pre Test 3 H <sub>2</sub> O static	Pre Test 0.4-0.5 H <sub>2</sub> O velocity	Post Test 3 H <sub>2</sub> O Static	Post Test 0.4-0.5 H <sub>2</sub> O velocity
Plugged Probe				
Vacuum (inches Hg.)	3	.5	.3	.4
Check OK (no change after 15 sec.)	OK	OK	OK	OK

OK  
mm



**PRE-TEST SCALE AUDIT**

Date: 2018-03-19      Manufacturer: Royce Supreme      Model: 38 FSC  
 Project #: PI 20164      Run: 3      Tech: mm      Reviewer: JP

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM 090	44 lbs, Class F	44 lbs
Wood	EM 090	44 lbs, Class F	44 lbs
Analytical	EM 128	100 mg, Class S	100 mg
Analytical	EM 129	200 g, Class S	200 g

**LIMITS OF WEIGHT RANGES**

**ANALYTICAL SCALE:** ..... 50%-150% of dry filter weight, ± 0.1 mg  
**PLATFORM SCALE:** ..... 20%-80% of ideal test load weight, ± 0.1 lbs or 1%  
**WOOD SCALE:** ..... 20%-80% of ideal test load weight, ± 0.01 lbs or 1%

Date: 2015-03-19 Manufacturer: Foga Supreme Model: 38 FSL  
 Project #: PI 20164 Run: 3 Tech: MM Reviewer: DP

FOR TUNNELS &lt; 12 in

 Barometric pressure ( $P_{bar}$ ) 101.5 (KPa.) Static pressure ( $P_q$ ) 0.12 (inches w.c.)  
 Inside diameter: Port A \_\_\_\_\_ Port B \_\_\_\_\_  
 Tunnel cross sectional area: .1963Ft<sup>2</sup>  
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head $\Delta_p$ (inches H <sub>2</sub> O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.056	65.09
B - Centroid	3.00	3.50	4	0.056	70.31
A-1	0.40	0.50	0.50	0.051	67.88
A-2	1.50	1.75	2	0.056	68.13
A-3	4.50	5.25	6	0.061	68.99
A-4	5.60	6.5	7.5	0.048	69.36
B-1	0.40	0.50	0.50	0.051	71.05
B-2	1.50	1.75	2	0.058	71.99
B-3	4.50	5.25	6	0.059	72.81
B-4	5.60	6.5	7.5	0.047	72.77
				AVERAGE	

$$v_s = K_p C_p (\sqrt{\Delta p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

- Where,
- $C_p$  = pitot tube coefficient, dimension less = 0.99 for standard pitot.
  - $\Delta_p$  = manometer reading (inches H<sub>2</sub>O)
  - $T_s$  = average absolute dilution tunnel temperature (°F + 460)
  - $P_s$  = absolute dilution tunnel gas pressure or  $P_{bar} + P_{qg}$
  - $P_q$  = static pressure in H<sub>2</sub>O { 13.6 }
  - $M_s$  = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)
  - $K_p$  = 85.49 pitot tube constant, (conversion factor for English units)

$\Delta_p$  avg. = average of the square roots of the velocity heads ( $\Delta_p$ ) measured at each traverse point.



**CONTINUOUS ANALYZERS**

 Date: 2018-03-19

 Manufacturer: Fogen Supreme

 Model: 38 FSC

 Project #: PI 20164

 Run: 3

 Tech: MM

 Reviewer: DD
**Pre-Test (Adjust and Record)**

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	3001	300	1007	100
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO <sub>2</sub>	0	0	1795	1800	973	1000
Tolerance CO <sub>2</sub>		+/- 0.02		+/- 0.5		+/- 0.5
O <sub>2</sub> informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

**Post Test (Record Only)**

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0	2995	1000	0	0.02	0.06	0.15	0.007	0.05	✓	
CO <sub>2</sub>	0	1792	977	0	0.02	0.03	0.5	0.04	0.5	✓	

Date: 2018-03-19 Manufacturer: Fogon Supreme Model: 38 FSC  
 Project #: PI 20164 Run: 3 Tech: MM Reviewer: DP

**RAW DRY GAS METER READINGS**

	System 1	System 2	Blank
Final (Liter)	644 906.90	58867442	115.51
Initial (Liter)	642 936.80	58665400	084.03

**AMBIENT CONDITIONS**

	Before	After
Barometer (kPa):	101.5	101.3
Dry Bulb (F):	73.04	74.84
Humidity (%):	19.0	18.3

**Flow Meter**

	Start	End
Flow meter reading	N.A	N.A

**Flow Meter Verification**

	Before	After
Flow meter Check (liters)	N.A	N.A
Scale Weight ( Kg)	N.A	N.A



## FUEL DATA

Date: 2018-03-19 Manufacturer: Poly Supreme Model: 38 FSC  
 Project #: PI 20164 Run: 3 Tech: mm Reviewer: DO

### FUEL DESCRIPTION:

Type of wood:

### PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*					
2 x 4 x 10 in.	1304 lbs.	216	214	216	213	218	
2 x 4 x 10 in.	1344 lbs.	219	214	213	218	218	
2 x 4 x 10 in.	1302 lbs.	220	223	226	223	222	
2 x 4 x 10 in.	1250 lbs.	218	216	213	217	220	
2 x 4 x 10 in.	1244 lbs.	206	209	203	208	206	
2 x 4 x 10 in.	1210 lbs.	200	201	202	208	203	
2 x 4 x 10 in.	1350 lbs.	206	203	202	203	200	
2 x 4 x 10 in.	1224 lbs.	199	196	199	200	200	
2 x 4 x 10 in.	1274 lbs.	203	206	208	204	208	
2 x 4 x 10 in.	1304 lbs.	210	213	216	216	213	
2 x 4 x 10 in.	1204 lbs.	196	193	194	193	198	
2 x 4 x 10 in.	1220 lbs.	194	196	193	196	195	
2 x 4 x 15 in.	3086 lbs.	210	213	210	211	209	
2 x 4 x 15 in.	3042 lbs.	220	221	224	224	221	
2 x 4 x 15 in.	1948 lbs.	219	216	219	218	218	
2 x 4 x 15 in.	1954 lbs.	220	221	224	223	221	
2 x 4 x 15 in.	1938 lbs.	219	216	219	218	219	
2 x 4 x 15 in.	1948 lbs.	213	219	218	219	219	
2 x 4 x 15 in.	1952 lbs.	219	216	209	209	211	
x x in.	lbs.						
x x in.	lbs.						
x x in.	lbs.						
x x in.	lbs.						

TEST LOAD WEIGHT: 29096 lbs



### FUEL DATA

Date: 2018-03-19 Manufacturer: foya supreme Model: 38 FSC  
 Project #: PT 20164 Run: Ar 3 Mr. Tech: Mr Reviewer: DP

**FUEL DESCRIPTION:**  
 Type of wood :

**TEST LOAD**

Piece Size	Weight	Meter Moisture Content (% dry)*				
3 1/2 x 3 1/2 x 22 in.	5652 lbs.	193	212	216	208	209
3 1/2 x 3 1/2 x 22 in.	4682 lbs.	191	193	192	191	192
3 1/2 x 3 1/2 x 22 in.	7708 lbs.	196	201	203	203	202
3 1/2 x 3 1/2 x 22 in.	5076 lbs.	194	196	200	201	193
3 1/2 x 3 1/2 x 22 in.	4152 lbs.	191	196	192	193	192
1 1/2 x 3/4 x 5 in.	0088 lbs.			201		
1 1/2 x 3/4 x 5 in.	0088 lbs.			206		
1 1/2 x 3/4 x 5 in.	0084 lbs.			204		
1 1/2 x 3/4 x 5 in.	0084 lbs.			203		
1 1/2 x 3/4 x 5 in.	0088 lbs.			209		
1 1/2 x 3/4 x 5 in.	0084 lbs.			211		
1 1/2 x 3/4 x 5 in.	0084 lbs.			204		
1 1/2 x 3/4 x 5 in.	0084 lbs.			208		
1 1/2 x 3/4 x 5 in.	0088 lbs.			209		
1 1/2 x 3/4 x 5 in.	0086 lbs.			210		
1 1/2 x 3/4 x 5 in.	0086 lbs.			213		
1 1/2 x 3/4 x 5 in.	0082 lbs.			216		
1 1/2 x 3/4 x 5 in.	0084 lbs.			199		
1 1/2 x 3/4 x 5 in.	0084 lbs.			196		
1 1/2 x 3/4 x 5 in.	0096 lbs.			193		
1 1/2 x 3/4 x 5 in.	0080 lbs.			204		
1 1/2 x 3/4 x 5 in.	0084 lbs.			205		
1 1/2 x 3/4 x 5 in.	0080 lbs.			208		
1 1/2 x 3/4 x 5 in.	0082 lbs.			210		
1 1/2 x 3/4 x 5 in.	0088 lbs.			209		
x x in.	lbs.			<del>209</del>		
x x in.	lbs.			Mr		

TEST LOAD WEIGHT: 25,972 lbs Min 20%: 5,19 Max 25%: 6,49



Date: 2018-03-15      Manufacturer: foyer supreme      Model: 38 Fsc  
 Project # PT 20164      Run: 3      Tech: MS      Reviewer: BO

		SYSTEM 1 - 1 <sup>st</sup> hour					SYSTEM 1				
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Back Filter Number	gaskets	Blank
Date	Time	002	422	8	30	423	424	13	424	13	427
2018-03-15	17:00	611006	01271	34 9220	110 2394	0 1282	0 1261	35 7053	0 1300	0 1300	
2018-03-19	10:00	611006	01272	34 9219	110 2398	0 1283	0 1261	35 7054	0 1301	0 1301	

		SYSTEM 1 - 1 <sup>st</sup> hour					SYSTEM 1				
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Back Filter Number	gaskets	Blank
Date	Time	002	422	8	30	423	424	13	424	13	427
2018-03-19	17:30	611014	01396	34 9240	110 2410	0 1314	0 1259	<del>35 7068</del>	0 1303	35 7068	0 1303
2018-03-26	8:00	611009	01385	34 9234	110 2402	0 1314	<del>0 1259</del>	35 7068	0 1303	35 7068	0 1303
2018-03-30	8:00	611009	01385	34 9234	110 2402	0 1314	0 1259	35 7068	0 1303	35 7068	0 1303



**DILUTION TUNNEL PARTICULATE SAMPLER DATA**

Date: 2018-03-15 Project #: PT 20164 Run: 3 Manufacturer: Fogya S-prenk Model: 38 F5c  
 Tech: M M Reviewer: DP

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	425	426	23	
2018-03-15	17:00	01300	01281	35 2014	
2018-03-19	10:00	01300	01282	35 2015	

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	425	426	23	
2018-03-19	17:30	01442	01277	35 2045	
2018-03-26	8:00	01438	01276	35 2041	
2018-03-30	8:00	01438	01276	35 2041	

## Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

### Description du test

Test standard	EPA
Run #	4
Date	20-03-2018
Technicien	m.m
Project #	pi 20164

### Description de l'unité

Manufacturier	foyer supreme	
Modèle	38 fsc	
Combustion system	Non-Cat	
Appliance type	fireplace	
Firebox volume	3,5	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

### Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category	3	
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

### Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,988	Dimensionless
Equipment number (DGM #1):	em 178	
Calibration Factor (DGM #2):	0,988	Dimensionless
Equipment number (DGM #2):	em 179	
Calibration Factor (DGM #3):	0,986	Dimensionless
Equipment number (DGM #3):	em 070	Dimensionless

### Tunnel

Targeted tunnel flow rate	300	scfm
Tunnel diameter	8	in.
Molecular weight	29	
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 20164
Date	20-03-2018
Technicien	<input type="text" value="m.m"/>

### Fuel data

Fuel type	Dimension	
Fuel specie	D. Fir	
HHV		19810,0 kJ/kg
%C		48,7
%H		6,9
%O		43,9
%Ash		0,5
HHV		8519,2 Btu/lb
LHV		7451,0 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480

	Start	End
Barometer (kPa):	101,5	101,2
Barometer (in.Hg):	29,972939	29,88434875
Dry Bulb (F):	70,88	76,1
Humidity (%):	18,7	25,1
Air velocity (ft/min)	6	3

DGM #1	Final:	22843,580	cuft
	Initial:	22774,743	cuft
DGM #2	Final:	20859,135	cuft
	Initial:	20789,024	cuft
DGM room			

	Final:	646858,150	Liter
	Initial:	644908,880	Liter
	Final:	590664,920	Liter
	Initial:	588679,580	Liter
	Final:	148,000	cuft
	Initial:	125,510	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

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Autres données à rentrer: dans preload data, load data, traverse et filter set weight

<b>Project nu.</b>	pi 20164
<b>Date</b>	20-03-2018
<b>Technicien</b>	m.m



### FUEL LOAD DATA SHEET, CSA B415

Test Load Weight:

Lower	Ideal	Upper
22,1	24,5	27,0

\* For boilers, a loading density factor of 10 lb/ft<sup>3</sup> is applied

Load Volume:  cu. ft

Loading Density: 7,4 lbs./ft<sup>3</sup>

Number of Spaces:   
Spacer weight:  lbs

Load Density (wet): 30,7 lbs./ft<sup>3</sup>  
Dry Wood Density: 25,6 lbs./ft<sup>3</sup>

Piece Size (in):			Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x Weight	Volume Cubic Inches	Ave. MC %
Thick	Wide	Length									
3,5	3,5	22,25	5,04	19,50	20,10	19,20	19,10	20,00	98,76152	272,56	19,6
3,5	3,5	22,25	5,11	20,10	20,80	20,80	20,60	19,40	103,97808	272,56	20,3
3,5	3,5	22,25	4,91	20,40	20,60	20,90	19,10	19,20	98,47656	272,56	20,0
3,5	3,5	22,25	4,57	19,30	19,20	19,10	19,20	19,30	87,91228	272,56	19,2
3,5	3,5	22,25	4,56	19,10	20,60	21,30	21,80	21,90	95,4864	272,56	20,9
										0,00	
1,5	0,75	5	0,09			20,60			1,8128	5,63	20,6
1,5	0,75	5	0,10			20,10			2,0904	5,63	20,1
1,5	0,75	5	0,08			21,00			1,764	5,63	21,0
1,5	0,75	5	0,10			19,40			1,9788	5,63	19,4
1,5	0,75	5	0,09			20,70			1,7802	5,63	20,7
1,5	0,75	5	0,10			21,00			2,058	5,63	21,0
1,5	0,75	5	0,10			20,60			2,0188	5,63	20,6
1,5	0,75	5	0,10			21,60			2,1168	5,63	21,6
1,5	0,75	5	0,09			21,00			1,806	5,63	21,0
1,5	0,75	5	0,09			21,10			1,8568	5,63	21,1
1,5	0,75	5	0,09			21,20			1,9504	5,63	21,2
1,5	0,75	5	0,10			21,40			2,0972	5,63	21,4
1,5	0,75	5	0,10			22,00			2,156	5,63	22,0
1,5	0,75	5	0,09			22,30			1,9624	5,63	22,3
1,5	0,75	5	0,10			22,10			2,1658	5,63	22,1
1,5	0,75	5	0,10			22,10			2,1658	5,63	22,1
1,5	0,75	5	0,08			22,8			1,824	5,63	22,8
1,5	0,75	5	0,09			21			1,932	5,63	21,0
1,5	0,75	5	0,088			21			1,848	5,63	21,0
1,5	0,75	5	0,09			20,6			1,854	5,63	20,6
										0,00	
										0,00	
										0,00	
										0,00	
SUM MCx									523,85304		20,9 %

Test Load Weight:  lbs.

Dry Weight:  kg.

Average Moisture Content: %

Dry:  Dry(EPA) 20,10  
Dry(B415) 20,10

Must be 19-25

Wet:  must be 15,2-22

Coal Bed Range:  lbs. to

lbs.

TEST CHARGE:

Coal bed weight:

lbs.

Project nu.	pi 20164
Date	20-03-2018
Technicien	<input type="text" value="m.m"/>

## Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,15 in. H2O  
 Barometer: 29,900 in. Hg

**Pour un tunnel de 12" et plus, prendre 6 lectures**

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=  
0,999

**Pour un tunnel moins de 12", prendre 4 lectures**

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,049	71,17	0,2214
B center	0,050	71,2	0,2236
A1	0,044	71,07	0,2098
A2	0,050	71,98	0,2236
A3	0,055	72,24	0,2345
A4	0,045	72,09	0,2121
B1	0,049	72,760	0,2214
B2	0,053	72,680	0,2302
B3	0,052	72,120	0,2280
B4	0,048	71,920	0,2191
AVERAGE	0,0495	71,9230	0,2224

<b>Project nu.</b>	pi 20164
<b>Date</b>	20-03-2018
<b>Technicien</b>	<span style="border: 1px solid red; padding: 2px;">m.m</span>



Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	12	54	55	2	16	56	57	25	33	58	59	26	60		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	94,5406	0,1255	0,1254	35,5301	108,7539	0,1247	0,1265	34,9739	109,3629	0,1272	0,1271	35,5810	0,1251	2018-03-19	19:00
Before (6)	94,5407	0,1255	0,1255	35,5301	108,7538	0,1246	0,1264	34,9738	109,3629	0,1273	0,1270	35,5810	0,1252	2018-03-20	10:00
After (1)	94,5428	0,1272	0,1253	35,5321	108,7545	0,1248	0,1259	34,9756	109,3635	0,1296	0,1262	35,5841	0,1254	2018-03-20	17:15
After (2)	94,5417	0,1270	0,1253	35,5313	108,7539	0,1248	0,1259	34,9755	109,3630	0,1295	0,1261	35,5836	0,1254	2018-03-26	08:00
After (3)	94,5417	0,1269	0,1253	35,5312	108,7539	0,1248	0,1259	34,9754	109,3631	0,1296	0,1262	35,5837	0,1254	2018-03-30	08:00
After (4)															
After (5)															
After (6)	94,5417	0,1269	0,1253	35,5312	108,7539	0,1248	0,1259	34,9754	109,3631	0,1296	0,1262	35,5837	0,1254	2018-03-30	08:00
Difference	0,0010	0,0014	-0,0002	0,0011	0,0001	0,0002	-0,0005	0,0016	0,0002	0,0023	-0,0008	0,0027	0,0002		
Total (mg)		3,3				4,7				4,4			0,2		
Total ajusté (mg)		<b>3,10</b>				<b>4,50</b>				<b>4,20</b>					

Project nu.	pi 20164
Date	20-03-2018
Technicien	m.m

# Demonstration purpose only, not the real number, negative filter weight rounded to zero

## Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	12	54	55	2	16	56	57	25	33	58	59	26	60		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	94,5406	0,1255	0,1254	35,5301	108,7539	0,1247	0,1265	34,9739	109,3629	0,1272	0,1271	35,5810	0,1251	2018-03-19	19:00
Before (6)	94,5407	0,1255	0,1255	35,5301	108,7538	0,1246	0,1264	34,9738	109,3629	0,1273	0,1270	35,5810	0,1252	2018-03-20	10:00
After (1)	94,5428	0,1272	0,1253	35,5321	108,7545	0,1248	0,1259	34,9756	109,3635	0,1296	0,1262	35,5841	0,1254	2018-03-20	17:15
After (2)	94,5417	0,1270	0,1253	35,5313	108,7539	0,1248	0,1259	34,9755	109,3630	0,1295	0,1261	35,5836	0,1254	2018-03-26	08:00
After (3)	94,5417	0,1269	0,1253	35,5312	108,7539	0,1248	0,1259	34,9754	109,3631	0,1296	0,1262	35,5837	0,1254	2018-03-30	08:00
After (4)															
After (5)															
After (6)	94,5417	0,1269	0,1255	35,5312	108,7539	0,1248	0,1264	34,9754	109,3631	0,1296	0,1270	35,5837	0,1254	2018-03-30	08:00
Difference	0,0010	0,0014	0,0000	0,0011	0,0001	0,0002	0,0000	0,0016	0,0002	0,0023	0,0000	0,0027	0,0002		
Total (mg)		3,5				5,4				5,2			0,2		
Total ajusté (mg)		<b>3,30</b>				<b>5,20</b>				<b>5,00</b>					

<b>Project nu.</b>	pi 20164
<b>Date</b>	20-03-2018
<b>Technicien</b>	m.m

Elapsed Time min	Raw data row	* Weight Remaining lbs	* * * *			*1	*2	*3	*4	*5	*6	*7	*8	Mass flow 1 Reading	DGM 1 Inlet T	DGM 1 Outlet T	Filter 1 Temp	Mass flow 2 Reading	DGM 2 Inlet T	DGM 2 Outlet T	Filter 2 Temp	Tunnel Velo Pressure	Flue draft Pressure	Change in Surface Temp
			CO	CO <sub>2</sub>	O <sub>2</sub>	Flue Gas	Room Temp	Tunnel Dry Bulb	Unit Top	Unit Back	Unit R.Side	Unit L.Side	Unit Bottom											
0,00	171,00	26,1	0,5	5,8	368,4	274,7	71,4	107,7	224,8	332,4	440,4	401,4	442,8	0,18	73,96	74,10	73,71	0,18	74,17	74,37	73,36	0,05	0,05	0,0
1,0	172,0	25,7	0,5	3,6	370,0	342,9	71,6	99,1	256,6	325,8	430,5	396,6	440,8	0,18	73,96	74,10	73,87	0,18	74,19	74,37	73,43	0,05	0,06	1,6887816
2,0	173,0	25,5	0,6	5,7	372,6	385,3	71,8	100,3	289,0	321,5	422,4	391,1	438,9	0,17	73,93	73,96	74,01	0,18	74,18	74,38	73,47	0,05	0,07	4,2245056
3,0	174,0	25,3	0,7	6,7	375,3	429,8	71,8	103,2	323,5	318,6	416,0	384,8	433,4	0,18	73,91	73,92	74,13	0,18	74,17	74,36	73,54	0,05	0,07	6,8975646
4,0	175,0	25,1	0,7	7,7	380,7	480,8	71,3	107,0	365,7	317,8	409,2	379,9	431,1	0,18	73,93	73,91	74,26	0,18	74,21	74,37	73,65	0,05	0,08	12,355682
5,0	176,0	24,8	0,8	9,0	386,3	536,6	71,5	111,6	419,7	317,9	389,9	378,9	428,7	0,18	73,89	73,89	74,39	0,18	74,21	74,37	73,76	0,05	0,09	21,063794
6,0	177,0	24,6	0,8	10,1	396,3	574,1	71,1	114,2	461,7	317,8	400,4	374,8	427,0	0,18	73,91	73,89	74,55	0,18	74,23	74,40	73,88	0,05	0,09	27,987884
7,0	178,0	24,3	0,7	11,1	402,6	606,4	71,9	115,9	501,8	316,5	396,5	373,3	424,9	0,18	73,92	73,89	74,70	0,18	74,23	74,41	74,05	0,05	0,09	34,237744
8,0	179,0	24,0	0,7	11,8	411,7	651,9	72,1	118,4	551,1	315,5	394,0	371,7	423,5	0,18	73,90	73,89	74,88	0,18	74,22	74,43	74,24	0,05	0,09	42,790503
9,0	180,0	23,7	0,8	13,1	417,5	653,9	71,9	117,6	587,4	313,8	392,4	370,7	423,1	0,18	73,89	73,89	75,05	0,18	74,26	74,44	74,39	0,05	0,09	49,146784
10,0	181,0	23,5	0,8	12,6	423,5	647,1	71,5	114,8	623,2	313,0	390,0	370,4	420,8	0,18	73,94	73,94	74,43	0,18	74,23	74,42	74,15	0,05	0,09	55,135217
11,0	182,0	23,3	0,8	11,3	416,4	603,0	71,9	111,2	593,0	310,4	388,7	370,0	419,8	0,18	73,98	73,99	74,33	0,18	74,24	74,41	74,16	0,05	0,09	48,01889
12,0	183,0	23,1	1,2	8,4	403,8	564,6	72,4	108,4	537,5	307,9	384,9	370,3	418,5	0,18	74,00	74,01	74,33	0,18	74,26	74,42	74,20	0,05	0,09	35,451221
13,0	184,0	23,0	1,0	7,3	396,1	546,2	72,2	107,2	504,7	306,4	383,1	369,3	417,2	0,18	74,02	74,04	74,36	0,18	74,26	74,42	74,22	0,05	0,09	27,760321
14,0	185,0	22,8	0,8	7,6	390,8	535,4	72,4	106,2	485,9	303,3	380,9	367,6	416,4	0,18	74,02	74,06	74,39	0,18	74,28	74,44	74,28	0,05	0,08	22,455768
15,0	186,0	22,6	0,8	8,1	387,8	527,9	74,2	105,0	479,5	301,5	376,9	365,8	415,6	0,18	74,05	74,09	74,41	0,18	74,29	74,43	74,29	0,05	0,08	19,471997
16,0	187,0	22,5	0,8	8,3	384,7	520,2	72,8	104,5	472,1	299,4	374,0	363,7	414,4	0,18	74,04	74,11	74,42	0,18	74,30	74,45	74,33	0,05	0,08	16,350189
17,0	188,0	22,3	0,9	8,3	382,1	513,8	72,2	104,4	464,0	297,9	372,4	362,5	413,7	0,18	74,08	74,12	74,41	0,18	74,30	74,46	74,33	0,05	0,08	13,767603
18,0	189,0	22,2	1,0	8,5	380,7	510,9	72,8	104,1	460,6	296,8	370,5	362,9	412,9	0,18	74,07	74,13	74,44	0,18	74,32	74,47	74,34	0,05	0,08	12,358075
19,0	190,0	22,0	1,0	8,7	379,0	506,4	73,2	103,6	457,0	295,6	368,1	362,3	412,1	0,17	74,11	74,16	74,44	0,18	74,35	74,48	74,35	0,05	0,08	10,654462
20,0	191,0	21,8	1,1	8,8	377,8	505,2	73,2	103,6	455,4	294,4	366,5	362,5	411,3	0,17	74,11	74,18	74,44	0,18	74,36	74,50	74,37	0,05	0,08	9,4520752
21,0	192,0	21,6	1,1	9,1	377,0	507,2	72,2	104,0	455,0	294,1	364,6	362,2	409,1	0,17	74,12	74,17	74,39	0,18	74,35	74,49	74,35	0,05	0,08	8,675132
22,0	193,0	21,4	1,2	9,5	379,2	513,8	73,7	104,4	467,1	294,2	364,1	362,5	408,1	0,18	74,15	74,19	74,40	0,18	74,39	74,57	74,50	0,05	0,08	10,851959
23,0	194,0	21,3	1,2	9,9	381,6	525,4	73,4	104,9	478,6	294,8	365,4	361,6	407,8	0,18	74,17	74,21	74,62	0,18	74,42	74,64	74,62	0,05	0,09	13,93683
24,0	195,0	21,0	1,1	10,5	388,2	545,5	74,5	106,0	506,1	295,5	364,1	367,3	407,8	0,17	74,15	74,15	74,83	0,18	74,41	74,65	74,69	0,05	0,09	19,808203
25,0	196,0	20,8	0,7	11,9	399,7	586,5	73,4	108,2	564,5	296,2	364,5	369,1	408,2	0,17	74,13	74,14	75,05	0,18	74,41	74,67	74,79	0,05	0,09	31,324548
26,0	197,0	20,6	0,9	14,1	416,3	649,2	72,6	112,3	638,0	297,0	367,0	371,4	407,9	0,18	74,13	74,17	75,15	0,18	74,43	74,69	74,92	0,05	0,10	47,90567
27,0	198,0	20,3	0,6	15,2	425,7	672,5	72,2	115,1	678,5	298,9	369,4	374,2	407,4	0,18	74,14	74,18	75,33	0,18	74,46	74,71	75,03	0,05	0,10	57,310516
28,0	199,0	20,1	0,4	15,0	430,0	682,1	73,2	115,5	694,8	300,3	371,3	377,0	406,5	0,18	74,17	74,19	75,48	0,18	74,51	74,74	75,17	0,05	0,10	61,606165
29,0	200,0	19,8	0,4	14,7	429,8	670,2	72,1	114,4	688,8	301,9	372,9	380,1	405,3	0,18	74,16	74,20	75,63	0,18	74,50	74,77	75,29	0,05	0,10	61,435962
30,0	201,0	19,6	0,3	13,8	427,9	656,2	72,3	113,2	674,4	302,6	374,9	382,9	404,7	0,18	74,19	74,20	75,77	0,18	74,50	74,78	75,43	0,05	0,09	59,542096
31,0	202,0	19,5	0,3	12,9	424,3	641,0	72,8	112,3	653,4	303,8	375,9	385,7	404,8	0,17	74,23	74,23	75,93	0,18	74,53	74,81	75,56	0,05	0,09	56,369861
32,0	203,0	19,2	0,4	12,3	421,3	628,1	73,1	111,8	632,7	304,6	377,2	388,0	403,8	0,18	74,24	74,25	76,07	0,18	74,54	74,83	75,72	0,05	0,09	52,893152
33,0	204,0	19,1	0,4	11,9	418,5	617,1	72,9	110,9	614,1	305,0	379,5	390,6	403,1	0,18	74,27	74,26	76,20	0,18	74,56	74,87	75,83	0,05	0,09	50,101172
34,0	205,0	18,9	0,5	11,6	416,1	606,4	71,9	110,2	600,6	304,2	381,5	390,9	403,2	0,18	74,31	74,29	76,37	0,18	74,61	74,89	76,00	0,05	0,09	47,709533
35,0	206,0	18,7	0,5	11,6	416,1	606,4	71,9	110,2	598,5	303,7	381,5	390,9	403,2	0,18	74,31	74,29	76,37	0,18	74,61	74,89	76,00	0,05	0,09	47,709533
36,0	207,0	18,6	0,6	11,6	413,9	590,5	72,5	109,0	584,3	305,0	386,0	393,6	400,7	0,18	74,40	74,33	76,63	0,18	74,65	74,93	76,31	0,05	0,09	45,557098
37,0	208,0	18,4	0,6	11,8	414,7	587,5	72,5	108,3	582,8	305,3	389,4	395,5	400,7	0,18	74,44	74,35	76,77	0,18	74,65	74,95	76,45	0,05	0,09	46,294659
38,0	209,0	18,2	0,6	11,9	415,4	586,5	72,4	108,7	584,0	305,8	391,4	396,6	398,9	0,18	74,48	74,37	76,90	0,18	74,70	74,98	76,58	0,05	0,09	47,001978
39,0	210,0	18,0	0,5	12,3	417,8	590,4	72,8	109,0	592,6	305,4	394,9	398,5	397,8	0,18	74,52	74,38	77,03	0,18	74,72	74,99	76,69	0,05	0,09	49,479883
40,0	211,0	17,8	0,5	12,7	419,7	592,1	73,4	108,7	597,4	306,0	398,3	400,5	396,0	0,18	74,57	74,41	77,16	0,18	74,76	75,02	76,84	0,05	0,09	51,30899
41,0	212,0	17,5	0,5	13,6	420,3	596,0	73,6	109,1	598,5	307,7	400,4	402,9	398,9	0,18	74,65	74,42	77,30	0,18	74,79	75,04	76,94	0,05	0,09	51,937843
42,0	213,0	17,5	0,4	13,0	422,9	600,6	73,7	108,9	605,0	306,8	405,3	403,4	394,3	0,18	74,68	74,45	77,44	0,18	74,79	75,05	77,09	0,05	0,09	54,586493
43,0	214,0	17,3	0,4	12,9	424,3	606,4	74,2	109,5	607,6	307,0	409,1	405,1	392,9	0,17	74,73	74,47	77,57	0,18	74,81	75,07	77,22	0,05	0,09	55,979712
44,0	215,0	17,2	0,3	13,1	426,3	605,2	74,7	108,9	612,3	307,8	412,4	406,6	392,3	0,17	74,75	74,47	77,65	0,18	74,83	75,07	77,33	0,05	0,09	57,925305
45,0	216,0	16,9	0,3	12,9	428,3	605,7	73,9	109,6	614,8	309,1	417,2	408,1	392,1	0,17	74,84	74,51	77,75	0,18	74,89	75,11	77,44	0,05	0,09	59,829279
46,0	217,0	16,7	0,3	12,8	427,9	605,3	74,8	109,6	614,3	307,9	418,2	408,4	390,8	0,18	74,92	74,55	77,87	0,18	74,94	75,15	77,56	0,05	0,09	59,568005
47,0	218,0	16,6	0,3	12,8	428,5	605,9	71,3	109,7	616,0	307,1	420,9	409,8	388,9	0,18</										

96,0	267,0	8,5	0,3	12,8	482,8	606,1	74,4	109,1	651,0	356,8	548,2	496,6	361,2	0,18	75,66	75,56	78,93	0,18	75,84	76,18	80,15	0,05	0,09	114,40446
97,0	268,0	8,3	0,3	12,7	483,9	604,6	74,8	108,6	651,8	359,0	548,6	498,3	361,6	0,17	75,65	75,59	79,01	0,18	75,85	76,20	80,17	0,05	0,09	115,49584
98,0	269,0	8,2	0,4	12,7	484,5	603,6	75,6	109,0	648,9	361,4	550,1	500,0	362,3	0,17	75,66	75,60	79,08	0,18	75,85	76,21	80,16	0,05	0,09	116,17887
99,0	270,0	8,1	0,4	12,7	484,0	597,9	73,5	108,6	635,6	362,7	552,8	501,4	362,5	0,17	75,70	75,62	79,15	0,18	75,89	76,22	80,18	0,05	0,09	114,65319
100,0	271,0	7,9	0,5	12,5	482,3	594,7	73,5	108,2	626,4	364,8	554,1	502,8	363,5	0,18	75,73	75,64	79,18	0,18	75,93	76,24	80,18	0,05	0,09	113,95406
101,0	272,0	7,8	0,5	12,4	482,6	593,2	74,6	108,2	623,8	366,5	555,2	504,0	363,5	0,17	75,74	75,65	79,23	0,18	75,95	76,28	80,21	0,05	0,09	114,26711
102,0	273,0	7,6	0,6	12,4	483,3	590,0	73,1	108,3	620,3	369,8	555,8	506,3	364,2	0,17	75,72	75,66	79,27	0,18	75,93	76,27	80,20	0,05	0,09	114,93375
103,0	274,0	7,5	0,6	12,4	483,7	587,8	73,4	107,5	618,7	371,8	555,5	508,1	364,4	0,18	75,68	75,65	79,30	0,18	75,94	76,30	80,22	0,05	0,09	115,33245
104,0	275,0	7,4	0,6	12,3	483,5	583,0	74,4	107,2	612,4	372,6	558,5	509,0	364,8	0,18	75,70	75,67	79,35	0,18	75,93	76,31	80,21	0,05	0,09	115,11716
105,0	276,0	7,2	0,7	12,0	483,8	581,5	73,4	107,2	610,9	375,6	558,2	510,4	365,7	0,17	75,73	75,71	79,36	0,18	75,97	76,31	80,22	0,05	0,09	115,46831
106,0	277,0	7,1	0,7	12,0	483,4	575,6	73,9	107,3	604,0	375,8	558,9	512,0	366,1	0,18	75,74	75,71	79,37	0,18	75,97	76,33	80,23	0,05	0,09	115,00297
107,0	278,0	7,0	0,7	11,7	482,2	569,3	73,9	106,7	592,8	377,0	560,2	513,9	367,1	0,17	75,72	75,73	79,46	0,18	75,96	76,35	80,22	0,05	0,09	113,83379
108,0	279,0	6,9	0,7	11,4	481,2	564,1	74,6	105,8	585,7	377,6	559,5	514,9	368,3	0,18	75,68	75,72	79,43	0,18	75,94	76,36	80,21	0,05	0,09	112,81165
109,0	280,0	6,8	0,7	11,3	479,5	558,9	74,0	106,0	576,5	377,8	559,6	514,9	368,7	0,18	75,68	75,74	79,48	0,18	75,95	76,36	80,18	0,05	0,08	111,10496
110,0	281,0	6,7	0,6	11,1	478,4	553,8	73,5	105,2	567,9	377,9	559,6	515,8	370,8	0,18	75,68	75,74	79,51	0,18	75,95	76,36	80,16	0,05	0,08	110,05328
111,0	282,0	6,6	0,6	10,9	476,6	547,8	73,5	104,4	559,7	377,0	559,1	516,6	370,0	0,17	75,68	75,74	79,49	0,18	75,92	76,36	80,13	0,05	0,08	108,24965
112,0	283,0	6,5	0,6	10,6	475,2	542,1	72,9	104,5	551,4	378,1	560,8	513,2	372,5	0,17	75,65	75,75	79,51	0,18	75,92	76,38	80,13	0,05	0,08	106,83924
113,0	284,0	6,4	0,6	10,5	474,0	538,4	73,4	103,8	546,3	377,9	559,4	513,0	373,9	0,18	75,67	75,77	79,51	0,18	75,92	76,39	80,12	0,05	0,08	105,67225
114,0	285,0	6,3	0,5	10,5	473,5	534,3	72,8	103,6	539,5	377,8	561,8	513,4	374,9	0,18	75,67	75,78	79,53	0,18	75,92	76,40	80,10	0,05	0,08	105,12676
115,0	286,0	6,2	0,5	10,5	473,1	529,4	73,0	103,4	537,6	377,6	562,3	512,2	375,8	0,18	75,72	75,79	79,52	0,18	75,96	76,43	80,09	0,05	0,08	104,72204
116,0	287,0	6,1	0,6	10,4	472,5	525,5	73,2	103,0	533,4	376,9	563,3	511,9	376,7	0,18	75,73	75,81	79,53	0,18	75,95	76,42	80,08	0,05	0,08	104,0992
117,0	288,0	6,0	0,6	10,2	471,2	519,8	72,6	102,6	528,7	376,2	564,4	508,9	377,8	0,18	75,74	75,81	79,52	0,18	75,96	76,43	80,05	0,05	0,08	102,83509
118,0	289,0	6,0	0,6	10,0	469,2	514,2	72,4	102,0	522,0	375,6	563,3	507,4	377,9	0,17	75,75	75,82	79,52	0,18	75,98	76,46	80,03	0,05	0,08	100,88409
119,0	290,0	5,9	0,6	9,7	466,9	509,8	72,6	101,6	515,4	375,3	562,5	504,1	377,3	0,18	75,75	75,84	79,54	0,18	75,98	76,45	79,99	0,05	0,08	98,54386
120,0	291,0	5,8	0,7	9,6	465,2	504,2	73,5	100,9	507,5	375,2	563,1	501,9	378,6	0,17	75,73	75,84	79,55	0,18	75,96	76,46	79,96	0,05	0,08	96,88237
121,0	292,0	5,7	0,7	9,5	462,9	498,5	73,3	100,6	501,2	374,5	560,2	499,6	378,9	0,18	75,70	75,85	79,53	0,18	75,95	76,48	79,94	0,05	0,08	94,507281
122,0	293,0	5,6	0,8	9,1	459,7	491,7	73,0	100,2	496,3	374,2	559,5	497,3	379,3	0,18	75,67	75,83	79,57	0,18	75,93	76,47	79,93	0,05	0,08	92,13119
123,0	294,0	5,6	0,8	9,1	458,4	485,2	72,4	99,7	480,5	374,8	559,7	494,1	379,5	0,17	75,65	75,88	79,51	0,18	75,93	76,48	79,88	0,05	0,08	90,056885
124,0	295,0	5,5	0,9	8,9	456,5	476,6	74,3	99,1	470,4	379,2	559,1	492,0	381,7	0,18	75,64	75,86	79,52	0,18	75,90	76,50	79,85	0,05	0,08	88,118726
125,0	296,0	5,5	0,9	8,7	454,8	469,1	73,0	98,3	461,5	381,3	558,8	490,8	381,3	0,18	75,61	75,86	79,48	0,18	75,87	76,50	79,80	0,05	0,08	86,486609
126,0	297,0	5,4	1,0	8,5	452,7	462,0	73,0	98,1	449,9	384,2	558,7	488,7	382,1	0,18	75,57	75,86	79,42	0,18	75,84	76,47	79,75	0,05	0,08	84,357562
127,0	298,0	5,3	1,0	8,2	450,9	455,6	72,8	97,5	443,0	386,4	556,0	486,6	382,6	0,18	75,58	75,86	79,39	0,18	75,83	76,48	79,70	0,05	0,07	82,564502
128,0	299,0	5,3	1,1	8,0	449,8	449,7	72,6	96,9	438,5	387,7	554,7	485,7	383,7	0,17	75,58	75,87	79,37	0,18	75,83	76,48	79,66	0,05	0,07	80,448597
129,0	300,0	5,3	1,2	8,0	449,6	444,5	73,4	96,5	437,4	390,5	552,0	485,1	382,9	0,18	75,57	75,89	79,34	0,18	75,83	76,49	79,62	0,05	0,07	81,198804
130,0	301,0	5,2	1,2	8,0	449,4	440,5	72,6	95,8	436,4	391,1	551,9	482,7	385,1	0,17	75,55	75,88	79,30	0,18	75,82	76,48	79,56	0,05	0,07	81,072723
131,0	302,0	5,2	1,2	8,0	449,3	435,1	72,4	95,5	435,1	393,8	549,8	482,8	385,0	0,17	75,53	75,88	79,27	0,18	75,82	76,48	79,52	0,05	0,07	80,949554
132,0	303,0	5,1	1,2	8,1	447,0	431,7	73,4	95,0	430,1	393,8	544,1	481,3	385,5	0,18	75,52	75,89	79,22	0,18	75,79	76,48	79,47	0,05	0,07	86,619714
133,0	304,0	5,1	1,2	8,1	447,0	427,5	73,3	94,7	430,2	395,2	542,6	480,9	385,9	0,18	75,52	75,90	79,19	0,18	75,80	76,50	79,42	0,05	0,07	78,599182
134,0	305,0	5,0	1,2	8,2	445,9	423,6	73,2	94,2	426,3	396,3	540,5	478,5	387,1	0,18	75,51	75,91	79,16	0,18	75,81	76,50	79,36	0,05	0,07	76,313858
135,0	306,0	4,9	1,2	8,1	444,7	419,9	76,3	94,2	420,9	396,4	539,1	479,0	388,4	0,18	75,51	75,90	79,12	0,18	75,79	76,50	79,30	0,05	0,07	76,378314
136,0	307,0	4,9	1,2	8,1	443,8	415,1	72,7	93,8	418,4	397,7	537,3	477,6	387,8	0,17	75,51	75,91	79,07	0,18	75,79	76,51	79,29	0,05	0,07	75,10413
137,0	308,0	4,8	1,3	7,9	441,9	410,7	73,0	93,5	410,9	398,5	536,1	475,1	389,0	0,18	75,54	75,90	79,02	0,18	75,80	76,50	79,23	0,05	0,07	73,571405
138,0	309,0	4,8	1,4	7,9	440,4	406,2	72,4	93,3	406,2	399,9	534,0	473,6	388,3	0,18	75,56	75,93	78,98	0,18	75,81	76,52	79,18	0,05	0,07	72,03468
139,0	310,0	4,8	1,4	7,9	438,9	402,5	73,0	93,0	400,1	402,0	531,9	471,8	388,6	0,17	75,56	75,93	78,93	0,18	75,81	76,52	79,11	0,05	0,07	70,517865
140,0	311,0	4,7	1,4	7,9	437,9	399,3	74,0	92,7	398,3	403,0	529,9	470,7	389,5	0,17	75,56	75,94	78,87	0,18	75,81	76,51	79,06	0,05	0,07	69,057987
141,0	312,0	4,6	1,4	7,9	436,7	396,0	73,3	92,3	393,6	403,2	526,2	469,5	390,7	0,18	75,54	75,95	78,86	0,18	75,80	76,54	79,02	0,05	0,07	68,321271
142,0	313,0	4,6	1,4	7,9	435,4	391,4	72,9	91,9	389,8	405,4	524,8	466,1	391,0	0,18	75,52	75,94	78,80	0,18	75,79	76,53	78,94	0,05	0,07	67,041101
143,0	314,0	4,6	1,5	7,7	433,5	387,4	72,7	91,6	383,4	406,2	522,4	463,6	391,9	0,17	75,46	75,95	78,75	0,18	75,76	76,53	78,89	0,05	0,06	65,148102
144,0	315,0	4,6	1,4	7,6	431,1	381,5	72,9	91,0	372,6	407,4	521,4	461,8	392,3	0,18	75,42	75,94	78,71	0,18	75,71	76,52	78,81	0,05	0,06	62,739013
145,0	316,0	4,5	1,4	7,6	428,9	377,1	73,0	90,3	365,1	408,1	519,0	459,8	392,3	0,18										

197,0	368,0	3,1	2,2	6,1	394,9	290,6	73,4	83,6	293,4	394,4	421,2	415,4	450,2	0,18	74,66	75,62	76,23	0,18	75,06	76,17	76,24	0,05	0,05	26,557831
198,0	369,0	3,1	2,2	6,2	394,2	289,6	72,6	83,7	292,5	393,0	421,3	414,3	450,1	0,17	74,65	75,61	76,22	0,18	75,05	76,17	76,22	0,05	0,05	25,87041
199,0	370,0	3,1	2,2	6,3	392,9	288,3	73,2	83,8	291,8	392,6	418,1	413,1	449,6	0,18	74,64	75,62	76,16	0,18	75,04	76,15	76,19	0,05	0,05	24,562451
200,0	371,0	3,0	2,3	6,0	392,0	287,5	73,8	83,5	290,7	390,7	416,4	413,5	449,0	0,18	74,63	75,60	76,16	0,18	75,03	76,16	76,16	0,05	0,05	23,652301
201,0	372,0	3,1	2,3	6,1	391,3	286,5	74,4	83,1	290,7	389,8	414,2	411,9	450,1	0,18	74,63	75,61	76,14	0,18	75,03	76,13	76,14	0,05	0,05	22,976196
202,0	373,0	3,0	2,3	6,1	391,2	285,9	73,3	83,2	289,9	389,8	413,9	411,4	450,8	0,17	74,67	75,60	76,12	0,18	75,05	76,15	76,11	0,05	0,05	22,794739
203,0	374,0	3,0	2,3	6,1	390,5	285,2	72,0	83,1	290,1	388,2	412,8	409,7	451,8	0,18	74,66	75,59	76,07	0,18	75,06	76,13	76,07	0,05	0,05	22,148102
204,0	375,0	3,0	2,3	6,1	389,3	284,5	72,4	83,4	288,9	386,7	410,9	408,6	451,5	0,17	74,70	75,59	76,06	0,18	75,07	76,12	76,07	0,05	0,05	20,977258
205,0	376,0	2,9	2,1	6,2	388,7	283,4	72,8	83,5	288,1	385,4	410,0	408,3	451,6	0,17	74,73	75,60	76,04	0,18	75,08	76,11	76,03	0,05	0,05	20,322455
206,0	377,0	2,9	2,1	6,1	388,4	282,3	73,7	83,7	287,0	384,0	407,3	407,0	451,7	0,18	74,73	75,61	76,01	0,18	75,07	76,07	76,01	0,05	0,05	19,761293
207,0	378,0	2,9	2,2	6,1	386,7	281,6	72,4	83,0	287,8	381,7	405,6	406,8	451,4	0,17	74,72	75,58	75,99	0,18	75,06	76,10	75,98	0,05	0,05	18,297693
208,0	379,0	2,9	2,2	6,0	385,7	280,9	72,7	83,0	286,0	380,5	403,9	405,3	452,8	0,18	74,70	75,59	76,01	0,18	75,08	76,10	75,96	0,05	0,05	17,334863
209,0	380,0	2,9	2,2	6,0	384,6	281,6	73,5	83,0	286,9	377,5	401,3	405,0	452,4	0,18	74,67	75,57	75,96	0,18	75,08	76,09	75,95	0,05	0,05	16,273145
210,0	381,0	2,8	1,9	6,2	382,8	280,2	72,5	82,8	286,5	374,8	398,9	402,7	451,2	0,18	74,68	75,59	75,94	0,18	75,05	76,10	75,91	0,05	0,05	14,479291
211,0	382,0	2,8	2,0	5,7	381,6	279,2	73,5	82,9	286,1	371,8	397,4	401,3	451,7	0,17	74,65	75,58	75,93	0,18	75,05	76,11	75,89	0,05	0,05	13,277899
212,0	383,0	2,8	2,1	5,5	380,2	278,1	75,4	82,6	284,7	367,9	395,8	399,4	453,4	0,18	74,66	75,58	75,92	0,18	75,02	76,10	75,87	0,05	0,05	11,886987
213,0	384,0	2,8	2,1	5,4	378,6	276,7	73,6	82,7	281,8	364,9	393,3	397,3	453,6	0,17	74,64	75,56	75,91	0,18	75,03	76,09	75,84	0,05	0,05	10,240681
214,0	385,0	2,7	2,1	5,4	377,3	275,9	74,5	82,8	280,3	362,2	393,9	394,6	455,5	0,17	74,64	75,54	75,89	0,18	75,04	76,07	75,84	0,05	0,05	8,9410096
215,0	386,0	2,8	2,1	5,4	376,1	274,4	74,0	82,5	278,2	359,7	392,0	392,4	458,3	0,18	74,66	75,56	75,87	0,18	75,05	76,08	75,80	0,05	0,05	7,7662352
216,0	387,0	2,8	2,0	5,4	375,5	273,4	76,8	82,3	277,9	357,5	390,3	391,1	460,5	0,18	74,67	75,56	75,84	0,18	75,03	76,08	75,78	0,05	0,05	7,1005308
217,0	388,0	2,7	2,1	5,4	374,7	272,5	72,7	82,2	277,7	355,0	389,0	389,1	462,8	0,18	74,66	75,55	75,87	0,18	75,03	76,07	75,76	0,05	0,05	6,3825742
218,0	389,0	2,7	2,1	5,4	373,2	271,5	72,9	82,5	275,9	352,1	387,2	387,1	463,5	0,17	74,65	75,54	75,85	0,18	75,03	76,07	75,74	0,05	0,05	4,8041626
219,0	390,0	2,7	2,1	5,4	372,1	270,8	74,1	82,5	275,1	349,7	386,6	384,5	464,4	0,17	74,69	75,54	75,82	0,18	75,03	76,09	75,73	0,05	0,05	3,7037168
220,0	391,0	2,7	2,1	5,4	370,7	269,7	73,1	82,3	274,0	347,6	383,7	383,5	464,9	0,17	74,72	75,54	75,82	0,18	75,03	76,07	75,72	0,05	0,05	2,3910276
221,0	392,0	2,6	2,1	5,4	370,1	269,0	75,5	82,3	273,0	345,9	383,0	381,7	466,8	0,17	74,73	75,54	75,81	0,18	75,06	76,07	75,71	0,05	0,05	1,7036866
222,0	393,0	2,6	2,1	5,4	369,7	268,5	74,5	82,2	273,4	343,8	381,6	379,9	469,7	0,18	74,74	75,55	75,81	0,18	75,07	76,06	75,69	0,05	0,05	1,3178406
223,0	394,0	2,5	2,1	5,4	369,8	267,8	74,8	82,1	267,5	342,1	380,6	379,6	472,1	0,18	74,74	75,57	75,80	0,18	75,07	76,07	75,69	0,05	0,05	0,9389954
224,0	395,0	2,6	2,2	5,3	368,4	266,6	74,6	82,1	271,5	339,9	378,8	376,5	474,7	0,18	74,78	75,58	75,80	0,18	75,13	76,08	75,68	0,05	0,05	0,0393585
225,0	396,0	2,6	2,2	5,3	367,9	266,2	74,6	82,0	271,5	338,7	377,0	375,6	476,7	0,17	74,80	75,57	75,79	0,18	75,12	76,09	75,69	0,05	0,05	0,0457343
226,0	397,0	2,5	2,2	5,3	366,5	265,4	73,8	82,1	269,1	336,9	375,5	373,6	477,6	0,17	74,80	75,57	75,79	0,18	75,13	76,08	75,67	0,05	0,05	-1,826001
227,0	398,0	2,5	2,3	5,2	365,2	264,8	73,3	82,1	268,9	334,7	373,8	369,5	479,1	0,17	74,81	75,56	75,77	0,18	75,12	76,08	75,65	0,05	0,05	-3,14455
228,0	399,0	2,5	2,3	5,1	364,6	264,3	73,6	82,1	269,7	333,9	372,1	368,9	478,1	0,18	74,83	75,56	75,76	0,18	75,13	76,07	75,64	0,05	0,05	-3,8032278
229,0	400,0	2,5	2,4	5,2	363,2	263,4	72,4	82,2	266,7	332,6	370,6	367,3	477,3	0,17	74,82	75,57	75,76	0,18	75,13	76,07	75,65	0,05	0,05	-5,1618164
230,0	401,0	2,5	2,4	5,1	362,0	262,6	73,5	81,8	264,6	330,7	369,2	366,9	478,7	0,18	74,83	75,56	75,75	0,18	75,12	76,09	75,65	0,05	0,05	-6,338293
231,0	402,0	2,4	2,4	5,1	361,3	261,8	73,0	81,9	265,2	328,7	367,8	365,0	479,8	0,18	74,80	75,56	75,73	0,18	75,10	76,07	75,60	0,05	0,05	-7,060394
232,0	403,0	2,5	2,4	5,1	359,9	260,9	75,4	82,1	264,4	325,2	366,0	363,4	480,5	0,18	74,81	75,55	75,74	0,18	75,09	76,06	75,61	0,05	0,05	-8,475085
233,0	404,0	2,4	2,4	5,1	358,7	259,8	73,3	81,9	263,9	322,8	365,2	361,7	479,8	0,17	74,82	75,54	75,74	0,18	75,10	76,06	75,59	0,05	0,05	-9,677625
234,0	405,0	2,4	2,4	5,1	357,7	258,9	73,3	81,8	262,8	321,1	364,0	360,5	480,1	0,18	74,84	75,55	75,74	0,18	75,15	76,06	75,58	0,05	0,05	-10,68798
235,0	406,0	2,4	2,4	5,0	356,1	258,1	76,1	81,9	261,9	319,8	362,2	359,2	481,4	0,18	74,85	75,56	75,75	0,18	75,15	76,05	75,56	0,05	0,05	-11,342311
236,0	407,0	2,4	2,5	4,9	355,0	256,8	76,6	81,8	261,3	318,1	362,1	358,4	480,8	0,17	74,88	75,57	75,73	0,18	75,16	76,07	75,59	0,05	0,05	-12,346677
237,0	408,0	2,3	2,5	4,9	355,0	255,6	76,3	81,5	261,3	316,0	361,2	356,9	479,8	0,17	74,90	75,57	75,73	0,18	75,18	76,06	75,58	0,05	0,05	-13,31647
238,0	409,0	2,3	2,5	4,9	353,9	254,8	73,7	81,6	260,1	315,7	359,2	355,5	479,8	0,17	74,88	75,56	75,70	0,18	75,19	76,07	75,56	0,05	0,05	-14,501115
239,0	410,0	2,3	2,5	4,8	353,1	254,9	74,7	81,5	260,3	314,7	358,5	354,6	477,5	0,17	74,87	75,56	75,70	0,18	75,18	76,07	75,56	0,05	0,05	-15,25632
240,0	411,0	2,3	2,5	5,1	352,0	254,6	73,1	81,6	259,2	313,3	357,8	353,1	476,8	0,17	74,84	75,56	75,67	0,18	75,20	76,07	75,53	0,05	0,05	-16,32403
241,0	412,0	2,5	2,5	5,3	351,0	254,0	73,0	81,6	258,0	312,0	356,0	351,9	476,0	0,18	74,86	75,57	75,69	0,18	75,20	76,07	75,54	0,05	0,05	-17,45537
242,0	413,0	2,3	2,3	5,1	349,7	254,3	72,9	81,6	258,7	311,4	354,7	351,1	472,4	0,17	74,87	75,59	75,66	0,18	75,21	76,10	75,53	0,05	0,05	-18,66166
243,0	414,0	2,2	2,4	5,1	349,2	254,2	74,9	81,6	259,0	310,5	354,1	349,7	472,6	0,18	74,87	75,60	75,65	0,18	75,23	76,11	75,55	0,05	0,05	-19,18437
244,0	415,0	2,2	2,4	5,1	347,6	253,6	74,4	81,5	257,2	310,0	351,6	348,3	470,8	0,17	74,86	75,60	75,65	0,18	75,22	76,11	75,54	0,05	0,05	-20,79684
245,0	416,0	2,2	2,4	5,1	346,8	253,4	73,2	81,5	256,4	309,4	351,6	346,2	470,4	0,18	74,85	75,62	75,62	0,18	75,25	76,12	75,54	0,05	0,05	-21,57502
246,0	417,0	2,2	2,4	5,0	346,8	252,8	74,8	81,2	256,0	308,9	351,3	345,8	470,3	0,17	74,88	75,60	75,64	0,18	75,25	76,12				

298,0	469,0	1,2	2,0	5,6	326,1	250,8	73,8	81,3	251,9	248,7	309,2	318,5	502,2	0,18	75,25	75,74	75,59	0,18	75,53	76,25	75,42	0,05	0,04	-42,21773
299,0	470,0	1,2	2,0	5,6	325,7	250,0	75,8	81,4	251,0	248,2	309,4	318,7	501,5	0,18	75,24	75,76	75,59	0,18	75,53	76,26	75,43	0,05	0,04	-42,61183
300,0	471,0	1,2	1,8	5,9	324,5	248,9	74,5	81,4	248,2	248,0	307,6	318,1	500,4	0,17	75,26	75,76	75,59	0,18	75,55	76,27	75,41	0,05	0,04	-43,88955
301,0	472,0	1,1	1,7	5,7	323,6	247,8	74,5	81,4	246,1	247,5	307,7	317,5	499,5	0,17	75,29	75,77	75,60	0,18	75,58	76,28	75,43	0,05	0,04	-44,71491
302,0	473,0	1,1	1,7	5,6	322,7	247,2	76,1	81,2	244,3	246,8	307,8	317,0	497,6	0,18	75,34	75,78	75,59	0,18	75,61	76,29	75,43	0,05	0,04	-45,64453
303,0	474,0	1,1	1,7	5,6	321,9	246,1	74,7	81,3	242,9	246,3	307,1	316,1	496,9	0,18	75,36	75,79	75,60	0,18	75,63	76,28	75,43	0,05	0,04	-46,49928
304,0	475,0	1,1	1,7	5,5	321,3	245,5	73,7	81,3	241,5	245,4	306,7	316,2	496,7	0,17	75,37	75,79	75,62	0,18	75,64	76,30	75,45	0,05	0,04	-47,05166
305,0	476,0	1,1	1,7	5,5	320,8	245,7	73,2	81,3	241,1	244,5	306,6	314,9	495,7	0,17	75,39	75,82	75,62	0,18	75,66	76,32	75,46	0,05	0,04	-47,51357
306,0	477,0	1,1	1,7	5,5	320,3	245,2	72,8	81,4	241,5	244,0	306,0	314,9	495,2	0,18	75,38	75,83	75,63	0,18	75,67	76,33	75,45	0,05	0,04	-48,06555
307,0	478,0	1,0	1,7	5,4	319,4	244,3	73,3	81,3	240,3	243,3	305,2	314,1	494,3	0,18	75,39	75,84	75,63	0,18	75,67	76,33	75,43	0,05	0,04	-48,51793
308,0	479,0	1,0	1,7	5,6	319,1	244,0	76,2	81,2	240,5	242,5	305,1	313,1	494,5	0,17	75,39	75,85	75,65	0,18	75,67	76,35	75,48	0,05	0,04	-49,22892
309,0	480,0	1,0	1,8	5,5	318,9	243,2	73,9	81,2	240,9	241,6	305,5	313,0	493,6	0,17	75,38	75,86	75,66	0,18	75,67	76,37	75,47	0,05	0,04	-49,44836
310,0	481,0	1,0	1,8	5,5	318,8	242,7	73,2	81,3	239,4	241,7	305,4	312,4	493,1	0,17	75,37	75,85	75,69	0,18	75,68	76,37	75,47	0,05	0,04	-49,57081
311,0	482,0	0,9	1,8	5,4	318,7	241,7	74,2	81,2	240,3	241,0	303,8	312,2	492,4	0,18	75,40	75,87	75,69	0,18	75,71	76,39	75,50	0,05	0,04	-49,63283
312,0	483,0	1,0	1,7	5,4	318,2	240,5	76,3	81,2	239,3	239,9	303,8	311,7	491,5	0,18	75,42	75,90	75,70	0,18	75,72	76,42	75,51	0,05	0,04	-50,13094
313,0	484,0	0,9	1,6	5,3	317,8	239,7	75,9	81,0	238,5	238,7	303,9	310,6	491,1	0,17	75,41	75,89	75,68	0,18	75,73	76,42	75,48	0,05	0,04	-50,58272
314,0	485,0	0,9	1,5	5,4	317,2	239,0	74,6	81,3	238,4	237,8	303,5	309,8	490,6	0,18	75,49	75,91	75,72	0,18	75,77	76,41	75,52	0,05	0,04	-51,16463
315,0	486,0	0,9	1,5	5,3	316,5	238,5	75,0	81,2	237,2	237,2	302,7	309,2	490,8	0,17	75,51	75,93	75,72	0,18	75,79	76,43	75,51	0,05	0,04	-51,82361
316,0	487,0	0,9	1,5	5,3	316,3	238,0	75,8	81,0	235,9	236,1	303,0	309,2	491,1	0,18	75,51	75,93	75,71	0,18	75,81	76,44	75,52	0,05	0,04	-52,0811
317,0	488,0	0,9	1,5	5,2	315,9	237,6	73,8	81,2	236,7	235,5	303,2	308,2	490,9	0,18	75,50	75,93	75,72	0,18	75,80	76,43	75,53	0,05	0,04	-52,45607
318,0	489,0	0,8	1,5	5,2	315,2	236,7	74,3	81,0	235,2	235,3	301,6	308,1	490,8	0,17	75,52	75,94	75,73	0,18	75,83	76,46	75,53	0,05	0,04	-53,16729
319,0	490,0	0,8	1,6	5,2	314,3	235,9	74,3	81,1	234,5	234,6	301,1	307,3	490,0	0,18	75,50	75,95	75,74	0,18	75,81	76,46	75,53	0,05	0,04	-54,07511
320,0	491,0	0,8	1,7	5,1	313,6	235,6	73,1	81,1	233,5	233,7	301,3	306,2	490,5	0,17	75,52	75,95	75,74	0,18	75,84	76,48	75,53	0,05	0,04	-54,71145
321,0	492,0	0,8	1,7	5,0	313,3	235,0	73,0	81,1	232,6	233,1	300,4	305,9	490,6	0,18	75,54	75,97	75,75	0,18	75,83	76,48	75,55	0,05	0,04	-55,05556
322,0	493,0	0,8	1,7	5,0	312,5	234,7	73,2	81,0	232,0	232,5	299,6	304,1	494,6	0,18	75,55	75,99	75,77	0,18	75,87	76,51	75,57	0,05	0,04	-55,85228
323,0	494,0	0,8	1,7	5,0	311,2	234,5	73,6	81,0	231,2	230,3	299,5	302,8	492,1	0,17	75,56	75,98	75,77	0,18	75,86	76,51	75,56	0,05	0,04	-57,19237
324,0	495,0	0,7	1,7	4,9	310,8	233,9	73,0	81,0	230,7	229,6	299,6	302,7	491,5	0,17	75,57	75,99	75,77	0,18	75,88	76,51	75,57	0,05	0,04	-58,07903
325,0	496,0	0,8	1,7	4,9	309,9	233,2	74,6	80,8	228,0	229,5	298,8	302,3	490,8	0,18	75,61	76,01	75,79	0,18	75,91	76,54	75,58	0,05	0,04	-58,48891
326,0	497,0	0,7	1,7	4,6	308,6	232,0	74,6	81,1	226,0	229,5	297,7	301,1	488,5	0,18	75,59	76,01	75,79	0,18	75,89	76,53	75,58	0,05	0,04	-59,79851
327,0	498,0	0,7	1,7	4,5	307,7	231,6	74,3	81,2	226,2	228,2	296,7	300,0	487,2	0,17	75,58	76,02	75,79	0,18	75,89	76,54	75,57	0,05	0,04	-60,7049
328,0	499,0	0,7	1,7	4,5	306,6	231,3	75,8	81,0	224,4	227,3	297,2	299,1	485,0	0,18	75,61	76,05	75,81	0,18	75,92	76,55	75,59	0,05	0,04	-61,76709
329,0	500,0	0,7	1,8	4,5	305,1	230,4	74,0	81,0	222,7	226,7	296,7	297,7	481,9	0,17	75,61	76,04	75,80	0,18	75,92	76,56	75,59	0,05	0,04	-63,20908
330,0	501,0	0,7	1,8	4,5	304,1	229,2	73,2	81,1	221,6	226,2	296,6	296,6	480,4	0,18	75,66	76,06	75,82	0,18	75,96	76,58	75,61	0,05	0,04	-64,22542
331,0	502,0	0,7	1,8	4,4	303,2	228,3	73,2	81,0	221,0	225,5	294,0	295,8	479,8	0,17	75,68	76,07	75,84	0,18	75,98	76,60	75,60	0,05	0,04	-65,13805
332,0	503,0	0,6	1,8	4,5	302,5	227,5	73,0	81,1	220,2	225,2	293,7	294,6	478,8	0,18	75,71	76,10	75,84	0,18	76,00	76,61	75,61	0,05	0,04	-65,87608
333,0	504,0	0,6	1,7	4,5	301,3	225,9	73,0	81,1	218,6	224,6	292,9	293,7	476,8	0,18	75,71	76,08	75,86	0,18	76,01	76,62	75,63	0,05	0,04	-67,04224
334,0	505,0	0,6	1,8	4,4	300,0	225,1	73,0	81,0	216,0	224,0	292,9	292,2	475,0	0,17	75,75	76,11	75,85	0,18	76,06	76,63	75,60	0,05	0,04	-68,37127
335,0	506,0	0,6	1,9	4,4	299,2	224,1	78,1	80,9	214,4	223,5	291,6	291,5	474,9	0,17	75,78	76,13	75,85	0,18	76,08	76,66	75,61	0,05	0,04	-69,16497
336,0	507,0	0,6	1,9	4,3	297,9	222,9	74,9	80,9	212,5	221,8	290,5	290,4	473,4	0,18	75,81	76,14	75,87	0,18	76,10	76,67	75,61	0,05	0,04	-70,27533
337,0	508,0	0,6	1,9	4,3	297,0	222,2	74,9	80,9	208,3	222,5	291,7	290,1	472,4	0,18	75,77	76,13	75,88	0,18	76,07	76,65	75,63	0,05	0,04	-71,36696
338,0	509,0	0,6	1,9	4,2	295,7	220,9	75,8	80,9	205,7	221,9	290,0	289,3	471,6	0,18	75,74	76,14	75,90	0,18	76,08	76,64	75,61	0,05	0,04	-72,66389
339,0	510,0	0,5	2,0	4,0	294,7	220,4	74,3	80,9	204,3	221,3	290,4	288,5	468,8	0,18	75,77	76,16	75,90	0,18	76,08	76,67	75,64	0,05	0,04	-73,70804
340,0	511,0	0,6	2,0	4,0	293,6	219,3	76,5	80,8	202,5	220,6	290,2	286,5	468,4	0,17	75,78	76,17	75,88	0,18	76,09	76,69	75,63	0,05	0,04	-74,74214
341,0	512,0	0,6	2,0	4,1	292,9	218,3	76,0	80,9	201,3	219,8	290,2	285,5	467,4	0,18	75,79	76,17	75,90	0,18	76,10	76,69	75,65	0,05	0,04	-75,49262
342,0	513,0	0,6	2,0	4,2	292,0	217,3	75,8	80,8	200,6	218,7	289,6	284,6	466,4	0,18	75,80	76,18	75,92	0,18	76,11	76,70	75,64	0,05	0,04	-76,06659
343,0	514,0	0,5	2,2	4,0	291,0	217,3	73,8	80,8	199,1	218,0	289,9	282,8	465,3	0,18	75,82	76,20	75,93	0,18	76,12	76,70	75,66	0,05	0,04	-77,32304
344,0	515,0	0,5	2,2	4,0	289,9	216,9	73,5	80,8	197,7	217,8	288,9	281,6	463,5	0,17	75,86	76,21	75,93	0,18	76,16	76,73	75,66	0,05	0,04	-78,43171
345,0	516,0	0,4	2,2	3,9	289,1	216,3	74,2	80,7	196,9	216,9	288,2	280,4	463,3	0,18	75,86	76,22	75,92	0,18	76,16	76,74	75,66	0,05	0,04	-79,23244
346,0	517,0	0,4	2,2	3,9	288,4	215,6	76,6	80,6	195,8	216,0	287,2	280,0	462,0	0,17	75,89	76,22	75,93	0,18	76,19	76,74	75,68	0,05	0,04	-79,95735
347,0	518,0	0,5	2,2	3,9	287,6	214,5	76,0	80,7	194,7	216,5	286,9	278,6	461,6	0,17	75,91	76,24	75,93	0,18	76,18	76,77	75,68	0,05	0,04	-8



SFBA EPA EMISSION RESULTS

RESULTS

**Average emission rate:** 1,0 g/hr  
 Burn Rate : 1,542 Dry kg/hr

**Test Duration:** 383 min

PRESSURE FACTOR: DGM 1 0,97698  
 DGM 2 0,97697  
 DGM 3 1,00029

BAROMETRIC PRESSURE  
 Average: 29,928644 in Hg  
 Start: 29,972939 in Hg  
 End: 29,884349 in Hg

TEMPERATURE FACTORS DGM 1 0,98659  
 DGM 2 0,98583  
 DGM 3 0,98909

DGM CONTROLLER VALUES  
 DGM 1 Final: 22843,580 Cuft  
 Initial: 22774,743 Cuft

VOLUMES SAMPLED DGM 1 65,546 Scft  
 DGM 2 66,745 Scft  
 DGM 3 21,949 Scft

DGM 2 Final: 20859,135 Cuft  
 Initial: 20789,024 Cuft

DGM #3 Final: 148,000 Cuft  
 Initial: 125,510 Cuft

TOTAL TUNNEL VOLUME : 112118

TEMPERATURES  
 DGM 1 535,177 °R  
 DGM 2 535,588 °R

SAMPLE RATIOS  
 Sample Train 1: 1710,522  
 Sample Train 2: 1679,785

CALIBRATION FACTORS  
 DGM 1 0,9879  
 DGM 2 0,9884  
 DGM #3 0,9864

Paticulate concentration  
 Sample Train 1 **0,000072** g/dscf  
 Sample Train 2 **0,000066** g/dscf  
 Room **0,000009** g/dscf

TUNNEL FLOW RATE: 292,737 Dscfm

TOTAL EMISSIONS  
 Sample Train 1 **7,02** g  
 Sample Train 2 **6,37** g

PARTICULATE CATCH  
 Total Sample Train 1: 4,70 mg  
 Total Sample Train 2: 4,40 mg  
 Total Sample Train 1 1st hour: 3,30 mg

EMISSION RATES  
 Sample Train 1 **1,10** g/hr  
 Sample Train 2 **1,00** g/hr

1st hour emission rate **5,64** g/hr

DEVIATION: 4,84%

Cs Train 1 Train 2  
 7,171E-05 6,59221E-05







321,00	0,36	1,72	5,00	192,2%	20,50	14,64	112,8	22,8	79,5%	77,2%	61,4%
322,00	0,36	1,70	5,01	192,7%	20,50	14,64	112,6	22,9	79,7%	77,3%	61,6%
323,00	0,36	1,72	4,99	192,9%	20,50	14,65	112,5	23,1	79,6%	77,3%	61,5%
324,00	0,31	1,71	4,99	193,1%	20,50	14,65	112,2	22,8	79,6%	77,3%	61,5%
325,00	0,36	1,70	4,88	198,7%	20,51	14,78	111,8	23,5	79,4%	77,2%	61,3%
326,00	0,30	1,67	4,58	214,1%	20,53	15,11	111,1	23,7	78,7%	76,6%	60,3%
327,00	0,30	1,70	4,51	216,3%	20,53	15,17	110,9	22,9	78,3%	76,4%	59,8%
328,00	0,30	1,72	4,48	216,9%	20,53	15,19	110,7	24,1	77,9%	76,5%	59,6%
329,00	0,30	1,76	4,48	214,7%	20,53	15,17	110,2	23,3	77,5%	76,4%	59,2%
330,00	0,30	1,78	4,48	213,4%	20,53	15,15	109,6	22,9	77,4%	76,4%	59,1%
331,00	0,30	1,83	4,44	212,9%	20,53	15,16	109,1	22,9	76,8%	76,4%	58,6%
332,00	0,27	1,80	4,48	212,9%	20,53	15,15	108,6	22,8	77,2%	76,5%	59,1%
333,00	0,26	1,75	4,54	212,6%	20,53	15,12	107,7	22,8	77,9%	76,8%	59,8%
334,00	0,26	1,80	4,45	214,1%	20,53	15,18	107,3	22,8	77,1%	76,6%	59,0%
335,00	0,26	1,85	4,39	215,0%	20,53	15,22	106,7	25,6	76,4%	76,9%	58,8%
336,00	0,26	1,87	4,31	217,8%	20,53	15,28	106,0	23,5	76,0%	76,5%	58,2%
337,00	0,26	1,88	4,30	218,1%	20,53	15,30	105,7	23,8	75,9%	76,6%	58,1%
338,00	0,26	1,93	4,23	219,3%	20,53	15,35	104,9	24,3	75,1%	76,5%	57,5%
339,00	0,22	2,00	4,05	224,5%	20,54	15,49	104,7	23,4	73,8%	75,9%	56,0%
340,00	0,26	2,03	4,02	224,4%	20,54	15,50	104,1	24,7	73,4%	76,1%	55,8%
341,00	0,26	2,04	4,08	220,7%	20,54	15,43	103,5	24,5	73,6%	76,3%	56,1%
342,00	0,26	2,14	4,00	219,9%	20,53	15,46	103,3	24,2	72,4%	76,0%	55,0%
343,00	0,22	2,17	3,98	219,7%	20,53	15,47	102,9	23,2	72,1%	75,8%	54,7%
344,00	0,22	2,17	4,00	218,4%	20,53	15,45	102,7	23,1	72,1%	75,9%	54,7%
345,00	0,17	2,18	3,89	223,6%	20,54	15,56	102,4	23,4	71,6%	75,7%	54,2%
346,00	0,18	2,21	3,91	221,2%	20,54	15,53	102,0	24,8	71,4%	76,0%	54,2%
347,00	0,22	2,19	3,94	220,7%	20,54	15,50	101,4	24,4	71,7%	76,1%	54,6%
348,00	0,22	2,12	3,84	229,8%	20,55	15,65	100,9	24,5	71,9%	75,9%	54,6%
349,00	0,17	2,08	3,79	234,4%	20,55	15,72	100,6	23,2	72,0%	75,7%	54,5%
350,00	0,17	2,06	3,77	237,3%	20,56	15,76	100,0	24,1	72,1%	75,8%	54,7%
351,00	0,17	2,05	3,75	238,8%	20,56	15,78	99,8	23,5	72,1%	75,7%	54,6%
352,00	0,17	2,06	3,76	237,3%	20,56	15,76	99,3	23,2	72,0%	75,8%	54,6%
353,00	0,17	2,10	3,75	235,6%	20,55	15,75	98,9	23,3	71,6%	75,8%	54,3%
354,00	0,17	2,13	3,77	233,1%	20,55	15,72	98,4	22,8	71,5%	75,8%	54,2%
355,00	0,13	2,15	3,65	238,6%	20,56	15,83	97,9	22,8	70,7%	75,5%	53,4%
356,00	0,13	2,17	3,50	246,1%	20,57	15,98	97,6	24,4	69,8%	75,3%	52,6%
357,00	0,13	2,18	3,50	246,3%	20,57	15,98	97,1	24,7	69,8%	75,4%	52,6%
358,00	0,13	2,20	3,51	244,1%	20,56	15,95	96,4	23,6	69,7%	75,4%	52,6%
359,00	0,13	2,22	3,55	240,9%	20,56	15,91	96,2	23,3	69,7%	75,5%	52,6%
360,00	0,13	2,23	3,57	238,4%	20,56	15,87	95,9	23,5	69,7%	75,7%	52,7%
361,00	0,13	2,24	3,57	238,2%	20,56	15,87	95,6	23,3	69,6%	75,7%	52,6%
362,00	0,13	2,26	3,56	237,5%	20,56	15,86	95,2	23,3	69,4%	75,7%	52,5%
363,00	0,13	2,24	3,58	237,7%	20,56	15,86	94,7	22,9	69,6%	75,8%	52,8%
364,00	0,13	2,25	3,57	237,6%	20,56	15,86	94,4	23,2	69,5%	75,8%	52,7%
365,00	0,08	2,24	3,56	238,8%	20,56	15,88	94,2	22,9	69,6%	75,8%	52,7%
366,00	0,08	2,23	3,56	239,0%	20,56	15,88	93,9	22,9	69,6%	75,8%	52,8%
367,00	0,08	2,23	3,55	239,8%	20,56	15,89	93,5	22,9	69,6%	75,9%	52,9%
368,00	0,08	2,23	3,55	239,8%	20,56	15,89	93,3	23,1	69,6%	75,9%	52,9%
369,00	0,08	2,26	3,48	242,7%	20,56	15,96	92,9	23,0	69,0%	75,7%	52,3%
370,00	0,04	2,31	3,42	242,6%	20,56	15,98	92,5	24,0	68,2%	75,7%	51,7%
371,00	0,04	2,38	3,40	240,1%	20,56	15,97	92,2	23,6	67,6%	75,6%	51,1%
372,00	0,08	2,40	3,34	242,4%	20,56	16,02	91,9	24,3	67,1%	75,6%	50,7%
373,00	0,04	2,30	3,43	242,7%	20,56	15,98	91,6	23,9	68,4%	75,9%	51,9%
374,00	0,04	2,20	3,58	240,0%	20,56	15,88	91,3	23,6	69,9%	76,4%	53,4%
375,00	0,04	2,16	3,54	244,5%	20,56	15,94	90,9	24,3	70,1%	76,5%	53,6%
376,00	0,04	2,11	3,52	249,1%	20,57	16,00	90,8	24,6	70,4%	76,5%	53,9%
377,00	0,04	2,07	3,40	259,1%	20,58	16,14	90,4	23,3	70,2%	76,1%	53,4%
378,00	0,04	2,04	3,36	263,7%	20,58	16,21	90,4	23,3	70,2%	75,9%	53,3%
379,00	0,04	2,03	3,35	265,0%	20,58	16,22	90,1	23,9	70,2%	76,0%	53,4%
380,00	0,04	2,02	3,38	263,5%	20,58	16,19	89,8	23,6	70,5%	76,1%	53,7%
381,00	0,04	2,02	3,34	266,4%	20,59	16,23	89,6	24,0	70,4%	76,1%	#DIV/0!
382,00	0,04	2,03	3,38	262,9%	20,58	16,18	89,3	23,2	70,5%	76,2%	53,7%
383,00	0,00	2,02	3,38	263,4%	20,58	16,19	88,9	23,5	70,5%	76,3%	53,8%

Time acquisition minutes	Flue	Room	Tunnel	scale	Tunnel Velocity	Right	Back	bottom	Top	Left
	temp	temp	dry bulb		Pressure					
	°F	°F	°F	lbs	in. Wc	°F	°F	°F	°F	°F
1	68,50	67,68	71,36	29,49	0,0494	67,96	68,09	68,11	68,46	68,21
2	93,16	67,59	73,44	30,00	0,0510	68,35	68,45	69,57	81,52	68,26
3	223,96	67,74	93,80	29,71	0,0475	69,50	71,26	75,86	157,43	68,90
4	450,11	67,94	135,22	29,20	0,0451	75,67	80,73	84,93	348,72	70,84
5	598,52	67,75	173,45	28,71	0,0394	92,81	96,11	98,11	508,52	75,65
6	659,01	68,06	198,99	28,31	0,0382	112,48	112,38	116,00	583,66	83,64
7	652,53	68,24	210,04	27,91	0,0366	119,28	128,77	138,30	595,69	93,90
8	613,49	68,10	209,56	27,52	0,0392	123,15	147,86	164,41	586,15	103,38
9	584,46	68,28	206,75	27,11	0,0387	126,90	169,96	193,15	566,90	110,34
10	656,52	68,27	219,80	26,62	0,0382	134,83	193,07	223,00	559,49	116,30
11	660,28	68,25	227,51	26,22	0,0385	143,65	189,11	246,26	504,09	121,29
12	638,30	68,54	225,26	25,82	0,0392	150,71	185,10	269,75	465,82	123,81
13	601,92	68,64	218,33	25,52	0,0387	156,01	183,20	285,50	455,31	128,66
14	574,41	69,07	213,37	25,12	0,0392	160,29	180,89	297,60	431,42	134,97
15	545,82	69,13	205,08	24,81	0,0404	163,34	179,47	315,73	429,37	140,43
16	536,23	69,89	201,54	24,53	0,0404	165,88	177,97	334,68	429,57	144,79
17	533,81	69,35	199,32	24,23	0,0399	168,56	176,06	353,12	421,80	148,15
18	532,42	68,92	198,28	23,82	0,0397	170,75	175,84	369,70	418,14	151,58
19	565,24	69,49	181,53	23,21	0,0416	172,72	175,71	384,36	433,58	154,47
20	471,43	68,72	131,10	23,04	0,0439	175,81	175,71	393,80	378,90	157,62
21	429,19	69,22	151,63	23,02	0,0432	177,47	174,23	401,06	347,29	160,42
22	544,09	69,01	184,15	22,73	0,0427	178,55	173,70	406,55	422,02	163,01
23	629,57	69,53	206,44	22,33	0,0409	181,14	174,01	413,25	488,56	165,89
24	748,75	69,05	234,39	21,94	0,0407	184,78	175,34	424,21	587,76	169,71
25	809,52	69,39	254,40	21,52	0,0404	190,62	177,90	433,95	637,67	174,89
26	719,89	68,87	159,23	20,82	0,0432	197,31	183,16	436,28	637,29	181,11
27	606,59	69,54	131,97	20,63	0,0446	202,39	185,13	436,70	511,55	185,76
28	531,51	70,79	119,13	20,44	0,0446	206,01	186,09	432,10	436,73	190,79
29	483,75	68,60	111,85	20,24	0,0458	209,27	185,78	428,07	387,43	193,49
30	450,77	69,11	106,91	20,13	0,0465	211,41	184,29	423,91	357,64	196,14
31	425,71	68,83	103,23	19,93	0,0468	212,53	182,89	416,07	338,55	198,79
32	420,62	68,85	107,46	19,84	0,0465	213,21	181,23	408,62	322,89	200,75
33	421,33	69,44	108,41	19,64	0,0465	213,53	180,66	406,36	319,07	202,63
34	420,99	71,91	108,56	19,33	0,0470	214,48	181,12	406,59	324,43	205,64
35	420,53	69,45	108,55	19,13	0,0473	216,11	181,04	410,06	328,59	208,78
36	420,29	69,01	108,10	18,94	0,0470	218,16	182,21	417,64	328,79	212,96
37	423,62	68,96	108,91	18,63	0,0465	220,32	184,69	428,54	322,59	217,32
38	430,92	69,16	109,95	18,43	0,0465	223,71	188,37	442,74	324,28	221,44
39	439,26	69,01	110,19	18,24	0,0470	226,05	192,71	457,70	330,37	224,80
40	453,24	73,04	109,92	18,05	0,0468	228,84	199,79	471,41	340,79	229,20
41	474,34	70,41	110,96	17,74	0,0473	232,24	205,88	484,97	364,77	231,61
42	500,76	73,81	113,19	17,53	0,0453	235,22	213,41	498,48	402,45	236,41
43	533,11	70,01	115,67	17,25	0,0468	239,29	220,56	510,04	453,40	239,92
44	569,82	70,00	117,77	17,03	0,0475	243,26	227,57	523,66	513,49	244,78
45	600,04	69,64	119,86	16,74	0,0463	247,61	234,49	536,53	568,91	250,53
46	625,27	69,55	120,28	16,44	0,0465	253,65	241,71	547,67	609,14	256,78
47	596,07	69,72	120,12	16,14	0,0468	260,09	248,66	558,00	575,81	262,88
48	567,06	69,12	117,64	15,94	0,0470	269,58	254,89	568,61	515,22	270,05
49	560,02	69,76	116,90	15,65	0,0470	279,37	261,04	578,64	482,84	276,97
50	571,46	69,61	116,35	15,34	0,0465	288,31	268,56	586,07	480,28	283,98
51	590,23	69,65	116,81	15,15	0,0468	296,40	274,74	594,84	491,68	289,36
52	616,37	68,63	118,10	14,86	0,0473	305,17	282,35	601,29	537,08	296,41
53	657,04	69,56	119,56	14,54	0,0465	314,55	288,21	607,84	590,35	301,69
54	685,54	69,87	119,96	14,25	0,0465	323,26	294,22	611,94	632,76	305,55
55	715,44	69,98	119,42	13,94	0,0465	330,14	298,69	617,26	670,91	310,33
56	725,85	70,10	120,91	13,75	0,0463	337,32	301,53	622,50	694,60	314,15
57	726,96	70,26	120,13	13,45	0,0466	343,00	304,66	625,43	734,91	319,27
58	723,73	70,48	119,52	13,26	0,0465	348,32	307,61	629,96	747,96	323,95
59	726,15	70,01	119,36	13,04	0,0470	353,55	309,42	632,22	757,38	330,93
60	733,83	70,05	120,19	12,75	0,0458	358,91	311,88	631,43	756,99	338,18
61	747,81	70,55	120,93	12,56	0,0458	363,06	314,46	630,36	778,80	344,66
62	763,18	70,50	122,44	12,35	0,0458	368,03	316,69	628,09	794,35	349,97
63	770,97	71,55	123,25	12,05	0,0468	373,24	319,97	624,87	798,56	355,86
64	780,56	70,67	124,65	11,86	0,0468	379,16	322,10	621,37	804,57	360,70
65	791,61	70,87	125,62	11,67	0,0463	383,74	324,69	612,28	816,14	366,71
66	796,96	71,23	126,81	11,35	0,0463	389,40	326,53	603,79	820,11	372,87
67	797,65	71,19	126,69	11,16	0,0465	394,76	329,24	595,52	814,58	379,21
68	794,65	72,53	126,95	10,96	0,0465	399,30	330,84	589,03	810,08	382,97
69	790,71	72,07	126,86	10,75	0,0463	404,53	331,87	581,97	808,59	386,28
70	786,54	71,77	127,34	10,56	0,0463	409,16	334,09	577,38	806,68	389,61
71	782,27	72,32	125,73	10,36	0,0458	414,13	337,36	574,84	796,81	394,37
72	780,20	72,13	125,10	10,05	0,0468	417,63	340,31	571,67	795,91	400,11
73	785,92	71,35	126,76	9,95	0,0463	423,65	342,35	569,90	800,33	403,20
74	796,12	71,80	127,89	9,66	0,0468	428,37	344,88	567,62	810,84	408,21
75	800,79	71,15	129,15	9,76	0,0475	433,70	348,06	570,03	821,35	411,37
76	806,69	72,11	130,28	9,25	0,0477	439,63	351,39	569,93	825,70	416,64
77	810,32	71,96	130,81	9,47	0,0470	445,24	355,73	569,80	829,86	421,99
78	808,98	72,24	130,58	8,77	0,0468	452,15	359,82	570,39	828,65	427,13
79	805,78	72,34	130,70	8,59	0,0480	458,77	365,09	571,49	830,41	433,24
80	831,03	72,77	226,86	23,07	0,0394	465,00	375,04	571,85	746,90	438,67
81	850,31	72,41	182,67	7,78	0,0448	481,87	383,91	579,00	777,98	455,44
82	829,07	73,37	150,07	7,56	0,0463	497,52	391,08	583,32	788,71	467,55
83	772,67	72,08	138,36	7,46	0,0468	514,94	396,64	583,01	745,77	474,57
84	732,86	72,72	132,51	7,27	0,0468	526,64	402,22	582,96	707,89	484,92
85	701,65	73,04	127,61	7,07	0,0473	537,57	405,22	584,56	671,42	492,16
86	675,06	72,28	124,04	6,96	0,0470	544,87	408,99	584,59	644,01	499,12
87	642,00	72,70	135,44	12,64	0,0463	551,86	412,71	580,74	604,96	504,19
88	552,64	73,37	202,56	6,67	0,0463	560,14	419,06	578,16	494,99	506,27
89	553,41	73,16	175,93	6,38	0,0458	565,03	422,05	578,67	452,65	507,49
90	571,02	73,07	130,32	6,28	0,0475	568,45	423,58	577,20	482,14	508,88



91	556,52	72,38	118,66	6,28	0,0477	569,98	428,49	571,99	485,78	512,21
92	542,88	72,34	112,91	6,16	0,0482	571,97	435,77	569,50	479,37	514,01
93	526,93	71,66	109,31	6,06	0,0487	570,89	442,32	566,20	465,10	515,16
94	510,78	71,30	107,29	6,06	0,0485	571,19	446,87	561,48	444,15	513,12
95	496,26	71,63	105,06	5,97	0,0494	569,28	448,42	557,97	429,00	510,71
96	481,52	71,54	103,85	5,97	0,0498	566,03	449,94	551,78	415,11	510,04
97	467,43	71,88	101,88	5,87	0,0498	563,22	451,21	546,66	406,36	506,93
98	455,27	72,17	100,40	5,77	0,0500	557,54	449,50	540,80	399,34	504,32
99	442,05	71,52	99,80	5,77	0,0498	553,03	445,50	536,87	394,06	503,00
100	431,17	71,57	98,88	5,77	0,0502	548,44	442,20	532,86	387,73	499,88
101	420,53	71,85	97,67	5,77	0,0500	545,16	436,70	528,42	380,58	497,43
102	409,90	71,24	96,67	5,67	0,0500	541,21	433,60	524,16	371,52	495,10
103	399,93	72,00	95,74	5,67	0,0500	538,82	429,84	519,79	361,20	491,66
104	390,72	71,84	94,81	5,58	0,0498	535,65	426,26	517,09	354,21	488,66
105	382,49	71,42	94,13	5,58	0,0492	529,91	421,92	513,83	346,95	485,74
106	375,20	71,93	93,52	5,58	0,0493	526,40	418,42	510,91	341,26	482,21
107	367,79	71,54	92,84	5,48	0,0502	520,43	414,92	506,47	334,84	479,14
108	360,69	71,60	91,93	5,48	0,0507	516,92	410,38	502,96	328,09	475,26
109	353,13	71,62	91,06	5,48	0,0505	511,26	403,74	499,55	320,84	470,38
110	344,74	72,18	90,46	5,48	0,0502	506,43	397,21	497,59	313,69	464,92
111	338,70	71,49	89,93	5,36	0,0494	501,11	388,08	493,52	309,60	459,68
112	332,62	71,30	89,26	5,36	0,0500	496,74	382,03	490,12	304,40	455,77
113	327,05	71,44	88,74	5,36	0,0502	490,61	376,21	486,51	300,18	452,29
114	321,81	72,19	88,28	5,36	0,0505	486,36	370,91	483,22	295,86	448,25
115	317,56	71,90	88,06	5,36	0,0507	483,01	365,86	481,15	293,37	444,03
116	313,87	71,42	87,54	5,36	0,0510	481,23	361,77	478,69	290,75	439,75
117	310,00	71,32	87,25	5,26	0,0512	476,67	356,23	475,60	286,34	435,48
118	306,35	71,72	86,80	5,26	0,0502	475,21	354,30	472,59	283,44	431,85
119	302,51	71,60	86,58	5,26	0,0507	469,49	350,63	468,89	280,97	427,36
120	299,25	71,65	85,95	5,26	0,0510	464,94	348,52	466,44	278,49	425,64
121	295,86	71,25	85,76	5,27	0,0505	462,31	344,80	462,23	275,45	422,52
122	292,59	71,43	85,66	5,27	0,0500	458,28	341,69	460,39	273,51	418,82
123	289,43	71,36	85,18	5,27	0,0510	453,69	337,86	457,35	271,76	414,29
124	286,08	71,36	85,03	5,27	0,0500	452,79	335,05	454,30	267,94	410,85

Date: 2018-03-20 Manufacturer: Fogon Suprem Model: 38 FSC  
 Project #: PT 20164 Run: 4 Tech: M m Reviewer: DP

- Left setting: <sup>90°</sup> No kindling 29 LBS 5 JOKI FIRE (Fan ~~80%~~ <sup>90%</sup> at maximum)
- At 23 to LBS close Door
  - Setting Draft (by metal) 12°
  - At 8.8 LBS tapocher et Brassch Feux
  - At 6.5 LBS tapocher et Fan channel
  - At 5.20 LBS hSEH load
  - Open a.h. hkl
  - Close Door immediately

TEST LOAD CONFIGURATION

Date: 2018-03-20  
 Project #: PI 20164

 Manufacturer: Foga Supreme  
 Run: 4 Tech: MM

 Model: 38 FSC  
 Reviewer: DO

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	4.4 lbs, Class F	4.4 lbs
Wood	EM-090	4.4 lbs, Class F	4.4 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

**LIMITS OF WEIGHT RANGES**

**ANALYTICAL SCALE:** ..... 50%-150% of dry filter weight,  $\pm 0.1$  mg  
**PLATFORM SCALE:** ..... 20%-80% of ideal test load weight,  $\pm 0.1$  lbs or 1%  
**WOOD SCALE:** ..... 20%-80% of ideal test load weight,  $\pm 0.01$  lbs or 1%



Date: 2018-03-20 Manufacturer: Fogco Supreme Model: 38 FSC  
 Project #: PI 20164 Run: 4 Tech: MR Reviewer: DP

**FOR TUNNELS < 12 in**

Barometric pressure ( $P_{bar}$ ) 101.5 (KPa.) Static pressure ( $P_q$ ) 0.15 (inches w.c.)  
 Inside diameter: Port A \_\_\_\_\_ Port B \_\_\_\_\_  
 Tunnel cross sectional area: .1963Ft<sup>2</sup>  
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head $\Delta_p$ (inches H <sub>2</sub> O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A - Centroid	3.00	3.50	4	0.049	71.17
B - Centroid	3.00	3.50	4	0.050	71.20
A-1	0.40	0.50	0.50	0.049	71.07
A-2	1.50	1.75	2	0.050	71.98
A-3	4.50	5.25	6	0.055	72.24
A-4	5.60	6.5	7.5	0.045	74.09
B-1	0.40	0.50	0.50	0.049	74.76
B-2	1.50	1.75	2	0.053	72.68
B-3	4.50	5.25	6	0.052	72.12
B-4	5.60	6.5	7.5	0.048	71.92
				AVERAGE	

$$v_s = K_p C_p (\sqrt{\Delta_p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

Where,

$C_p$  = pitot tube coefficient, dimension less = 0.99 for standard pitot.

$\Delta_p$  = manometer reading (inches H<sub>2</sub>O)

$T_s$  = average absolute dilution tunnel temperature (°F + 460)

$P_s$  = absolute dilution tunnel gas pressure or  $P_{bar} + P_{qg}$

$P_q$  = static pressure in. H<sub>2</sub>O  
 { 13.6 }

$M_s$  = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)

$K_p$  = 85.49 pitot tube constant, (conversion factor for English units)

$\Delta_p$  avg. = average of the square roots of the velocity heads ( $\Delta_p$ ) measured at each traverse point.

**CONTINUOUS ANALYZERS**

Date: 2018-03-20 Manufacturer: Fogel Systems Model: 38 FSC  
 Project #: PI 20164 Run: 4 Tech: MM Reviewer: DP

**Pre-Test (Adjust and Record)**

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2998	3000	1007	1000
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO <sub>2</sub>	0	0	1788	1800	972	300
Tolerance CO <sub>2</sub>		+/- 0.02		+/- 0.5		+/- 0.5
O <sub>2</sub> informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

**Post Test (Record Only)**

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0.007	2994	1006	0.007	0.02	0.004	0.15	0.001	0.05	✓	
CO <sub>2</sub>	0.00	1794	976	0	0.02	0.06	0.5	0.04	0.5	✓	



**TEST DATA LOG**

Date: 2018-03-20 Manufacturer: Foga Supreme Model: 38 FSC  
 Project #: PT 20164 Run: 4 Tech: mmv Reviewer: BO

**RAW DRY GAS METER READINGS**

	System 1	System 2	Blank
Final (Liter)	646858, 15	590664, 92	14800
Initial (Liter)	644908, 88	588679, 88	125, 51

**AMBIENT CONDITIONS**

	Before	After
Barometer (kPa):	101,5	101,2
Dry Bulb (F):	70,88	76,1
Humidity (%):	18,7	25,1

**Flow Meter**

	Start	End
Flow meter reading	NA	NA

**Flow Meter Verification**

	Before	After
Flow meter Check (liters)	NA	NA
Scale Weight ( Kg)	NA	NA



**FUEL DATA**

Date: 2018-03-20 Manufacturer: foya supreme Model: 38 FSC  
 Project #: PT 20164 Run: 4 Tech: MM Reviewer: DP

**FUEL DESCRIPTION:**

Type of wood:

**PRE-TEST LOAD**

Piece Size	Weight	Meter Moisture Content (% dry)*				
2 x 4 x 10 in.	1298 lbs.	214	218	209	208	209
2 x 4 x 10 in.	1284 lbs.	223	228	226	224	223
2 x 4 x 10 in.	1294 lbs.	214	218	213	218	214
2 x 4 x 10 in.	1260 lbs.	224	223	228	222	222
2 x 4 x 10 in.	1208 lbs.	193	196	199	200	203
2 x 4 x 10 in.	1330 lbs.	200	203	208	209	206
2 x 4 x 10 in.	1302 lbs.	213	214	218	209	208
2 x 4 x 10 in.	1354 lbs.	214	218	213	219	218
2 x 4 x 10 in.	1606 lbs.	206	203	209	206	203
2 x 4 x 10 in.	1364 lbs.	224	226	227	228	225
2 x 4 x 10 in.	1314 lbs.	219	230	226	228	229
2 x 4 x 15 in.	2028 lbs.	220	223	226	229	224
2 x 4 x 15 in.	2084 lbs.	209	206	208	209	218 mm
2 x 4 x 15 in.	1986 lbs.	201	210	207	206	209
2 x 4 x 15 in.	2152 lbs.	217	218	217	219	220
2 x 4 x 15 in.	2132 lbs.	224	219	213	214	218
2 x 4 x 15 in.	2224 lbs.	220	223	224	219	216
2 x 4 x 15 in.	1876 lbs.	213	218	214	218	214
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 2908 lbs



### FUEL DATA

Date: 2018-03-20 Manufacturer: foya supreme Model: 38 FSC  
 Project #: PT 20164 Run: 4 Tech: MM Reviewer: BO

#### FUEL DESCRIPTION:

Type of wood :

#### TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
3 1/2 x 3 1/2 x 20 1/2 in.	5044 lbs.	195	201	192	191	200
3 1/2 x 3 1/2 x 20 1/2 in.	5112 lbs.	201	208	208	206	194
3 1/2 x 3 1/2 x 20 1/2 in.	4914 lbs.	204	206	209	191	192
3 1/2 x 3 1/2 x 20 1/2 in.	4574 lbs.	143	192	191	192	193
3 1/2 x 3 1/2 x 20 1/2 in.	4560 lbs.	191	206	213	218	219
1 1/2 x 3/4 x 5 in.	0088 lbs.			206		
1 1/2 x 3/4 x 5 in.	0104 lbs.			206		
1 1/2 x 3/4 x 5 in.	0084 lbs.			210		
1 1/2 x 3/4 x 5 in.	0102 lbs.			194		
1 1/2 x 3/4 x 5 in.	0086 lbs.			207		
1 1/2 x 3/4 x 5 in.	0078 lbs.			206		
1 1/2 x 3/4 x 5 in.	<del>0098</del> 0098 lbs.			206		
1 1/2 x 3/4 x 5 in.	<del>0098</del> 0098 lbs.			206		
1 1/2 x 3/4 x 5 in.	0086 lbs.			210		
1 1/2 x 3/4 x 5 in.	0088 lbs.			211		
1 1/2 x 3/4 x 5 in.	0072 lbs.			212		
1 1/2 x 3/4 x 5 in.	0098 lbs.			214		
1 1/2 x 3/4 x 5 in.	0098 lbs.			220		
1 1/2 x 3/4 x 5 in.	0088 lbs.			223		
1 1/2 x 3/4 x 5 in.	0098 lbs.			221		
1 1/2 x 3/4 x 5 in.	0098 lbs.			221		
1 1/2 x 3/4 x 5 in.	0080 lbs.			228		
1 1/2 x 3/4 x 5 in.	0092 lbs.			210		
1 1/2 x 3/4 x 5 in.	0088 lbs.			210		
1 1/2 x 3/4 x 5 in.	0090 lbs.			206		
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 2606 lbs Min 20%: 521 Max 25%: 652





DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2018-03-19 Project #: PT 20164 Run: 4 Manufacturer: foyer supreme Model: 38 Fsc  
 Tech: MM Reviewer: BP

		SYSTEM 1 - 1 <sup>st</sup> hour					SYSTEM 1				
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Back Filter Number	Blank	
Date	Time	12	54	55	2	16	56	25	57	60	
2018-03-19	19:00	94,5406	0,1255	0,1254	35,5301	108,7539	0,1247	34,9739	0,1265	0,1251	
2018-03-20	10:00	94,5407	0,1255	0,1255	35,5301	108,7538	0,1246	34,9738	0,1264	0,1252	

		SYSTEM 1 - 1 <sup>st</sup> hour					SYSTEM 1				
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Back Filter Number	Blank	
Date	Time	12	54	55	2	16	56	25	57	60	
2018-03-20	17:15	94,5428	0,1272	0,1253	35,5321	108,7545	0,1248	34,9756	0,1259	0,1254	
2018-03-26	8:00	94,5417	0,1270	0,1253	35,5313	108,7539	0,1248	34,9755	0,1259	0,1254	
2018-03-30	8:00	94,5417	0,1269	0,1253	35,5312	108,7539	0,1248	34,9754	0,1259	0,1254	

Date: 2018-03-19 Run: 4 Manufacturer: foya suprnt Model: 38 FSC  
 Project #: PI 20164 Tech: mr Reviewer: BO

SYSTEM 2				
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	33	58	26
2018-03-19	19:00	109,3629	0,1272	0,1271
2018-03-20	10:00	109,3629	0,1273	0,1270
				35,5810
				35,5810

SYSTEM 2				
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	33	58	26
2018-03-20	17:15	109,3635	0,1296	0,1262
2018-03-26	8:00	109,3630	0,1295	0,1261
2018-03-30	8:00	109,3631	0,1296	0,1262
				35,5841
				35,5836
				35,5837



## Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

### Description du test

Test standard	EPA
Run #	5
Date	21-03-2018
Technicien	m.m
Project #	pi 20164

### Description de l'unité

Manufacturier	foyer supreme	
Modèle	38 fsc	
Combustion system	Non-Cat	
Appliance type	fireplace	
Firebox volume	3,5	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

### Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category	4	
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

### Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,988	Dimensionless
Equipment number (DGM #1):	em 178	
Calibration Factor (DGM #2):	0,988	Dimensionless
Equipment number (DGM #2):	em 179	
Calibration Factor (DGM #3):	0,986	Dimensionless
Equipment number (DGM #3):	em 070	Dimensionless

### Tunnel

Targeted tunnel flow rate	300	scfm
Tunnel diameter	8	in.
Molecular weight	29	
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 20164
Date	21-03-2018
Technicien	<input type="text" value="m.m"/>

### Fuel data

Fuel type	Dimension	
Fuel specie	D. Fir	
HHV		19810,0 kJ/kg
%C		48,7
%H		6,9
%O		43,9
%Ash		0,5
HHV		8519,2 Btu/lb
LHV		7451,0 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480

	Start	End
Barometer (kPa):	101,2	100,9
Barometer (in.Hg):	29,884349	29,79575878
Dry Bulb (F):	76,1	75,56
Humidity (%):	22	27,4
Air velocity (ft/min)	5	3

DGM #1	Final:	22895,583	cuft
	Initial:	22843,649	cuft
DGM #2	Final:	20912,227	cuft
	Initial:	20859,247	cuft
DGM room			

	Final:	648330,700	Liter
	Initial:	646860,100	Liter
	Final:	592168,310	Liter
	Initial:	590668,090	Liter
	Final:	171,780	cuft
	Initial:	148,020	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

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Autres données à rentrer: dans preload data, load data, traverse et filter set weight

<b>Project nu.</b>	pi 20164
<b>Date</b>	21-03-2018
<b>Technicien</b>	m.m







## Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,16 in. H2O  
 Barometer: 29,900 in. Hg

**Pour un tunnel de 12" et plus, prendre 6 lectures**

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=  
0,994

**Pour un tunnel moins de 12", prendre 4 lectures**

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,051	72,09	0,2258
B center	0,052	70,89	0,2280
A1	0,046	71,85	0,2145
A2	0,051	71,53	0,2258
A3	0,058	71,31	0,2408
A4	0,047	71,29	0,2168
B1	0,047	70,590	0,2168
B2	0,055	70,360	0,2345
B3	0,054	70,210	0,2324
B4	0,048	70,000	0,2191
AVERAGE	0,0509	71,0120	0,2255

<b>Project nu.</b>	pi 20164
<b>Date</b>	21-03-2018
<b>Technicien</b>	<span style="border: 1px solid red; padding: 2px;">m.m</span>

**Filter set weight**

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure	
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter			
Number	35	50	51	12	38	52	53	15	43	222	223	21	224			
Before (1)																
Before (2)																
Before (3)																
Before (4)																
Before (5)	109,2836	0,1252	0,1267	35,1511	110,4334	0,1245	0,1256	35,4635	109,1640	0,1294	0,1289	35,3515	0,1270	2018-03-20	18:00	
Before (6)	109,2836	0,1251	0,1268	35,1512	110,4333	0,1246	0,1256	35,4636	109,1639	0,1294	0,1289	35,3516	0,1269	2018-03-21	09:00	
After (1)	109,2846	0,1314	0,1267	35,1542	110,4343	0,1244	0,1253	35,4656	109,1650	0,1354	0,1288	35,3543	0,1269	2018-03-21	16:30	
After (2)	109,2838	0,1306	0,1265	35,1532	110,4335	0,1243	0,1251	35,4654	109,1642	0,1352	0,1286	35,3537	0,1269	2018-03-26	08:00	
After (3)	109,2838	0,1306	0,1265	35,1531	110,4335	0,1243	0,1251	35,4653	109,1643	0,1352	0,1286	35,3538	0,1269	2018-03-30	08:00	
After (4)																
After (5)																
After (6)	109,2838	0,1306	0,1265	35,1531	110,4335	0,1243	0,1251	35,4653	109,1643	0,1352	0,1286	35,3538	0,1269	2018-03-30	08:00	
Difference	0,0002	0,0055	-0,0003	0,0019	0,0002	-0,0003	-0,0005	0,0017	0,0004	0,0058	-0,0003	0,0022	0,0000			
Total (mg)		7,3				8,4				8,1				0		
Total ajusté (mg)		<b>7,30</b>				<b>8,40</b>				<b>8,10</b>						

<b>Project nu.</b>	pi 20164
<b>Date</b>	21-03-2018
<b>Technicien</b>	m.m

# Demonstration purpose only not the real number, negative filter weight rounded to zero

## Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	35	50	51	12	38	52	53	15	43	222	223	21	224		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	109,2836	0,1252	0,1267	35,1511	110,4334	0,1245	0,1256	35,4635	109,1640	0,1294	0,1289	35,3515	0,1270	2018-03-20	18:00
Before (6)	109,2836	0,1251	0,1268	35,1512	110,4333	0,1246	0,1256	35,4636	109,1639	0,1294	0,1289	35,3516	0,1269	2018-03-21	09:00
After (1)	109,2846	0,1314	0,1267	35,1542	110,4343	0,1244	0,1253	35,4656	109,1650	0,1354	0,1288	35,3543	0,1269	2018-03-21	16:30
After (2)	109,2838	0,1306	0,1265	35,1532	110,4335	0,1243	0,1251	35,4654	109,1642	0,1352	0,1286	35,3537	0,1269	2018-03-26	08:00
After (3)	109,2838	0,1306	0,1265	35,1531	110,4335	0,1243	0,1251	35,4653	109,1643	0,1352	0,1286	35,3538	0,1269	2018-03-30	08:00
After (4)															
After (5)															
After (6)	109,2838	0,1306	0,1268	35,1531	110,4335	0,1246	0,1251	35,4653	109,1643	0,1352	0,1289	35,3538	0,1269	2018-03-30	08:00
Difference	0,0002	0,0055	0,0000	0,0019	0,0002	0,0000	-0,0005	0,0017	0,0004	0,0058	0,0000	0,0022	0,0000		
Total (mg)		7,6				9				8,4			0		
Total ajusté (mg)		<b>7,60</b>				<b>9,00</b>				<b>8,40</b>					

<b>Project nu.</b>	pi 20164
<b>Date</b>	21-03-2018
<b>Technicien</b>	m.m



SFBA EPA EMISSION RESULTS

RESULTS

**Average emission rate:** 2,8 g/hr

Burn Rate : 2,101 Dry kg/hr

**Test Duration:** 280 min

PRESSURE FACTOR: DGM 1 0,97189  
 DGM 2 0,97116  
 DGM 3 0,99733

BAROMETRIC PRESSURE  
 Average: 29,840054 in Hg  
 Start: 29,884349 in Hg  
 End: 29,795759 in Hg

TEMPERATURE FACTORS DGM 1 0,98887  
 DGM 2 0,98801  
 DGM 3 0,98923

DGM CONTROLLER VALUES

DGM 1 Final: 22895,583 Cuft  
 Initial: 22843,649 Cuft

VOLUMES SAMPLED DGM 1 49,306 SCft  
 DGM 2 50,247 SCft  
 DGM 3 23,123 SCft

DGM 2 Final: 20912,227 Cuft  
 Initial: 20859,247 Cuft

DGM #3 Final: 171,780 Cuft  
 Initial: 148,020 Cuft

TOTAL TUNNEL VOLUME : 79511

TEMPERATURES

DGM 1 533,944 °R  
 DGM 2 534,407 °R

SAMPLE RATIOS  
 Sample Train 1: 1612,592  
 Sample Train 2: 1582,419

CALIBRATION FACTORS

DGM 1 0,9879  
 DGM 2 0,9884  
 DGM #3 0,9864

Paticulate concentration  
 Sample Train 1 **0,000170** g/dscf  
 Sample Train 2 **0,000161** g/dscf  
 Room **0,000000** g/dscf

TUNNEL FLOW RATE: 283,969 Dscfm

TOTAL EMISSIONS  
 Sample Train 1 **13,55** g  
 Sample Train 2 **12,82** g

PARTICULATE CATCH  
 Total Sample Train 1: 8,40 mg  
 Total Sample Train 2: 8,10 mg  
 Total Sample Train 1 1st hour: 7,30 mg

EMISSION RATES  
 Sample Train 1 **2,90** g/hr  
 Sample Train 2 **2,75** g/hr

1st hour emission rate **11,77** g/hr

DEVIATION: 2,76%

Cs Train 1 Train 2  
 0,0001704 0,000161205



96,0	317,0	7,5	0,2	12,2	489,6	635,5	72,8	116,1	616,7	348,0	608,1	508,0	367,3	0,18	74,10	73,98	78,40	0,18	74,32	74,67	80,40	0,05	0,09	72,449683
97,0	318,0	7,4	0,2	12,4	493,8	643,3	73,2	116,2	634,6	349,4	606,0	511,1	367,9	0,18	74,11	74,00	78,47	0,18	74,32	74,69	80,45	0,05	0,09	76,640436
98,0	319,0	7,2	0,2	12,5	497,1	646,8	72,6	116,7	645,5	352,3	607,7	512,2	369,3	0,18	74,11	74,01	78,54	0,18	74,34	74,69	80,44	0,05	0,09	79,809888
99,0	320,0	7,1	0,2	12,5	500,3	650,0	73,1	116,7	655,8	355,9	604,2	515,3	370,3	0,18	74,12	74,03	78,62	0,18	74,37	74,71	80,44	0,05	0,09	83,192108
100,0	321,0	6,9	0,2	12,6	501,8	652,1	74,5	116,9	659,2	357,6	603,3	517,7	373,3	0,18	74,09	74,03	78,64	0,18	74,34	74,71	80,42	0,05	0,09	84,677283
101,0	322,0	6,8	0,2	12,5	503,8	651,9	72,5	116,8	658,7	361,4	603,3	522,3	373,3	0,18	74,11	74,04	78,70	0,18	74,35	74,73	80,40	0,05	0,09	86,669947
102,0	323,0	6,7	0,2	12,3	503,4	647,8	73,0	116,3	651,2	364,4	603,0	523,0	375,5	0,18	74,14	74,06	78,74	0,18	74,39	74,75	80,40	0,05	0,09	86,241034
103,0	324,0	6,5	0,2	12,0	503,4	642,2	73,7	115,7	647,7	368,1	600,2	524,8	376,5	0,18	74,10	74,06	78,78	0,18	74,34	74,74	80,40	0,05	0,09	86,28996
104,0	325,0	6,4	0,2	11,3	501,3	635,8	72,5	115,0	633,1	371,3	599,2	526,6	377,0	0,18	74,12	74,07	78,83	0,18	74,39	74,77	80,41	0,05	0,09	84,262644
105,0	326,0	6,3	0,2	12,2	500,6	630,6	73,0	115,9	645,9	373,3	598,7	529,7	378,1	0,18	74,14	74,08	78,89	0,18	74,39	74,78	80,46	0,05	0,09	83,430667
106,0	327,0	6,2	0,2	11,1	501,1	625,7	72,8	114,9	615,9	376,1	600,7	531,0	381,6	0,18	74,14	74,10	78,91	0,18	74,40	74,78	80,46	0,05	0,09	83,904523
107,0	328,0	6,1	0,2	10,9	499,7	620,3	73,3	114,3	605,9	379,4	598,9	531,6	382,6	0,18	74,14	74,10	78,92	0,18	74,40	74,80	80,47	0,05	0,09	82,522748
108,0	329,0	5,9	0,2	10,6	498,9	613,4	73,2	113,7	594,1	381,9	599,6	533,4	385,4	0,18	74,13	74,11	78,97	0,18	74,39	74,81	80,45	0,05	0,09	81,72041
109,0	330,0	5,9	0,3	10,4	497,4	606,1	73,0	113,2	581,4	384,8	600,4	533,5	387,2	0,18	74,14	74,11	78,95	0,18	74,41	74,82	80,42	0,05	0,09	80,282306
110,0	331,0	5,8	0,3	10,2	496,8	600,9	73,0	112,5	571,8	387,5	599,7	535,4	389,6	0,18	74,12	74,12	78,97	0,18	74,39	74,82	80,42	0,05	0,09	79,647766
111,0	332,0	5,6	0,3	10,1	496,5	594,9	72,8	112,2	563,8	390,5	600,0	536,1	392,0	0,18	74,13	74,12	78,99	0,18	74,39	74,83	80,38	0,05	0,09	79,334827
112,0	333,0	5,6	0,3	10,0	495,8	588,3	72,7	111,4	553,0	394,5	601,5	535,5	394,3	0,18	74,15	74,14	79,01	0,18	74,41	74,85	80,35	0,05	0,09	78,605121
113,0	334,0	5,5	0,3	9,9	495,8	583,5	72,0	111,2	547,8	397,3	601,7	535,5	396,7	0,18	74,14	74,14	78,98	0,18	74,37	74,84	80,31	0,05	0,09	78,642279
114,0	335,0	5,3	0,4	9,9	494,9	578,8	73,6	110,6	539,3	401,0	600,3	535,5	398,5	0,18	74,12	74,16	78,96	0,18	74,37	74,85	80,28	0,05	0,09	77,78192
115,0	336,0	5,3	0,4	9,8	495,1	574,1	72,5	110,0	535,0	404,9	599,2	535,5	400,6	0,18	74,15	74,18	79,01	0,18	74,40	74,87	80,23	0,05	0,09	77,90091
116,0	337,0	5,2	0,4	9,8	494,7	570,7	73,3	109,6	530,3	408,3	598,0	534,7	402,0	0,18	74,15	74,16	79,01	0,18	74,39	74,86	80,21	0,05	0,09	77,505133
117,0	338,0	5,1	0,4	9,8	493,9	563,5	73,2	109,1	522,2	411,7	597,4	533,4	404,6	0,18	74,14	74,17	79,00	0,18	74,39	74,88	80,13	0,05	0,09	76,718305
118,0	339,0	5,0	0,5	9,7	493,3	559,1	72,7	108,7	514,7	413,7	598,4	532,5	407,4	0,18	74,14	74,19	79,02	0,18	74,41	74,89	80,10	0,05	0,09	76,181384
119,0	340,0	4,9	0,4	9,8	491,5	554,1	72,9	108,4	505,5	412,7	597,0	533,9	408,5	0,18	74,14	74,19	79,00	0,18	74,41	74,89	80,09	0,05	0,09	74,381201
120,0	341,0	4,8	0,5	9,7	492,2	552,2	73,0	107,8	506,6	409,9	597,7	536,6	410,2	0,18	74,15	74,22	79,00	0,18	74,42	74,91	80,09	0,05	0,09	75,038349
121,0	342,0	4,7	0,5	9,6	491,2	549,3	73,4	107,4	502,1	405,9	597,4	537,6	412,8	0,18	74,13	74,19	79,01	0,18	74,41	74,90	80,06	0,05	0,09	74,020685
122,0	343,0	4,5	0,5	9,5	490,3	546,2	73,5	107,0	498,2	404,5	597,3	540,9	415,9	0,18	74,15	74,20	79,03	0,18	74,38	74,88	79,99	0,05	0,09	73,55845
123,0	344,0	4,6	0,7	9,1	489,3	537,9	73,2	106,2	490,8	399,1	600,2	538,6	417,6	0,18	74,14	74,22	78,98	0,18	74,42	74,91	79,94	0,05	0,09	72,110515
124,0	345,0	4,5	0,8	8,7	487,4	528,7	73,2	105,6	479,4	394,7	601,4	538,9	422,6	0,18	74,13	74,20	78,96	0,18	74,40	74,91	79,90	0,05	0,09	70,240412
125,0	346,0	4,5	0,9	8,3	485,0	519,8	73,9	104,8	468,7	391,7	598,6	539,6	426,3	0,18	74,12	74,21	78,93	0,18	74,40	74,92	79,85	0,05	0,09	67,849317
126,0	347,0	4,4	0,9	7,9	481,9	511,8	73,1	104,0	456,0	386,8	598,1	539,0	429,6	0,18	74,12	74,22	78,95	0,18	74,38	74,90	79,78	0,05	0,09	64,747705
127,0	348,0	4,4	1,0	7,7	479,9	503,9	73,7	103,0	446,3	384,0	596,1	540,3	432,9	0,18	74,14	74,24	78,93	0,18	74,41	74,93	79,73	0,05	0,09	62,760529
128,0	349,0	4,3	1,0	7,6	479,1	502,1	73,5	102,4	441,2	383,2	597,2	541,2	434,1	0,18	74,12	74,22	78,91	0,18	74,40	74,90	79,69	0,05	0,09	60,821283
129,0	350,0	4,3	1,0	7,2	478,1	488,0	73,3	101,9	435,7	380,5	594,4	541,8	438,3	0,18	74,12	74,25	78,88	0,18	74,40	74,93	79,66	0,05	0,09	60,963465
130,0	351,0	4,2	1,0	7,2	477,3	481,4	73,4	101,4	430,9	379,6	591,7	542,9	441,6	0,18	74,09	74,24	78,84	0,18	74,37	74,91	79,62	0,05	0,09	60,193122
131,0	352,0	4,2	0,9	7,2	476,2	475,8	73,9	100,7	426,7	377,0	590,6	542,4	444,4	0,18	74,06	74,24	78,81	0,18	74,34	74,93	79,54	0,05	0,09	59,065918
132,0	353,0	4,2	0,9	7,2	474,6	470,3	72,4	100,2	420,7	375,0	587,1	542,4	447,9	0,18	74,05	74,23	78,78	0,18	74,34	74,92	79,47	0,05	0,09	57,468848
133,0	354,0	4,1	1,0	7,2	473,9	464,7	73,5	100,0	415,8	374,0	585,3	542,9	451,6	0,18	74,05	74,23	78,74	0,18	74,33	74,92	79,39	0,05	0,09	56,755121
134,0	355,0	4,0	1,0	7,2	473,0	459,3	73,0	99,5	408,3	372,4	584,2	543,2	454,5	0,18	74,05	74,23	78,74	0,18	74,33	74,92	79,34	0,05	0,09	55,958283
135,0	356,0	4,0	1,0	7,1	470,5	451,9	72,5	98,7	401,1	371,4	579,4	544,0	458,0	0,18	74,01	74,25	78,62	0,18	74,31	74,92	79,25	0,05	0,09	53,392944
136,0	357,0	4,0	1,1	6,9	468,9	446,0	73,6	98,2	393,2	371,8	575,9	543,9	459,8	0,18	74,01	74,26	78,59	0,18	74,32	74,93	79,18	0,05	0,09	51,755481
137,0	358,0	3,9	1,2	6,8	467,4	441,7	72,6	98,0	386,0	371,0	575,4	542,4	462,2	0,18	73,99	74,23	78,56	0,18	74,32	74,93	79,08	0,05	0,09	50,239514
138,0	359,0	3,9	1,2	6,9	465,7	437,4	72,9	97,4	380,3	368,9	572,3	541,1	465,7	0,18	73,99	74,23	78,50	0,18	74,32	74,93	79,04	0,05	0,09	48,501984
139,0	360,0	3,9	1,2	6,9	463,7	434,0	72,5	96,6	376,6	367,2	568,0	539,7	466,9	0,18	73,93	74,21	78,43	0,18	74,26	74,89	78,94	0,05	0,09	46,537757
140,0	361,0	3,9	1,2	6,9	462,8	430,2	73,0	96,2	372,7	367,4	568,8	539,9	469,3	0,18	73,93	74,22	78,39	0,18	74,24	74,90	78,89	0,05	0,09	45,453994
141,0	362,0	3,8	1,2	6,9	461,8	426,8	73,1	96,2	368,4	366,4	564,1	539,0	471,2	0,18	73,98	74,22	78,33	0,18	74,26	74,88	78,80	0,05	0,09	44,656568
142,0	363,0	3,8	1,2	6,8	460,9	424,0	73,6	95,9	365,3	366,2	562,7	536,9	473,5	0,18	73,97	74,22	78,24	0,18	74,26	74,89	78,72	0,05	0,09	43,761457
143,0	364,0	3,7	1,2	6,8	459,5	420,8	74,0	95,9	362,7	364,6	559,7	534,9	475,7	0,18	73,99	74,23	78,22	0,18	74,26	74,89	78,65	0,05	0,09	42,354749
144,0	365,0	3,6	1,3	6,8	457,8	418,5	75,3	95,1	359,3	362,2	556,8	534,0	474,5	0,18	74,02	74,24	78,20	0,18	74,29	74,90	78,62	0,05	0,09	40,613702
145,0	366,0	3,7	1,5	6,8	455,7	415,7	73,4	95,0	357,0	364,2	553,5	533,1	475,4	0										

197,0	418,0	2,2	1,9	5,0	386,1	317,9	74,1	86,5	277,0	379,6	397,7	419,5	456,8	0,18	74,00	74,38	76,22	0,18	74,35	74,96	76,46	0,05	0,06	-31,02782
198,0	419,0	2,1	1,9	5,0	385,0	316,6	75,0	86,5	275,8	380,2	395,8	418,2	455,0	0,18	73,99	74,38	76,21	0,18	74,35	74,95	76,41	0,05	0,06	-32,18524
199,0	420,0	2,1	1,9	5,0	384,1	315,5	75,7	86,4	277,1	381,1	392,9	416,1	453,0	0,18	74,00	74,39	76,20	0,18	74,38	74,95	76,39	0,05	0,06	-33,09897
200,0	421,0	2,1	1,9	5,0	382,9	315,2	75,8	86,2	275,3	382,3	391,6	414,5	451,1	0,18	74,01	74,39	76,20	0,18	74,38	74,95	76,38	0,05	0,06	-34,20405
201,0	422,0	2,1	2,0	4,9	381,6	314,2	77,7	86,1	275,0	381,8	389,7	412,3	449,1	0,18	73,99	74,42	76,15	0,18	74,38	74,97	76,34	0,05	0,06	-35,57299
202,0	423,0	2,0	2,0	4,9	380,2	313,9	77,6	86,0	274,3	381,0	388,5	410,1	446,9	0,18	74,00	74,40	76,14	0,18	74,41	74,97	76,33	0,05	0,06	-36,98359
203,0	424,0	2,0	2,1	4,9	380,2	313,4	77,0	86,0	275,1	382,8	386,5	410,9	445,7	0,18	73,99	74,40	76,11	0,18	74,39	74,96	76,29	0,05	0,06	-36,96742
204,0	425,0	2,0	2,1	5,0	379,0	313,4	76,8	85,9	274,0	383,1	384,8	409,7	443,1	0,18	74,04	74,42	76,13	0,18	74,43	74,98	76,28	0,05	0,05	-38,20154
205,0	426,0	1,9	2,2	5,0	378,4	313,2	75,0	86,0	274,5	384,1	383,4	409,0	440,9	0,18	74,04	74,42	76,13	0,18	74,43	74,97	76,29	0,05	0,05	-38,80086
206,0	427,0	1,9	2,2	5,0	377,9	313,2	75,8	85,9	274,3	385,3	382,7	408,3	438,2	0,18	74,00	74,42	76,10	0,18	74,41	75,00	76,26	0,05	0,05	-39,98844
207,0	428,0	1,9	2,2	5,1	377,6	312,2	75,2	85,9	276,1	387,4	380,1	407,4	436,8	0,18	73,98	74,42	76,06	0,18	74,38	74,99	76,23	0,05	0,05	-39,55640
208,0	429,0	1,9	2,3	5,1	376,8	312,0	74,2	86,1	275,7	387,9	378,2	406,6	435,5	0,18	74,02	74,42	76,05	0,18	74,42	74,99	76,22	0,05	0,05	-40,38094
209,0	430,0	1,8	2,2	5,2	375,9	312,4	74,6	85,8	275,4	388,4	378,0	405,9	432,0	0,18	74,02	74,43	76,02	0,18	74,42	75,00	76,21	0,05	0,05	-41,23331
210,0	431,0	1,8	2,2	5,1	375,5	312,2	73,2	86,0	275,6	389,5	376,9	405,8	429,6	0,18	74,03	74,43	76,01	0,18	74,41	74,99	76,21	0,05	0,05	-41,63579
211,0	432,0	1,8	2,2	5,1	375,5	311,9	73,1	86,0	276,1	391,7	375,6	406,9	427,2	0,18	74,02	74,43	75,99	0,18	74,40	74,98	76,19	0,05	0,05	-41,61738
212,0	433,0	1,8	2,2	5,1	374,5	311,2	76,3	85,8	275,4	392,5	373,7	407,1	423,8	0,18	74,03	74,42	75,97	0,18	74,40	74,99	76,17	0,05	0,05	-42,62774
213,0	434,0	1,8	2,1	5,1	373,5	310,7	73,9	85,4	275,1	392,2	374,1	406,8	419,6	0,18	74,02	74,42	75,97	0,18	74,43	75,00	76,18	0,05	0,05	-43,60349
214,0	435,0	1,7	2,1	5,1	372,8	310,2	76,2	85,8	274,9	391,9	373,8	406,2	411,0	0,18	74,04	74,44	75,97	0,18	74,43	74,99	76,16	0,05	0,05	-44,35836
215,0	436,0	1,7	2,1	5,0	372,4	310,1	76,2	85,3	274,7	393,0	372,8	405,0	416,3	0,18	74,03	74,44	75,95	0,18	74,42	75,01	76,16	0,05	0,05	-44,80198
216,0	437,0	1,7	2,1	5,0	371,8	309,4	74,4	85,6	274,0	392,8	371,9	404,1	416,2	0,18	74,02	74,44	75,92	0,18	74,41	75,00	76,13	0,05	0,05	-45,36191
217,0	438,0	1,6	2,1	5,0	370,9	309,5	74,9	85,6	274,0	393,4	368,9	404,0	414,1	0,17	74,00	74,44	75,91	0,18	74,41	75,00	76,12	0,05	0,05	-46,26927
218,0	439,0	1,6	2,1	5,0	370,6	308,9	75,1	85,4	272,7	394,4	367,9	404,2	413,8	0,18	73,99	74,44	75,90	0,18	74,41	75,01	76,14	0,05	0,05	-46,56193
219,0	440,0	1,6	2,1	5,0	370,2	308,1	77,4	85,4	272,2	396,2	366,4	403,1	412,8	0,18	73,98	74,44	75,89	0,18	74,39	75,00	76,08	0,05	0,05	-47,00203
220,0	441,0	1,5	2,1	5,0	369,4	307,8	77,2	85,5	272,7	395,4	366,0	402,6	410,1	0,18	73,99	74,43	75,88	0,18	74,41	75,01	76,05	0,05	0,05	-47,78997
221,0	442,0	1,5	2,1	5,0	369,0	307,3	74,8	85,4	273,4	395,7	366,3	400,2	409,6	0,18	74,04	74,45	75,87	0,18	74,43	75,02	76,06	0,05	0,05	-48,11302
222,0	443,0	1,5	2,1	5,0	368,8	307,3	74,9	85,4	272,9	395,7	366,1	400,0	409,3	0,18	74,02	74,44	75,85	0,18	74,40	75,00	76,03	0,05	0,05	-48,37824
223,0	444,0	1,5	2,1	5,0	367,7	307,2	75,0	85,4	273,5	396,6	363,5	399,2	407,0	0,18	74,03	74,44	75,84	0,18	74,39	75,01	76,04	0,05	0,05	-49,09963
224,0	445,0	1,5	2,1	5,0	366,4	307,3	73,8	85,6	272,2	394,6	363,6	397,1	401,8	0,18	73,99	74,43	75,83	0,18	74,38	75,01	76,02	0,05	0,05	-50,70345
225,0	446,0	1,4	2,1	4,9	364,8	306,9	74,7	85,5	270,7	392,6	363,0	396,3	401,6	0,18	73,96	74,44	75,79	0,18	74,38	75,01	76,00	0,05	0,05	-52,31668
226,0	447,0	1,3	2,2	4,8	363,8	306,0	73,8	85,6	269,5	392,7	362,4	395,6	401,7	0,18	73,93	74,43	75,79	0,18	74,34	75,01	76,03	0,05	0,05	-53,37779
227,0	448,0	1,4	2,2	4,7	362,9	306,2	74,5	85,4	268,2	391,4	360,1	395,1	399,6	0,18	73,90	74,43	75,76	0,18	74,32	74,98	76,01	0,05	0,05	-54,27079
228,0	449,0	1,3	2,1	4,8	362,3	305,9	73,5	85,4	266,8	391,3	358,8	395,2	399,5	0,18	73,89	74,44	75,72	0,18	74,31	74,99	75,99	0,05	0,05	-54,84633
229,0	450,0	1,3	2,1	4,8	361,3	305,9	75,7	85,7	266,2	390,8	358,8	395,8	398,4	0,18	73,86	74,49	75,69	0,18	74,28	74,99	75,98	0,05	0,05	-55,85515
230,0	451,0	1,3	2,0	4,8	360,2	305,3	77,8	85,3	265,8	390,3	358,6	393,0	393,6	0,18	73,87	74,43	75,68	0,18	74,32	74,98	75,97	0,05	0,05	-56,90504
231,0	452,0	1,2	1,9	4,8	358,8	304,6	75,0	85,2	265,0	389,3	357,5	392,6	389,3	0,18	73,91	74,43	75,70	0,18	74,33	74,98	75,95	0,05	0,05	-58,33015
232,0	453,0	1,2	1,9	4,7	357,1	304,5	74,5	85,4	264,9	385,8	357,0	390,4	387,3	0,18	73,94	74,43	75,68	0,18	74,33	74,99	75,95	0,05	0,05	-60,06225
233,0	454,0	1,2	1,9	4,7	355,8	304,7	74,0	85,3	264,0	384,1	357,6	390,5	382,6	0,18	73,95	74,43	75,67	0,18	74,34	75,00	75,95	0,05	0,05	-61,38166
234,0	455,0	1,2	2,0	4,8	354,2	304,0	77,1	85,4	262,5	383,0	356,2	388,8	380,6	0,18	73,95	74,44	75,67	0,18	74,34	74,99	75,96	0,05	0,05	-62,92151
235,0	456,0	1,1	2,0	4,7	353,5	303,5	75,2	85,7	261,7	382,4	357,3	387,4	381,9	0,18	73,95	74,44	75,65	0,18	74,34	74,99	75,96	0,05	0,05	-64,09002
236,0	457,0	1,1	2,1	4,5	351,0	302,6	73,4	85,3	258,8	378,1	356,9	387,6	373,8	0,18	73,96	74,43	75,64	0,18	74,34	74,99	75,97	0,05	0,05	-66,12054
237,0	458,0	1,1	2,3	4,4	349,6	302,0	74,0	85,3	257,9	377,1	355,5	386,7	371,0	0,18	73,96	74,46	75,64	0,18	74,35	75,01	75,96	0,05	0,05	-67,50735
238,0	459,0	1,1	2,4	4,4	349,4	301,0	73,2	85,5	257,4	377,0	356,2	386,0	371,0	0,18	73,92	74,43	75,62	0,18	74,33	74,99	75,95	0,05	0,05	-67,7496
239,0	460,0	1,1	2,5	4,3	348,3	300,5	73,4	85,4	256,5	375,2	355,2	385,9	368,6	0,17	73,93	74,46	75,60	0,18	74,34	75,00	75,96	0,05	0,05	-68,86557
240,0	461,0	1,0	2,5	4,3	347,7	299,8	73,7	85,2	256,7	374,3	354,4	385,2	368,0	0,18	73,94	74,45	75,61	0,18	74,34	75,01	75,95	0,05	0,05	-69,43158
241,0	462,0	1,0	2,5	4,3	346,7	299,0	73,8	85,4	256,4	372,4	353,7	384,6	367,0	0,18	73,93	74,46	75,61	0,18	74,33	75,01	75,94	0,05	0,05	-70,90085
242,0	463,0	1,0	2,5	4,3	345,8	297,9	73,4	85,1	255,1	373,7	353,3	384,7	362,2	0,18	73,92	74,47	75,58	0,18	74,34	75,01	75,91	0,05	0,05	-71,35246
243,0	464,0	0,9	2,5	4,3	344,9	297,6	74,5	85,3	254,8	370,6	352,6	384,4	361,9	0,18	73,95	74,46	75,57	0,18	74,37	75,02	75,90	0,05	0,05	-72,28073
244,0	465,0	0,9	2,4	4,3	344,3	297,8	73,8	85,0	254,4	369,9	352,7	383,6	360,9	0,18	73,95	74,46	75,58	0,18	74,37	75,02	75,91	0,05	0,05	-72,85873
245,0	466,0	0,9	2,4	4,3	343,5	296,8	74,6	85,0	253,8	368,5	351,7	383,1	360,3	0,18	73,97	74,49	75,55	0,18	74,39	75,03	75,90	0,05	0,05	-73,68361
246,0	467,0	0,8	2,4	4,3	342,6	296,6	73,9	85,0	254,6	367,0	351,5	382,7	356,9	0,18	73,99	74,49	75,57	0,18	74,40	75,03	75,94	0,05	0,05	-74,09908
247,0	468,0	0,8	2,4	4,3	3																			

Manufacturer: foyer supreme  
 Model: 38 fsc

Run: 5  
 Project #: pi 20164  
 Test Duration: 280 min

Note: In the "Input data", "Calc. % O<sub>2</sub>", "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

Overall Heating Efficiency: 66,73%  
 Combustion Efficiency: 94,66%  
 Heat Transfer Efficiency: 70,49%

	HHV	LHV
Eff	66,73%	72,12%
Comb Eff	94,66%	94,66%
HT Eff	70,49%	76,19%
Output	27 782	kJ/h
Burn Rate	2,10	kg/h
Grams CO	741	g
Input	41 636	kJ/h
MC wet	17,26	

Ultimate CO<sub>2</sub>  
 CO<sub>2-ult</sub> 19,64  
 F<sub>0</sub>  
 1,062

Heat Output:	26 354 Btu/h
Heat Input:	39 496 Btu/h
Burn Duration:	4,67 h
Burn Rate:	4,63 lb/h
Stack Temp:	460,6 Deg. F

		1,15	7,99	1,31	20,34	11,77	237,88	23,19	87,4%	70,7%	61,8%	
INPUT DATA		Oxygen Calculation						Input Data		Combust	Heat	Net
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO <sub>2</sub> [d]	Excess Air EA	Total O <sub>2</sub>	Calc. % O <sub>2</sub> [g]	Flue Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %	
0,00	11,85	0,27	7,72	146,1%	20,41	12,56	172,1	22,1	97,6%	76,5%	74,7%	
1,00	11,67	0,19	8,43	128,0%	20,37	11,85	197,4	22,9	98,6%	75,4%	74,4%	
2,00	11,62	0,50	5,24	242,4%	20,56	15,07	211,0	23,1	93,4%	66,2%	61,8%	
3,00	11,58	0,49	5,89	208,0%	20,52	14,39	218,3	23,2	94,2%	67,7%	63,7%	
4,00	11,49	0,45	5,93	207,7%	20,52	14,36	227,1	23,1	94,7%	66,9%	63,3%	
5,00	11,40	0,41	6,43	187,1%	20,49	13,85	241,7	22,2	95,5%	66,8%	63,8%	
6,00	11,26	0,54	7,76	136,7%	20,39	12,36	268,7	22,9	94,9%	67,9%	64,4%	
7,00	11,17	0,67	9,31	96,8%	20,28	10,63	282,2	23,4	94,6%	70,0%	66,2%	
8,00	11,04	0,63	10,15	82,3%	20,23	9,77	300,0	23,2	95,3%	70,1%	66,8%	
9,00	10,95	0,74	10,51	74,7%	20,20	9,32	298,8	21,9	94,7%	70,6%	66,9%	
10,00	10,81	0,78	9,81	85,5%	20,24	10,04	315,4	22,2	94,0%	68,2%	64,2%	
11,00	10,68	0,93	11,89	53,3%	20,09	7,74	329,7	22,5	94,1%	70,5%	66,3%	
12,00	10,59	0,88	12,40	48,0%	20,06	7,23	329,0	22,7	94,6%	71,2%	67,3%	
13,00	10,45	0,96	11,57	56,7%	20,11	8,06	318,9	22,5	93,7%	70,7%	66,3%	
14,00	10,36	1,13	10,57	67,9%	20,17	9,03	307,6	22,7	92,1%	70,0%	64,5%	
15,00	10,27	0,96	9,71	84,3%	20,24	10,05	296,3	22,7	92,7%	69,5%	64,4%	
16,00	10,19	0,92	8,70	104,1%	20,30	11,14	285,7	23,3	92,3%	68,5%	63,2%	
17,00	10,08	0,92	8,07	118,5%	20,35	11,81	278,8	23,2	91,8%	67,7%	62,1%	
18,00	10,04	0,92	7,93	122,1%	20,36	11,97	277,7	23,3	91,7%	67,4%	61,8%	
19,00	9,94	0,91	8,91	100,0%	20,29	10,92	295,7	23,8	92,6%	68,1%	63,1%	
20,00	9,86	0,54	11,34	65,3%	20,16	8,55	313,2	23,3	96,4%	71,0%	68,4%	
21,00	9,72	0,39	11,70	62,4%	20,14	8,24	316,7	22,4	97,5%	71,2%	69,4%	
22,00	9,64	0,48	10,48	79,2%	20,22	9,50	315,8	23,0	96,5%	69,5%	67,1%	
23,00	9,59	0,57	9,64	92,4%	20,27	10,34	312,3	22,8	95,6%	68,3%	65,3%	
24,00	9,50	0,74	9,34	94,8%	20,27	10,56	310,7	22,4	94,1%	67,7%	63,8%	
25,00	9,41	0,68	9,79	87,6%	20,25	10,12	311,5	22,8	94,8%	68,6%	65,0%	
26,00	9,32	0,65	10,35	78,6%	20,21	9,54	315,5	22,9	95,3%	69,3%	66,0%	
27,00	9,18	0,66	10,93	69,5%	20,17	8,92	320,3	22,2	95,4%	69,8%	66,6%	
28,00	9,09	0,65	11,90	56,5%	20,11	7,89	332,9	22,1	95,8%	70,3%	67,4%	
29,00	8,96	0,33	12,79	49,7%	20,07	7,11	334,4	22,1	98,0%	71,4%	70,0%	
30,00	8,87	0,24	12,53	53,9%	20,10	7,45	332,6	21,9	98,6%	71,2%	70,2%	
31,00	8,82	0,20	12,11	59,5%	20,13	7,91	331,8	22,0	98,8%	70,8%	69,9%	
32,00	8,73	0,21	12,35	56,5%	20,11	7,66	333,3	22,6	98,8%	71,0%	70,1%	
33,00	8,64	0,24	12,82	50,4%	20,08	7,14	337,3	22,3	98,6%	71,3%	70,3%	
34,00	8,46	0,25	13,06	47,6%	20,06	6,88	338,3	22,3	98,5%	71,5%	70,5%	
35,00	8,41	0,27	13,04	47,6%	20,06	6,88	338,2	22,3	98,4%	71,5%	70,4%	
36,00	8,32	0,28	12,92	48,8%	20,07	7,01	337,6	22,3	98,4%	71,4%	70,3%	
37,00	8,23	0,26	12,79	50,5%	20,08	7,16	337,7	21,9	98,5%	71,2%	70,2%	
38,00	8,14	0,25	12,70	51,7%	20,08	7,26	337,1	23,0	98,5%	71,2%	70,2%	
39,00	8,05	0,25	12,63	52,6%	20,09	7,34	336,7	22,0	98,6%	71,1%	70,1%	
40,00	7,96	0,23	12,56	53,5%	20,09	7,41	337,6	22,1	98,6%	71,0%	70,0%	
41,00	7,85	0,24	12,58	53,3%	20,09	7,40	336,5	22,3	98,6%	71,1%	70,1%	
42,00	7,78	0,23	12,51	54,2%	20,10	7,47	337,4	22,6	98,6%	71,0%	70,0%	
43,00	7,64	0,21	12,58	53,7%	20,10	7,42	336,7	22,6	98,8%	71,1%	70,2%	
44,00	7,60	0,20	12,61	53,3%	20,09	7,38	337,7	22,8	98,8%	71,1%	70,3%	
45,00	7,47	0,19	12,59	53,6%	20,10	7,41	338,5	23,0	98,9%	71,0%	70,2%	
46,00	7,37	0,20	12,60	53,5%	20,09	7,40	339,5	22,8	98,8%	70,9%	70,1%	
47,00	7,28	0,19	12,66	52,8%	20,09	7,34	339,9	23,2	98,9%	71,0%	70,2%	
48,00	7,19	0,20	12,71	52,1%	20,09	7,28	341,2	22,5	98,8%	71,0%	70,1%	
49,00	7,10	0,18	12,81	51,3%	20,08	7,19	342,4	22,7	99,0%	71,0%	70,3%	
50,00	7,00	0,16	12,89	50,5%	20,08	7,10	343,2	22,9	99,1%	71,1%	70,4%	
51,00	6,92	0,16	12,92	50,1%	20,08	7,07	343,8	22,0	99,1%	71,0%	70,4%	
52,00	6,83	0,16	12,94	50,0%	20,08	7,06	345,0	23,0	99,2%	71,0%	70,4%	
53,00	6,74	0,15	12,94	50,1%	20,08	7,06	344,7	22,7	99,2%	71,0%	70,5%	
54,00	6,64	0,14	12,96	50,0%	20,08	7,05	345,9	23,1	99,2%	71,0%	70,5%	
55,00	6,55	0,14	12,89	50,8%	20,08	7,12	345,6	23,2	99,3%	71,0%	70,5%	
56,00	6,47	0,14	12,79	51,9%	20,09	7,23	344,8	22,9	99,2%	70,9%	70,3%	
57,00	6,38	0,13	12,71	53,0%	20,09	7,32	344,3	22,7	99,3%	70,8%	70,3%	
58,00	6,28	0,12	12,64	53,9%	20,10	7,39	343,6	23,1	99,4%	70,8%	70,3%	
59,00	6,20	0,12	12,61	54,3%	20,10	7,43	343,7	22,3	99,4%	70,7%	70,3%	
60,00	6,15	0,13	12,58	54,6%	20,10	7,46	342,3	22,5	99,3%	70,8%	70,3%	
61,00	6,06	0,12	12,51	55,5%	20,11	7,53	342,5	22,7	99,4%	70,7%	70,2%	
62,00	5,96	0,12	12,51	55,5%	20,11	7,53	341,5	22,0	99,3%	70,7%	70,2%	
63,00	5,87	0,12	12,49	55,8%	20,11	7,56	341,1	22,6	99,4%	70,7%	70,3%	
64,00	5,79	0,11	12,45	56,5%	20,11	7,61	340,3	22,5	99,5%	70,7%	70,3%	
65,00	5,70	0,11	12,38	57,2%	20,12	7,68	340,0	22,2	99,4%	70,6%	70,2%	
66,00	5,65	0,11	12,36	57,5%	20,12	7,70	339,4	22,7	99,4%	70,7%	70,3%	
67,00	5,56	0,10	12,35	57,8%	20,12	7,72	338,2	22,9	99,5%	70,7%	70,4%	
68,00	5,47	0,11	12,32	58,1%	20,12	7,75	338,3	22,5	99,5%	70,7%	70,3%	
69,00	5,38	0,11	12,28	58,6%	20,12	7,79	338,1	23,4	99,4%	70,7%	70,3%	
70,00	5,34	0,11	12,33	58,0%	20,12	7,74	337,9	22,6	99,5%	70,7%	70,3%	
71,00	5,24	0,11	12,30	58,3%	20,12	7,77	337,2	22,6	99,4%	70,7%	70,3%	
72,00	5,15	0,11	12,46	56,2%	20,11	7,59	337,2	22,4	99,4%	70,9%	70,5%	
73,00	5,06	0,10	12,55	55,3%	20,10	7,51	337,3	22,1	99,5%	71,0%	70,7%	
74,00	5,02	0,10	12,61	54,5%	20,10	7,44	336,8	22,4	99,5%	71,1%	70,8%	
75,00	4,92	0,10	12,68	53,7%	20,10	7,37	338,3	22,4	99,5%	71,1%	70,8%	
76,00	4,83	0,11	12,79	52,3%	20,09	7,24	338,2	21,9	99,5%	71,2%	70,9%	
77,00	4,74	0,12	12,81	51,9%	20,09	7,22	338,8	22,4	99,4%	71,2%	70,8%	
78,00	4,70	0,14	12,76	52,3%	20,09	7,26	338,5	23,4	99,3%	71,2%	70,7%	
79,00	4,61	0,15	12,59	54,1%	20,10	7,43	338,4	22,7	99,2%	71,0%	70,4%	
80,00	4,52	0,15	12,58	54,3%	20,10	7,45	338,5	22,6	99,2%	71,0%	70,4%	
81,00	4,47	0,14	12,56	54,6%	20,10	7,47	339,0	22,9	99,2%	71,0%	70,4%	
82,00	4,38	0,14	12,55	54,9%	20,10	7,49	338,2	22,6	99,3%	71,0%	70,4%	
83,00	4,29	0,13	12,45	56,2%	20,11	7,60	337,5	22,6	99,3%	70,9%	70,4%	
84,00	4,25	0,14	12,33	57,5%	20,12	7,72	336,5	22,5	99,2%	70,8%	70,3%	
85,00	4,15	0,14	12,20	59,2%	20,13	7,86	335,3	22,5	99,2%	70,7%	70,2%	
86,00	4,06	0,15	12,10	60,4%	20,13	7,96	334,1	22,8	99,2%	70,7%	70,1%	
87,00	4,02	0,16	12,03	61,1%	20,14	8,02	333,2	22,4	99,1%	70,6%	70,0%	
88,00	3,93	0,15	12,01	61,5%	20,14	8,05	332,5	22,6	99,1%	70,6%	70,0%	
89,00	3,89	0,16	12,00	61,5%	20,14	8,06	330,4	22,6	99,1%	70,8%	70,1%	
90,00	3,84	0,16	12,00	61,5%	20,14	8,05	330,7	22,8	99,1%	70,8%	70,1%	
91,00	3,75	0,17	11,95	62,1%	20,14	8,10	329,0	22,6	99,0%	70,8%	70,1%	
92,00	3,66	0,17	11,84	63,6%	20,15	8,23	328,3	23,8	99,0%	70,8%	70,0%	

93,00	3,57	0,19	11,69	65,3%	20,16	8,37	329,1	22,0	98,9%	70,4%	69,6%
94,00	3,53	0,26	11,65	64,9%	20,15	8,37	329,0	23,3	98,3%	70,4%	69,2%
95,00	3,47	0,24	11,82	62,8%	20,14	8,20	331,7	22,4	98,5%	70,4%	69,3%
96,00	3,39	0,21	12,17	58,8%	20,12	7,85	335,3	22,7	98,8%	70,7%	69,8%
97,00	3,34	0,23	12,40	55,6%	20,11	7,60	339,6	22,9	98,7%	70,7%	69,7%
98,00	3,25	0,24	12,47	54,6%	20,10	7,51	341,6	22,6	98,6%	70,6%	69,6%
99,00	3,21	0,23	12,53	53,9%	20,10	7,45	343,3	22,8	98,6%	70,6%	69,7%
100,00	3,11	0,21	12,58	53,6%	20,10	7,42	344,5	23,6	98,8%	70,7%	69,8%
101,00	3,07	0,20	12,51	54,6%	20,10	7,49	344,4	22,5	98,9%	70,5%	69,7%
102,00	3,02	0,17	12,33	57,2%	20,11	7,70	342,1	22,8	99,0%	70,5%	69,8%
103,00	2,94	0,15	12,00	61,7%	20,14	8,06	339,0	23,1	99,1%	70,3%	69,6%
104,00	2,89	0,16	11,49	68,6%	20,17	8,60	335,5	22,5	99,0%	69,7%	69,0%
105,00	2,85	0,17	11,19	72,9%	20,19	8,91	332,5	23,1	99,0%	69,5%	68,8%
106,00	2,79	0,17	11,08	74,6%	20,20	9,03	329,8	22,7	98,9%	69,5%	68,8%
107,00	2,75	0,19	10,88	77,5%	20,21	9,23	326,8	22,9	98,8%	69,4%	68,6%
108,00	2,66	0,22	10,65	80,7%	20,22	9,46	323,0	22,9	98,5%	69,3%	68,3%
109,00	2,66	0,26	10,35	85,1%	20,24	9,76	318,9	22,8	98,2%	69,1%	67,9%
110,00	2,62	0,26	10,20	87,7%	20,25	9,92	316,0	22,8	98,2%	69,1%	67,8%
111,00	2,55	0,28	10,14	88,6%	20,25	9,98	312,7	22,7	98,0%	69,2%	67,8%
112,00	2,53	0,31	10,02	90,1%	20,26	10,08	309,1	22,6	97,7%	69,2%	67,7%
113,00	2,48	0,34	9,94	91,2%	20,26	10,16	306,4	22,8	97,5%	69,3%	67,6%
114,00	2,41	0,36	9,89	91,7%	20,26	10,20	303,8	23,1	97,3%	69,4%	67,5%
115,00	2,39	0,39	9,82	92,3%	20,27	10,25	301,2	22,5	97,1%	69,4%	67,4%
116,00	2,34	0,40	9,84	91,8%	20,26	10,22	299,3	23,0	97,0%	69,6%	67,5%
117,00	2,30	0,43	9,75	92,8%	20,27	10,30	295,3	22,9	96,7%	69,8%	67,5%
118,00	2,26	0,47	9,66	94,0%	20,27	10,38	292,8	22,6	96,4%	69,8%	67,3%
119,00	2,21	0,44	9,79	91,9%	20,26	10,25	290,1	22,7	96,6%	70,2%	67,8%
120,00	2,17	0,45	9,67	94,0%	20,27	10,37	289,0	22,8	96,5%	70,1%	67,7%
121,00	2,12	0,48	9,59	95,1%	20,28	10,45	287,4	23,0	96,3%	70,1%	67,5%
122,00	2,12	0,53	9,46	96,6%	20,28	10,56	285,1	23,1	95,8%	70,0%	67,1%
123,00	2,07	0,67	9,07	101,8%	20,30	10,90	281,1	22,9	94,5%	69,6%	65,8%
124,00	2,03	0,76	8,70	107,6%	20,32	11,23	275,9	22,9	93,5%	69,3%	64,8%
125,00	2,03	0,85	8,27	115,4%	20,34	11,64	271,0	23,3	92,5%	68,8%	63,7%
126,00	1,98	0,91	7,94	121,8%	20,36	11,95	266,6	22,8	91,7%	68,4%	62,7%
127,00	1,98	0,97	7,73	126,0%	20,37	12,16	262,2	23,2	91,1%	68,3%	62,2%
128,00	1,94	0,96	7,56	130,7%	20,38	12,34	257,7	23,1	91,0%	68,3%	62,2%
129,00	1,94	0,97	7,18	141,1%	20,40	12,74	253,3	23,0	90,5%	67,7%	61,3%
130,00	1,92	0,96	7,19	141,2%	20,40	12,74	249,7	23,0	90,6%	68,1%	61,7%
131,00	1,89	0,93	7,23	140,7%	20,40	12,71	246,6	23,3	90,9%	68,6%	62,3%
132,00	1,89	0,95	7,21	140,7%	20,40	12,71	243,5	22,5	90,7%	68,7%	62,3%
133,00	1,85	0,96	7,22	140,4%	20,40	12,71	240,4	23,1	90,7%	69,1%	62,6%
134,00	1,81	0,98	7,20	140,2%	20,40	12,71	237,4	22,9	90,4%	69,3%	62,7%
135,00	1,81	1,03	7,13	140,5%	20,40	12,75	233,3	22,5	89,9%	69,5%	62,4%
136,00	1,80	1,13	6,92	143,9%	20,41	12,92	230,0	23,1	88,7%	69,3%	61,5%
137,00	1,76	1,17	6,82	145,9%	20,41	13,01	227,6	22,6	88,3%	69,2%	61,1%
138,00	1,76	1,18	6,85	144,6%	20,41	12,97	225,2	22,7	88,2%	69,5%	61,4%
139,00	1,76	1,19	6,85	144,1%	20,41	12,96	223,3	22,5	88,1%	69,7%	61,4%
140,00	1,71	1,21	6,85	143,8%	20,41	12,95	221,2	22,6	88,0%	69,9%	61,5%
141,00	1,71	1,22	6,85	143,4%	20,41	12,95	219,3	22,8	87,9%	70,1%	61,6%
142,00	1,71	1,24	6,82	143,8%	20,41	12,97	217,8	23,1	87,6%	70,2%	61,5%
143,00	1,66	1,25	6,84	143,0%	20,41	12,95	216,0	23,4	87,6%	70,4%	61,7%
144,00	1,64	1,28	6,80	143,2%	20,41	12,97	214,7	24,1	87,3%	70,5%	61,6%
145,00	1,66	1,30	6,80	142,4%	20,41	12,95	213,1	23,0	87,1%	70,6%	61,5%
146,00	1,62	1,36	6,79	141,1%	20,40	12,93	211,3	22,9	86,6%	70,7%	61,2%
147,00	1,62	1,30	6,39	155,2%	20,43	13,39	208,8	23,1	86,4%	70,0%	60,5%
148,00	1,62	1,43	6,15	159,3%	20,44	13,58	206,1	22,8	84,9%	69,6%	59,0%
149,00	1,58	1,47	6,08	160,4%	20,44	13,63	204,3	23,3	84,4%	69,6%	58,7%
150,00	1,58	1,48	6,05	161,0%	20,44	13,66	202,5	23,3	84,2%	69,7%	58,7%
151,00	1,53	1,50	6,02	161,4%	20,44	13,68	200,6	22,6	84,0%	69,7%	58,6%
152,00	1,53	1,49	6,05	160,2%	20,44	13,64	199,4	22,8	84,1%	70,0%	58,9%
153,00	1,53	1,50	6,00	161,9%	20,44	13,69	197,6	24,5	84,0%	70,2%	59,0%
154,00	1,53	1,52	5,95	162,8%	20,45	13,73	195,9	22,9	83,7%	70,1%	58,7%
155,00	1,49	1,55	5,96	161,7%	20,44	13,71	194,5	22,8	83,4%	70,2%	58,6%
156,00	1,49	1,58	5,97	160,2%	20,44	13,68	193,3	23,0	83,2%	70,4%	58,6%
157,00	1,46	1,60	5,92	161,4%	20,44	13,73	192,2	22,7	83,0%	70,4%	58,4%
158,00	1,44	1,62	5,91	160,8%	20,44	13,72	191,1	22,8	82,8%	70,5%	58,3%
159,00	1,44	1,63	5,87	161,8%	20,44	13,76	190,0	22,4	82,5%	70,4%	58,1%
160,00	1,44	1,64	5,82	163,4%	20,45	13,81	189,2	24,5	82,4%	70,6%	58,2%
161,00	1,39	1,65	5,85	161,9%	20,44	13,77	188,1	25,2	82,4%	70,9%	58,4%
162,00	1,39	1,67	5,83	161,6%	20,44	13,77	187,3	24,2	82,1%	70,8%	58,1%
163,00	1,39	1,70	5,77	162,8%	20,45	13,82	186,1	24,0	81,7%	70,7%	57,8%
164,00	1,35	1,70	5,74	164,1%	20,45	13,86	185,2	24,9	81,7%	70,8%	57,9%
165,00	1,35	1,70	5,71	165,2%	20,45	13,89	183,9	24,4	81,6%	70,8%	57,8%
166,00	1,35	1,70	5,68	166,3%	20,45	13,93	182,9	23,9	81,5%	70,8%	57,7%
167,00	1,35	1,70	5,63	167,9%	20,46	13,97	182,3	24,3	81,4%	70,8%	57,6%
168,00	1,30	1,70	5,64	167,5%	20,46	13,96	181,5	24,1	81,4%	70,9%	57,7%
169,00	1,30	1,69	5,66	167,1%	20,45	13,95	180,4	25,2	81,5%	71,2%	58,0%
170,00	1,30	1,72	5,51	171,8%	20,46	14,10	179,3	24,2	81,0%	70,8%	57,3%
171,00	1,30	1,71	5,49	172,7%	20,46	14,12	178,8	23,0	81,0%	70,6%	57,2%
172,00	1,26	1,75	5,46	172,6%	20,46	14,13	177,9	24,0	80,6%	70,8%	57,0%
173,00	1,26	1,73	5,31	178,9%	20,48	14,30	176,3	24,2	80,4%	70,5%	56,7%
174,00	1,26	1,75	5,18	183,4%	20,48	14,43	174,9	24,3	79,8%	70,3%	56,1%
175,00	1,21	1,71	5,20	184,5%	20,48	14,43	173,6	24,1	80,2%	70,5%	56,6%
176,00	1,21	1,70	5,10	188,8%	20,49	14,54	172,2	25,2	80,0%	70,5%	56,4%
177,00	1,21	1,81	4,94	191,2%	20,49	14,65	171,2	24,2	78,6%	69,9%	55,0%
178,00	1,21	1,83	4,95	189,6%	20,49	14,63	170,4	23,8	78,4%	70,0%	54,9%
179,00	1,17	1,84	5,04	185,6%	20,49	14,53	169,4	24,0	78,6%	70,4%	55,4%
180,00	1,17	1,85	5,04	185,0%	20,48	14,52	168,6	23,9	78,5%	70,5%	55,4%
181,00	1,17	1,85	5,02	186,0%	20,49	14,54	167,9	23,6	78,5%	70,5%	55,4%
182,00	1,15	1,82	5,12	183,3%	20,48	14,46	167,4	23,5	79,1%	70,9%	56,0%
183,00	1,13	1,80	5,15	182,6%	20,48	14,43	166,5	24,0	79,3%	71,1%	56,4%
184,00	1,13	1,75	5,13	185,5%	20,49	14,48	165,6	23,0	79,7%	71,1%	56,7%
185,00	1,13	1,73	5,07	188,8%	20,49	14,56	164,7	23,6	79,6%	71,1%	56,6%
186,00	1,09	1,73	4,99	192,3%	20,50	14,64	164,2	23,9	79,4%	70,9%	56,3%
187,00	1,13	1,74	4,98	192,2%	20,50	14,64	163,3	24,1	79,4%	71,1%	56,4%
188,00	1,08	1,75	4,98	191,8%	20,50	14,64	162,6	24,1	79,3%	71,1%	56,4%
189,00	1,08	1,73	5,07	189,0%	20,49	14,56	162,1	23,3	79,7%	71,4%	56,9%
190,00	1,08	1,74	5,08	188,0%	20,49	14,54	161,7	23,3	79,7%	71,5%	56,9%
191,00	1,03	1,73	5,07	189,0%	20,49	14,56	161,5	23,9	79,7%	71,5%	57,0%
192,00	1,03	1,74	5,08	188,0%	20,49	14,54	161,2	23,3	79,6%	71,5%	57,0%
193,00	1,03	1,75	5,06	188,2%	20,49	14,55	160,7	23,5	79,5%	71,6%	56,9%
194,00	1,02	1,80	5,05	186,7%	20,49	14,54	160,4	23,7	79,0%	71,6%	56,5%
195,00	0,98	1,83	5,02	186,8%	20,49	14,55	159,8	23,6	78,7%	71,5%	56,3%
196,00	0,98	1,85	5,02	185,9%	20,49						



207,00	0,85	2,18	5,13	168,8%	20,46	14,24	155,7	24,0	76,2%	72,3%	55,0%
208,00	0,85	2,26	5,10	167,2%	20,45	14,23	155,6	23,5	75,5%	72,1%	54,4%
209,00	0,81	2,19	5,18	166,8%	20,45	14,18	155,8	23,6	76,3%	72,3%	55,2%
210,00	0,81	2,17	5,13	169,2%	20,46	14,25	155,7	22,9	76,3%	72,1%	55,0%
211,00	0,81	2,20	5,08	170,0%	20,46	14,28	155,5	25,6	75,9%	72,3%	54,9%
212,00	0,81	2,19	5,14	168,0%	20,46	14,22	155,1	24,6	76,2%	72,4%	55,2%
213,00	0,81	2,10	5,13	171,6%	20,46	14,28	154,8	23,3	76,8%	72,3%	55,5%
214,00	0,76	2,10	5,07	173,9%	20,47	14,35	154,5	24,5	76,6%	72,3%	55,4%
215,00	0,76	2,13	5,05	173,6%	20,47	14,35	154,5	24,5	76,3%	72,2%	55,1%
216,00	0,76	2,11	5,03	175,1%	20,47	14,38	154,1	23,6	76,4%	72,1%	55,1%
217,00	0,72	2,11	4,98	176,7%	20,47	14,43	154,1	23,9	76,2%	72,0%	54,9%
218,00	0,72	2,10	4,98	177,1%	20,47	14,44	153,8	23,9	76,3%	72,1%	55,0%
219,00	0,72	2,09	4,98	177,7%	20,47	14,44	153,4	25,2	76,4%	72,3%	55,2%
220,00	0,67	2,08	4,98	178,3%	20,47	14,45	153,2	25,1	76,5%	72,3%	55,3%
221,00	0,67	2,06	5,00	178,3%	20,47	14,45	153,0	23,8	76,7%	72,2%	55,4%
222,00	0,67	2,09	5,00	177,1%	20,47	14,43	152,9	23,9	76,5%	72,2%	55,2%
223,00	0,67	2,10	4,99	176,8%	20,47	14,43	152,9	24,1	76,4%	72,2%	55,2%
224,00	0,67	2,10	4,95	178,6%	20,47	14,47	153,0	23,2	76,3%	72,0%	54,9%
225,00	0,62	2,12	4,94	178,5%	20,47	14,48	152,7	23,7	76,0%	72,0%	54,8%
226,00	0,58	2,16	4,78	183,1%	20,48	14,62	152,2	23,2	75,2%	71,5%	53,8%
227,00	0,62	2,18	4,74	183,8%	20,48	14,65	152,3	23,6	74,9%	71,5%	53,5%
228,00	0,58	2,09	4,80	184,8%	20,48	14,63	152,2	23,1	75,8%	71,6%	54,3%
229,00	0,58	2,05	4,80	186,5%	20,49	14,66	152,2	24,3	76,1%	71,8%	54,7%
230,00	0,58	1,98	4,80	189,4%	20,49	14,70	151,8	25,5	76,7%	72,0%	55,2%
231,00	0,53	1,93	4,79	192,2%	20,50	14,74	151,5	23,9	77,1%	71,8%	55,4%
232,00	0,54	1,93	4,74	194,3%	20,50	14,79	151,4	23,6	76,9%	71,7%	55,1%
233,00	0,53	1,92	4,71	196,1%	20,50	14,83	151,5	23,4	76,9%	71,5%	55,0%
234,00	0,53	1,99	4,77	190,4%	20,49	14,73	151,1	25,0	76,5%	71,9%	55,0%
235,00	0,49	2,03	4,68	193,1%	20,50	14,81	150,8	24,0	75,9%	71,5%	54,3%
236,00	0,49	2,12	4,55	194,8%	20,50	14,89	150,4	23,0	74,7%	71,0%	53,1%
237,00	0,49	2,30	4,39	193,5%	20,50	14,96	150,0	23,3	72,7%	70,5%	51,3%
238,00	0,49	2,45	4,37	188,3%	20,49	14,90	149,4	22,9	71,5%	70,4%	50,3%
239,00	0,49	2,48	4,33	188,7%	20,49	14,92	149,1	23,0	71,1%	70,3%	50,0%
240,00	0,45	2,49	4,33	188,1%	20,49	14,92	148,8	23,2	71,0%	70,4%	50,0%
241,00	0,45	2,48	4,34	188,0%	20,49	14,91	148,2	24,2	71,2%	70,7%	50,3%
242,00	0,45	2,48	4,27	190,8%	20,49	14,98	147,7	23,0	70,9%	70,3%	49,8%
243,00	0,40	2,47	4,30	190,3%	20,49	14,96	147,5	23,6	71,1%	70,5%	50,1%
244,00	0,40	2,44	4,29	192,0%	20,50	14,99	147,6	23,2	71,3%	70,4%	50,2%
245,00	0,40	2,42	4,30	192,4%	20,50	14,99	147,1	23,6	71,5%	70,6%	50,4%
246,00	0,36	2,41	4,32	191,5%	20,50	14,96	147,0	23,3	71,6%	70,6%	50,6%
247,00	0,36	2,37	4,34	193,0%	20,50	14,98	147,1	23,3	72,0%	70,7%	50,9%
248,00	0,36	2,34	4,36	193,0%	20,50	14,96	146,9	23,4	72,3%	70,8%	51,2%
249,00	0,36	2,34	4,38	192,5%	20,50	14,95	147,1	23,1	72,4%	70,8%	51,2%
250,00	0,30	2,29	4,41	193,1%	20,50	14,94	147,2	22,8	72,8%	70,9%	51,6%
251,00	0,30	2,26	4,47	192,1%	20,50	14,90	147,1	23,8	73,3%	71,2%	52,2%
252,00	0,30	2,30	4,36	195,2%	20,50	14,99	147,1	23,2	72,6%	70,8%	51,4%
253,00	0,30	2,32	4,32	195,9%	20,50	15,02	146,8	23,2	72,3%	70,7%	51,1%
254,00	0,30	2,31	4,30	196,9%	20,50	15,04	146,5	23,3	72,2%	70,7%	51,0%
255,00	0,30	2,19	4,32	201,3%	20,51	15,09	147,3	23,2	73,3%	70,7%	51,8%
256,00	0,26	1,85	5,02	186,1%	20,49	14,54	147,7	23,7	78,5%	73,0%	57,3%
257,00	0,22	1,79	5,02	188,6%	20,49	14,58	148,1	23,8	79,0%	73,0%	57,7%
258,00	0,22	1,77	4,99	190,9%	20,49	14,62	148,4	23,2	79,1%	72,8%	57,6%
259,00	0,22	1,74	4,91	195,5%	20,50	14,72	148,1	23,3	79,2%	72,6%	57,5%
260,00	0,22	1,84	4,68	201,2%	20,51	14,91	147,6	23,3	77,5%	71,9%	55,8%
261,00	0,22	1,86	4,63	202,8%	20,51	14,95	147,6	23,3	77,2%	71,8%	55,4%
262,00	0,17	1,86	4,61	203,4%	20,51	14,97	147,5	23,0	77,1%	71,7%	55,3%
263,00	0,17	1,86	4,64	202,1%	20,51	14,94	147,6	23,2	77,2%	71,8%	55,5%
264,00	0,17	1,87	4,64	201,3%	20,51	14,93	147,5	22,9	77,1%	71,8%	55,3%
265,00	0,17	1,90	4,63	201,0%	20,51	14,93	147,6	23,4	76,8%	71,8%	55,2%
266,00	0,13	1,91	4,60	201,7%	20,51	14,96	147,1	23,1	76,6%	71,7%	54,9%
267,00	0,13	1,91	4,55	204,0%	20,51	15,01	147,0	23,7	76,4%	71,6%	54,7%
268,00	0,13	1,92	4,53	204,5%	20,51	15,02	147,3	23,2	76,3%	71,5%	54,5%
269,00	0,13	1,88	4,57	204,9%	20,51	15,01	147,3	23,2	76,8%	71,6%	55,0%
270,00	0,08	1,90	4,52	206,1%	20,52	15,05	147,1	23,2	76,4%	71,4%	54,6%
271,00	0,08	1,91	4,43	209,6%	20,52	15,13	146,6	23,0	76,0%	71,2%	54,1%
272,00	0,08	1,92	4,37	212,1%	20,52	15,19	146,1	23,7	75,7%	71,1%	53,9%
273,00	0,08	1,91	4,32	215,0%	20,53	15,25	145,5	23,5	75,6%	71,0%	53,7%
274,00	0,08	1,91	4,31	215,6%	20,53	15,26	145,2	23,7	75,6%	71,1%	53,7%
275,00	0,04	1,88	4,33	216,1%	20,53	15,26	144,9	23,6	75,9%	71,1%	54,0%
276,00	0,04	1,86	4,31	218,0%	20,53	15,29	144,7	23,3	76,0%	71,1%	54,0%
277,00	0,04	1,84	4,30	219,9%	20,53	15,31	144,3	23,3	76,2%	71,1%	54,2%
278,00	0,04	1,86	4,26	220,8%	20,54	15,34	143,9	23,0	75,9%	71,0%	53,8%
279,00	0,04	1,95	4,07	226,1%	20,54	15,49	143,2	23,1	74,3%	70,4%	52,3%
280,00	0,00	1,97	4,05	226,2%	20,54	15,51	142,8	23,1	74,1%	70,3%	52,1%

time acquisition minutes	Flue	Room	Tunnel	scale	Right	Back	bottom	Top	Left
	temp	temp	dry bulb						
	°F	°F	°F	lbs	°F	°F	°F	°F	°F
1	68,70	68,14	71,08	29,50	69,06	69,35	69,09	68,80	69,46
2	74,76	68,18	71,46	29,50	69,20	69,47	69,22	71,61	69,47
3	79,83	68,28	71,67	29,72	69,32	69,62	69,33	76,90	69,47
4	99,10	68,09	73,69	29,72	69,62	70,29	69,60	87,73	69,48
5	161,83	68,29	84,09	29,50	70,55	72,64	70,48	126,33	69,91
6	272,51	68,37	106,12	29,31	74,78	76,47	73,73	226,80	70,70
7	370,16	68,62	128,79	29,01	86,69	82,28	81,55	364,66	72,85
8	437,20	68,43	148,94	28,60	103,93	90,90	94,94	462,50	78,13
9	451,56	68,82	159,00	28,22	114,40	100,63	113,07	506,12	86,97
10	492,81	68,61	173,07	27,81	117,87	109,34	136,22	528,72	97,51
11	543,43	68,67	188,90	27,42	122,29	117,88	160,30	556,44	106,95
12	511,13	68,62	187,55	27,01	125,60	125,04	185,55	549,76	113,50
13	496,80	68,75	186,62	26,62	133,41	132,01	209,70	524,57	118,09
14	500,36	68,64	189,54	26,12	138,32	127,48	226,68	474,92	122,43
15	497,47	69,15	189,55	25,83	142,78	127,48	246,21	457,39	126,52
16	500,74	69,38	192,61	25,42	146,92	129,61	269,86	450,04	132,28
17	556,10	69,57	207,62	24,93	151,36	134,08	293,94	471,20	141,19
18	671,06	69,94	234,02	24,43	156,69	140,42	311,78	540,85	150,40
19	586,50	72,01	159,64	24,13	162,39	148,23	316,43	535,47	159,68
20	559,67	70,32	192,05	23,82	166,68	150,27	325,94	439,47	166,10
21	658,59	70,20	223,65	23,44	173,18	154,72	339,59	448,29	171,76
22	675,72	70,27	234,74	23,03	181,24	159,79	357,48	482,29	177,79
23	728,41	70,48	251,75	22,54	192,49	165,57	374,23	490,34	183,83
24	732,83	70,80	257,82	22,04	205,20	171,98	393,06	491,53	189,01
25	728,11	70,25	260,65	21,62	219,06	178,91	415,28	493,83	195,26
26	736,29	71,46	264,79	21,23	231,56	188,08	438,59	514,86	202,51
27	765,49	70,38	233,36	20,25	242,80	198,15	460,19	576,03	210,01
28	674,28	70,60	164,39	20,03	251,48	204,33	469,43	590,68	217,98
29	579,57	71,18	137,75	19,93	256,43	207,47	476,39	478,80	223,25
30	528,00	70,90	125,29	19,64	258,85	209,40	482,61	415,01	228,06
31	497,59	70,88	120,58	19,54	260,87	210,68	489,08	376,01	227,67
32	473,89	69,66	116,55	19,33	260,64	211,40	496,30	354,79	228,29
33	455,12	70,19	113,93	19,07	261,91	211,94	501,28	338,23	229,16
34	443,05	69,80	112,06	18,94	262,37	212,82	507,40	328,21	229,41
35	434,10	70,32	110,46	18,63	264,21	214,07	512,69	321,48	231,00
36	430,15	71,78	107,87	18,43	264,76	217,45	513,98	320,91	234,67
37	434,35	72,20	109,22	18,14	267,14	219,32	518,56	326,50	238,54
38	449,04	71,56	113,55	17,95	269,63	224,29	526,04	332,69	243,50
39	470,25	70,30	115,74	17,63	272,54	228,98	538,02	351,44	247,65
40	494,22	71,82	117,68	17,44	276,01	235,78	548,58	382,97	254,05
41	501,89	70,77	118,01	17,15	279,83	242,28	561,58	399,31	259,18
42	509,53	71,01	118,24	16,93	284,29	250,02	570,06	409,75	264,11
43	522,73	70,39	119,01	16,64	287,67	257,61	580,13	423,82	268,20
44	535,84	70,57	119,83	16,45	291,11	264,63	589,13	444,72	272,86
45	550,03	69,95	120,34	16,14	295,25	271,49	596,96	453,54	276,18
46	537,39	70,08	119,48	15,86	299,75	278,72	607,18	439,07	279,01
47	532,04	69,83	118,43	15,65	304,73	287,75	617,81	435,98	284,98
48	531,94	70,68	117,68	15,44	311,12	294,27	624,79	441,46	289,41
49	547,41	70,50	118,16	15,14	317,66	301,32	629,62	462,02	295,39
50	582,28	70,46	120,86	14,85	324,38	308,21	637,43	506,78	303,85
51	612,13	70,75	122,97	14,64	331,78	316,92	644,54	541,00	313,31
52	634,70	70,34	124,49	14,35	341,60	325,88	651,19	565,87	322,80
53	636,08	70,40	124,59	14,06	350,12	333,89	658,60	569,88	327,84
54	634,15	70,82	123,43	13,74	359,60	341,38	663,62	584,73	333,34
55	643,01	70,71	123,40	13,55	369,31	346,83	666,95	589,43	339,34
56	668,61	71,09	124,30	13,14	378,56	353,07	671,23	609,89	346,24
57	656,49	70,69	121,70	13,05	385,19	359,19	674,61	583,90	353,02
58	628,01	72,19	119,74	12,75	392,13	361,94	680,51	537,16	357,72
59	602,96	70,93	117,47	12,56	398,04	367,04	682,59	496,68	363,11
60	578,56	71,24	115,91	12,46	402,65	367,86	688,37	473,15	366,78
61	563,62	75,16	114,18	12,15	407,72	372,71	692,96	462,98	372,02
62	564,96	71,61	113,61	12,04	412,13	374,88	698,04	479,39	375,81
63	569,13	72,66	113,38	11,76	418,62	380,91	702,84	507,30	382,90
64	580,31	71,12	113,47	11,55	421,62	386,50	705,49	535,75	390,10
65	593,23	71,17	114,14	11,45	425,15	390,79	708,91	560,33	396,66
66	611,79	71,89	115,30	11,26	429,83	394,75	709,26	583,70	405,42
67	622,08	71,96	115,82	11,06	435,38	399,95	710,54	596,11	413,11
68	706,74	73,04	182,47	11,10	439,15	407,49	710,72	598,51	420,45
69	775,13	71,64	149,85	10,26	450,80	413,24	705,82	702,26	429,11
70	800,01	72,12	138,69	9,95	461,66	416,17	699,68	766,62	437,88
71	798,59	71,67	135,52	9,66	469,72	416,02	691,11	788,55	445,33
72	787,83	70,70	133,66	9,47	476,68	414,56	683,19	786,32	452,22
73	770,97	70,91	132,31	9,25	482,61	411,81	671,43	775,32	456,36
74	755,82	72,80	130,46	9,06	488,75	408,90	662,91	759,39	458,88
75	744,42	71,81	129,21	8,86	493,66	407,39	656,53	749,60	461,69
76	734,60	73,71	128,30	8,67	498,32	405,83	649,21	743,08	463,80
77	729,41	72,07	127,45	8,45	502,44	402,92	644,13	740,30	464,86

78	618,79	73,64	201,24	8,16	509,49	414,85	643,34	581,38	467,76
79	678,46	71,56	144,34	7,97	511,01	413,54	635,81	626,50	471,36
80	678,98	72,28	132,30	7,78	515,11	415,65	629,04	639,72	475,89
81	670,18	72,80	127,50	7,66	521,39	417,98	625,05	637,56	479,37
82	663,76	72,14	125,39	7,46	527,17	422,55	621,98	633,35	484,65
83	657,55	71,34	123,35	7,27	533,31	428,22	620,35	629,42	490,84
84	652,33	70,49	122,44	7,17	538,34	435,00	617,65	626,69	497,40
85	647,34	72,86	121,13	6,96	544,54	442,16	613,93	621,61	504,70
86	645,24	71,94	119,90	6,86	547,39	447,66	609,48	622,36	510,71
87	614,43	73,38	178,77	7,72	553,51	456,29	604,73	571,02	517,44
88	649,20	72,67	143,10	6,38	561,21	457,88	603,68	597,36	521,29
89	651,18	73,43	127,33	6,16	568,79	455,57	603,63	626,34	526,08
90	643,25	73,51	122,53	6,16	572,63	453,48	601,64	621,03	530,53
91	638,30	72,67	119,33	5,96	576,87	451,69	597,69	611,48	534,25
92	630,44	73,22	118,13	5,87	581,14	449,75	593,52	605,45	535,99
93	624,78	72,95	117,56	5,77	583,13	447,54	589,61	594,84	537,29
94	616,31	75,30	116,13	5,67	586,12	446,38	587,71	580,14	538,76
95	608,98	74,17	114,29	5,57	588,86	442,97	582,88	567,15	538,48
96	598,61	72,83	114,18	5,48	589,89	440,75	579,72	551,89	537,65
97	589,83	74,41	112,69	5,48	590,85	440,85	576,65	539,30	539,61
98	581,32	72,84	112,03	5,36	590,89	440,40	572,98	530,37	540,03
99	570,32	73,85	110,99	5,26	589,39	436,56	571,36	513,05	537,53
100	557,60	74,29	109,46	5,17	588,99	433,52	569,98	498,17	535,18
101	542,44	73,90	108,09	5,17	586,90	431,62	567,15	474,94	532,94
102	475,60	73,92	152,29	6,15	586,36	431,36	560,48	420,87	529,16
103	479,66	74,89	121,77	6,47	581,05	425,81	559,83	403,35	526,24
104	497,73	75,10	110,67	6,37	575,37	422,60	560,26	423,33	524,05
105	501,32	72,56	106,93	6,37	572,07	419,57	557,53	431,39	519,55
106	501,44	73,87	105,74	6,28	568,40	416,56	556,05	434,28	517,01
107	499,47	71,82	104,71	6,16	564,39	413,03	552,92	433,81	513,73
108	494,80	73,01	103,69	6,06	561,30	410,59	549,65	428,14	510,31
109	490,55	73,76	102,90	6,02	556,00	409,30	547,09	423,03	507,75
110	485,67	72,81	102,45	5,97	552,00	405,56	544,55	416,99	505,26
111	480,17	71,00	101,91	5,87	547,83	403,07	540,89	409,28	501,37
112	476,22	72,42	101,26	5,87	544,02	399,94	534,76	405,91	498,62
113	472,56	71,74	100,57	5,77	541,88	397,59	530,73	402,63	495,22
114	470,03	72,27	100,07	5,75	538,60	394,97	527,74	399,22	492,61
115	464,91	71,67	99,65	5,67	534,54	392,43	523,92	393,51	488,96
116	460,41	71,33	99,35	5,57	530,93	389,98	521,08	388,21	485,89
117	457,85	72,10	98,44	5,58	527,50	386,08	514,88	384,02	481,84
118	455,21	75,01	97,71	5,48	523,35	383,32	512,10	379,93	480,76
119	452,05	71,54	97,91	5,38	520,12	380,24	508,60	378,69	477,31
120	449,52	73,03	97,28	5,36	517,31	378,79	503,00	377,09	473,45
121	445,95	72,37	97,19	5,26	514,27	377,11	501,46	376,07	472,51
122	443,06	71,99	96,75	5,26	509,98	373,29	497,25	372,41	469,47
123	438,68	73,55	96,35	5,17	507,82	371,93	494,16	371,18	467,65



### PRE / POST CHECKS

 Date: 2018-03-21  
 Project #: PI 20164

 Manufacturer: Fogon Supreme  
 Run: 5 Tech: MM

 Model: 38 Psc  
 Reviewer: DO

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
EM-191	7:00	ok	ok

Pre-Test Post-Test

**Facility Conditions:**

 Air Velocity from less than 2 feet .....  
 Smoke Capture Check.....  
 Picture.....

5 (max50 Fpm)	3 (max50 Fpm)
ok	ok
4 sides	ok

**Wood Heater Conditions:**

 Date Wood Heater Stack Cleaned.....  
 Date Dilution Tunnel Cleaned.....  
 Induced Draft Check (max 0.005 H2O).....  
 Traverse before ignition.....  
 Flow Rate 140 cfm ±10%.....

2018-03-13
2018-03-13
ok
ok
ok

**Temperature System:**

 Ambient (65°-90°F).....  
 Wood Heater Surface (±125°F).....

ok	°F
ok	°F

**Proportional Checks:**

 Thermocouple check.....  
 Pitot Clean.....  
 Pitot verification.....

ok
ok
ok

**Sampling Train ID Numbers:**

 Probe.....  
 Filter Front.....  
 Filter Back.....  
 Filter Thermocouple.....  
 Filter (<90°F).....

Train 1 <sup>st</sup> hour	Train 1	Train 2
35	38	43
50	52	222
51	53	223
11	11	12
ok	ok	ok



Date: 2018-03-21

Manufacturer: Fogon Supreme

Model: 38 FSC

Project #: PI 2.164

Run: 5

Tech: MM

Reviewer: DP

**Leakage Checks Tunnel Samplers**

Unplugged Flow Rate = .25cfm	System 1 <sup>st</sup> hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	646859, 92	648331, 68	646859, 68	648331, 75	590666, 69	592169, 40
Initial 1minute DGM (Liter)	646859, 40	648331, 68	646859, 68	648331, 75	590666, 68	592169, 37
Change © (Liter)	0,02	Ø	Ø	Ø	0,01	0,03
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

**Leakage Checks Flue Gas Sampler**

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	<del>2-15</del> = 5 mm	<del>2-15</del> = 5 mm
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	ok	ok

**Leakage Checks Pitot**

Plugged Probe	Pre Test 3 H2o static	Pre Test 0.4-0.5 H2o velocity	Post Test 3 H2o Static	Post Test 0.4-0.5 H2o velocity
Vacuum (inches Hg.)	3	.5	3	.4
Check OK (no change after 15 sec.)	ok	ok	ok	ok



### PRE-TEST SCALE AUDIT

Date: 2018-03-21      Manufacturer: Fogon Supreme      Model: 38 F50  
 Project #: PI 20164      Run: 5      Tech: MR      Reviewer: DP

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	4.4 lbs, Class F	4.4 lbs
Wood	EM-090	4.4 lbs, Class F	4.4 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

#### LIMITS OF WEIGHT RANGES

**ANALYTICAL SCALE:** ..... 50%-150% of dry filter weight, ± 0.1 mg  
**PLATFORM SCALE:** ..... 20%-80% of ideal test load weight, ± 0.1 lbs or 1%  
**WOOD SCALE:** ..... 20%-80% of ideal test load weight, ± 0.01 lbs or 1%

Date: 2018-03-21 Manufacturer: Fogel Supreme Model: 38 FSC  
 Project #: PT 20164 Run: 5 Tech: mm Reviewer: BP

FOR TUNNELS < 12 in

Barometric pressure ( $P_{bar}$ ) 1013 (KPa.) Static pressure ( $P_q$ ) 0.16 (inches w.c.)  
 Inside diameter: Port A \_\_\_\_\_ Port B \_\_\_\_\_  
 Tunnel cross sectional area: .1963Ft<sup>2</sup>  
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head $\Delta_p$ (inches H <sub>2</sub> O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.051	72.09
B - Centroid	3.00	3.50	4	0.052	70.89
A-1	0.40	0.50	0.50	0.046	71.85
A-2	1.50	1.75	2	0.051	71.53
A-3	4.50	5.25	6	0.058	71.31
A-4	5.60	6.5	7.5	0.047	71.29
B-1	0.40	0.50	0.50	0.047	70.59
B-2	1.50	1.75	2	0.055	70.36
B-3	4.50	5.25	6	0.054	70.21
B-4	5.60	6.5	7.5	0.048	70.00
				AVERAGE	

$$v_s = K_p C_p (\sqrt{\Delta_p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

Where,

$C_p$  = pitot tube coefficient, dimension less = 0.99 for standard pitot.

$\Delta_p$  = manometer reading (inches H<sub>2</sub>O)

$T_s$  = average absolute dilution tunnel temperature (°F + 460)

$P_s$  = absolute dilution tunnel gas pressure or  $P_{bar} + P_{qg}$

$P_q$  = static pressure in. H<sub>2</sub>O  
 { 13.6 }

$M_s$  = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)

$K_p$  = 85.49 pitot tube constant, (conversion factor for English units)

$\Delta_p$  avg. = average of the square roots of the velocity heads ( $\Delta_p$ ) measured at each traverse point.



### CONTINUOUS ANALYZERS

Date: 2018-03-21 Manufacturer: Fogco Supreme Model: 38 FSC  
 Project #: PI 20164 Run: 5 Tech: MR Reviewer: [Signature]

#### Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2997	300	1,007	100
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO <sub>2</sub>	0	0	1793	1800	9.75	10.00
Tolerance CO <sub>2</sub>		+/- 0.02		+/- 0.5		+/- 0.5
O <sub>2</sub> informative CSA B415 calculated value	na	na	na	na	na	na

#### Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0.006	2994	1,004	0.006	0.02	0.003	0.15	0.003	0.05	[Signature]	
CO <sub>2</sub>	0.00	1795	9.75	0.00	0.02	0.02	0.5	0	0.5	[Signature]	

### TEST DATA LOG

Date: 2018-03-21 Manufacturer: Fogel Supreme Model: 38 FSC  
 Project #: PI 20164 Run: 5 Tech: MR Reviewer: DP

#### RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	648330, 70	592168, 31	171, 78
Initial (Liter)	646860, 10	590668, 09	148, 02

#### AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	101,2	100,2
Dry Bulb (F):	76,1	75,56
Humidity (%):	22,0	27,4

#### Flow Meter

	Start	End
Flow meter reading	N.A	N.A

#### Flow Meter Verification

	Before	After
Flow meter Check (liters)	N.A	N.A
Scale Weight ( Kg)	N.A	N.A



### FUEL DATA

Date: 2018-03-21 Manufacturer: foya supreme Model: 38 FSC  
 Project #: PI 20164 Run: 5 Tech: MM Reviewer: NP

#### FUEL DESCRIPTION:

Type of wood:

#### PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
2 x 4 x 10 in.	1364 lbs.	21.4	20.9	20.6	20.8	20.4
2 x 4 x 10 in.	1318 lbs.	21.6	21.9	21.3	21.8	21.4
2 x 4 x 10 in.	1362 lbs.	21.8	21.4	21.9	21.8	21.4
2 x 4 x 10 in.	1518 lbs.	22.3	22.6	22.4	22.7	22.2
2 x 4 x 10 in.	1352 lbs.	21.9	21.8	21.6	22.0	22.1
2 x 4 x 10 in.	1474 lbs.	22.3	22.8	21.9	21.8	21.4
2 x 4 x 10 in.	1532 lbs.	22.3	22.4	22.8	22.3	22.8
2 x 4 x 10 in.	1434 lbs.	23.0	23.1	22.9	22.1	22.0
2 x 4 x 10 in.	1254 lbs.	21.4	21.0	19.9	19.9	20.0
2 x 4 x 10 in.	1262 lbs.	19.6	19.3	19.8	19.9	19.9
2 x 4 x 15 in.	2164 lbs.	22.6	22.9	22.0	22.8	23.1
2 x 4 x 15 in.	2312 lbs.	22.6	23.3	22.9	22.6	22.7
2 x 4 x 15 in.	1984 lbs.	23.0	22.1	22.4	22.4	22.8
2 x 4 x 15 in.	2182 lbs.	22.4	22.3	22.3	22.6	22.8
2 x 4 x 15 in.	2234 lbs.	21.6	21.4	21.9	22.0	22.3
2 x 4 x 15 in.	2222 lbs.	22.9	23.0	23.1	22.8	22.8
2 x 4 x 15 in.	1936 lbs.	22.6	22.8	22.9	22.7	22.6
x x 15 in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 28.90 lbs



**FUEL DATA**

Date: 2018-03-21 Manufacturer: Foye Supreme Model: 38 FSC  
 Project #: PI 20164 Run: 5 Tech: mm Reviewer: DP

**FUEL DESCRIPTION:**

Type of wood :

**TEST LOAD**

Piece Size	Weight	Meter Moisture Content (% dry)*				
3 1/2 x 3 1/2 x 20 in.	4930 lbs.	197	208	206	199	199
3 1/2 x 3 1/2 x 20 in.	5014 lbs.	209	210	217	211	210
3 1/2 x 3 1/2 x 20 in.	4694 lbs.	209	221	216	219	220
3 1/2 x 3 1/2 x 20 in.	5116 lbs.	206	222	210	202	204
3 1/2 x 3 1/2 x 20 in.	4577 lbs.	193	211	211	213	210
1 1/2 x 3/4 x 5 in.	0080 lbs.			201		
1 1/2 x 3/4 x 5 in.	0086 lbs.			206		
1 1/2 x 3/4 x 5 in.	0088 lbs.			211		
1 1/2 x 3/4 x 5 in.	0088 lbs.			215		
1 1/2 x 3/4 x 5 in.	0092 lbs.			191		
1 1/2 x 3/4 x 5 in.	0088 lbs.			206		
1 1/2 x 3/4 x 5 in.	6092 lbs.			209		
1 1/2 x 3/4 x 5 in.	0086 lbs.			211		
1 1/2 x 3/4 x 5 in.	0092 lbs.			196		
1 1/2 x 3/4 x 5 in.	0088 lbs.			193		
1 1/2 x 3/4 x 5 in.	0088 lbs.			199		
1 1/2 x 3/4 x 5 in.	0096 lbs.			204		
1 1/2 x 3/4 x 5 in.	0088 lbs.			206		
1 1/2 x 3/4 x 5 in.	6106 lbs.			211		
1 1/2 x 3/4 x 5 in.	0078 lbs.			209		
1 1/2 x 3/4 x 5 in.	0080 lbs.			199		
1 1/2 x 3/4 x 5 in.	0098 lbs.			191		
1 1/2 x 3/4 x 5 in.	0094 lbs.			196		
1 1/2 x 3/4 x 5 in.	0082 lbs.			197		
1 1/2 x 3/4 x 5 in.	0092 lbs.			197		
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 2613 lbs Min 20%: 522 Max 25%: 653



Date: 2018-03-20 Model: 38 FSC

Manufacturer: Fogyn Supreme 6 Tech: MM

Project #: PI 20164 Run: 5 Reviewer: RP

Pre-test Weight Record		SYSTEM 1 - 1 <sup>st</sup> hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2018-03-20	18:00	35, 2836	0, 1252	0, 1267	35, 1511	38	0, 1245	0, 1256	35, 4635	38	0, 1245	0, 1256	35, 4635	0, 1270
2018-03-21	09:00	109, 2836	0, 1251	0, 1268	35, 1512	110, 4333	0, 1246	0, 1256	35, 4636	110, 4333	0, 1246	0, 1256	35, 4636	0, 1269

Post-test Weight Record		SYSTEM 1 - 1 <sup>st</sup> hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2018-03-20	16:30	35, 2846	0, 1314	0, 1267	35, 1542	38	0, 1244	0, 1253	35, 4656	38	0, 1244	0, 1253	35, 4656	0, 1269
2018-03-26	08:00	109, 2838	0, 1306	0, 1265	35, 1532	110, 4335	0, 1243	0, 1251	35, 4654	110, 4335	0, 1243	0, 1251	35, 4654	0, 1269
2018-03-30	08:00	109, 2838	0, 1306	0, 1265	35, 1531	110, 4335	0, 1243	0, 1251	35, 4653	110, 4335	0, 1243	0, 1251	35, 4653	0, 1269

Date: 2018-03-20 Project #: PI 20164 Run: 5 Manufacturer: Fogyn Supreme Model: 38 F5c  
 Tech: MR Reviewer: DP

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	43	222	223	21
2018-03-20	18:00	1091640	01294	01289	353515
2018-03-21	9:00	1091639	01294	01289	353516

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	43	222	223	21
2018-03-21	16:30	1091650	01354	01288	353543
2018-03-26	8:00	<del>1091642</del> 1091642	01352	01286	353537
2018-03-30	8:00	1091643	01352	01286	353538

## Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

### Description du test

Test standard	EPA
Run #	6
Date	22-03-2018
Technicien	m.m
Project #	pi 20160

### Description de l'unité

Manufacturier	foyer supreme	
Modèle	38 fsc	
Combustion system	Non-Cat	
Appliance type	fireplace	
Firebox volume	3,5	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

### Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category	2	
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

### Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,988	Dimensionless
Equipment number (DGM #1):	em 178	
Calibration Factor (DGM #2):	0,988	Dimensionless
Equipment number (DGM #2):	em 179	
Calibration Factor (DGM #3):	0,986	Dimensionless
Equipment number (DGM #3):	em 070	Dimensionless

### Tunnel

Targeted tunnel flow rate	300	scfm
Tunnel diameter	8	in.
Molecular weight	29	
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 20160
Date	22-03-2018
Technicien	<input type="text" value="m.m"/>

### Fuel data

Fuel type	Dimension	
Fuel specie	D. Fir	
HHV		19810,0 kJ/kg
%C		48,7
%H		6,9
%O		43,9
%Ash		0,5
HHV		8519,2 Btu/lb
LHV		7451,0 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480



	Start	End
Barometer (kPa):	101	100,8
Barometer (in.Hg):	29,825289	29,7662288
Dry Bulb (F):	70,7	79,88
Humidity (%):	24,2	22,3
Air velocity (ft/min)	4	8

DGM #1	Final:	22937,801	cuft
	Initial:	22895,633	cuft
DGM #2	Final:	20955,503	cuft
	Initial:	20912,395	cuft
DGM room			

	Final:	649526,190	Liter
	Initial:	648332,110	Liter
	Final:	593393,750	Liter
	Initial:	592173,080	Liter
	Final:	190,810	cuft
	Initial:	171,780	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

222

Autres données à rentrer: dans preload data, load data, traverse et filter set weight

<b>Project nu.</b>	pi 20160
<b>Date</b>	22-03-2018
<b>Technicien</b>	m.m







## Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,15 in. H2O  
 Barometer: 29,900 in. Hg

**Pour un tunnel de 12" et plus, prendre 6 lectures**

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=  
0,992

**Pour un tunnel moins de 12", prendre 4 lectures**

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,049	72,09	0,2214
B center	0,050	71,8	0,2236
A1	0,045	71,9	0,2121
A2	0,050	71,51	0,2236
A3	0,056	71,26	0,2366
A4	0,044	71,01	0,2098
B1	0,042	71,550	0,2049
B2	0,052	71,770	0,2280
B3	0,053	71,580	0,2302
B4	0,047	71,370	0,2168
AVERAGE	0,0488	71,5840	0,2207

<b>Project nu.</b>	pi 20160
<b>Date</b>	22-03-2018
<b>Technicien</b>	<span style="border: 1px solid red; padding: 2px;">m.m</span>

**Filter set weight**

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure	
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter			
Number	1	226	227	7	3	228	229	10	13	230	231	14	235			
Before (1)																
Before (2)																
Before (3)																
Before (4)																
Before (5)	61,0675	0,1270	0,1272	35,2100	61,4559	0,1268	0,1267	35,3350	95,1490	0,1291	0,1287	35,1797	0,1273	2018-03-21	19:00	
Before (6)	61,0676	0,1271	0,1273	35,2099	61,4560	0,1268	0,1267	35,3351	95,1489	0,1291	0,1286	35,1796	0,1274	2018-03-22	10:00	
After (1)	61,0683	0,1385	0,1274	35,2118	61,4567	0,1271	0,1263	35,3374	95,1512	0,1398	0,1286	35,1815	0,1276	2018-03-22	16:00	
After (2)	61,0678	0,1379	0,1273	35,2111	61,4564	0,1271	0,1262	35,3368	95,1505	0,1398	0,1285	35,1807	0,1276	2018-03-26	08:00	
After (3)	61,0678	0,1379	0,1273	35,2111	61,4564	0,1271	0,1262	35,3368	95,1505	0,1398	0,1285	35,1807	0,1276	2018-03-30	08:00	
After (4)																
After (5)																
After (6)	61,0678	0,1379	0,1273	35,2111	61,4564	0,1271	0,1262	35,3368	95,1505	0,1398	0,1285	35,1807	0,1276	2018-03-30	08:00	
Difference	0,0002	0,0108	0,0000	0,0012	0,0004	0,0003	-0,0005	0,0017	0,0016	0,0107	-0,0001	0,0011	0,0002			
Total (mg)		12,2				14,1				13,3				0,2		
Total ajusté (mg)		<b>12,00</b>				<b>13,90</b>				<b>13,10</b>						

<b>Project nu.</b>	pi 20160
<b>Date</b>	22-03-2018
<b>Technicien</b>	m.m

# Demonstration purpose only not the real number, negative filter weight rounded to zero

## Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure	
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter			
Number	1	226	227	7	3	228	229	10	13	230	231	14	235			
Before (1)																
Before (2)																
Before (3)																
Before (4)																
Before (5)	61,0675	0,1270	0,1272	35,2100	61,4559	0,1268	0,1267	35,3350	95,1490	0,1291	0,1287	35,1797	0,1273	2018-03-21	19:00	
Before (6)	61,0676	0,1271	0,1273	35,2099	61,4560	0,1268	0,1267	35,3351	95,1489	0,1291	0,1286	35,1796	0,1274	2018-03-22	10:00	
After (1)	61,0683	0,1385	0,1274	35,2118	61,4567	0,1271	0,1263	35,3374	95,1512	0,1398	0,1286	35,1815	0,1276	2018-03-22	16:00	
After (2)	61,0678	0,1379	0,1273	35,2111	61,4564	0,1271	0,1262	35,3368	95,1505	0,1398	0,1285	35,1807	0,1276	2018-03-26	08:00	
After (3)	61,0678	0,1379	0,1273	35,2111	61,4564	0,1271	0,1262	35,3368	95,1505	0,1398	0,1285	35,1807	0,1276	2018-03-30	08:00	
After (4)																
After (5)																
After (6)	61,0678	0,1379	0,1273	35,2111	61,4564	0,1271	0,1267	35,3368	95,1505	0,1398	0,1286	35,1807	0,1276	2018-03-30	08:00	
Difference	0,0002	0,0108	0,0000	0,0012	0,0004	0,0003	0,0000	0,0017	0,0016	0,0107	0,0000	0,0011	0,0002			
Total (mg)		12,2				14,6				13,4				0,2		
Total ajusté (mg)		<b>12,00</b>				<b>14,40</b>				<b>13,20</b>						

<b>Project nu.</b>	pi 20160
<b>Date</b>	22-03-2018
<b>Technicien</b>	m.m

SFBA EPA EMISSION RESULTS

RESULTS

**Average emission rate:** 5,5 g/hr

Burn Rate : 2,325 Dry kg/hr

**Test Duration:** 225 min

PRESSURE FACTOR: DGM 1 0,97238  
 DGM 2 0,97094  
 DGM 3 0,99585

BAROMETRIC PRESSURE  
 Average: 29,795759 in Hg  
 Start: 29,825289 in Hg  
 End: 29,766229 in Hg

TEMPERATURE FACTORS DGM 1 0,97996  
 DGM 2 0,97872  
 DGM 3 0,97901

DGM CONTROLLER VALUES

DGM 1 Final: 22937,801 Cuft  
 Initial: 22895,633 Cuft

VOLUMES SAMPLED DGM 1 39,695 SCft  
 DGM 2 40,490 SCft  
 DGM 3 18,301 SCft

DGM 2 Final: 20955,503 Cuft  
 Initial: 20912,395 Cuft

DGM #3 Final: 190,810 Cuft  
 Initial: 171,780 Cuft

TOTAL TUNNEL VOLUME : 62246

TEMPERATURES

DGM 1 538,795 °R  
 DGM 2 539,481 °R

SAMPLE RATIOS  
 Sample Train 1: 1568,112  
 Sample Train 2: 1537,322

CALIBRATION FACTORS

DGM 1 0,9879  
 DGM 2 0,9884  
 DGM #3 0,9864

Paticulate concentration  
 Sample Train 1 **0,000355** g/dscf  
 Sample Train 2 **0,000328** g/dscf  
 Room **0,000011** g/dscf

TUNNEL FLOW RATE: 276,650 Dscfm

TOTAL EMISSIONS  
 Sample Train 1 **21,43** g  
 Sample Train 2 **19,77** g

PARTICULATE CATCH

Total Sample Train 1: 14,10 mg  
 Total Sample Train 2: 13,30 mg  
 Total Sample Train 1 1st hour: 12,20 mg

EMISSION RATES  
 Sample Train 1 **5,71** g/hr  
 Sample Train 2 **5,27** g/hr

1st hour emission rate **19,13** g/hr

DEVIATION: 4,04%

Cs Train 1 Train 2  
 0,0003552 0,000328475



Elapsed Time	Raw data row	* Weight Remaining	* CO	* CO <sub>2</sub>	* O <sub>2</sub>	*1 Flue Gas	*2 Room Temp	*3 Tunnel Dry Bulb	*4 Unit Top	*5 Unit Back	*6 Unit R.Side	*7 Unit L.Side	*8 Unit Bottom	Mass flow 1	DGM 1 Inlet T	DGM 1 Outlet T	Filter 1 Temp	Mass flow 2	DGM 2 Inlet T	DGM 2 Outlet T	Filter 2 Temp	Tunnel Velo		Flue draft		Change in Surface	
																						in wc	in wc	in wc	in wc	in wc	in wc
min		lbs	%	%	%	°F	°F	°F	°F	°F	°F	°F	°F	cuft/min	°F	°F	°F	cuft/min	°F	°F	°F	in wc	in wc	in wc	in wc	°F	°F
0,00	222,00	23,1	0,3	10,2	436,8	267,6	74,6	112,0	287,8	444,5	465,7	447,8	538,1	0,18	75,75	75,89	74,75	0,18	76,08	76,27	74,15	0,05	0,03	0,0	0,0		
1,0	223,0	23,0	0,3	2,9	427,7	267,2	74,4	102,5	264,7	437,4	459,3	442,3	534,8	0,18	75,91	75,88	74,80	0,18	76,19	76,35	74,52	0,05	0,05	-9,07	2162		
2,0	224,0	23,1	0,6	4,7	426,8	296,7	74,5	98,1	275,8	438,3	452,2	436,1	531,6	0,18	75,85	75,77	74,90	0,18	76,18	76,35	74,61	0,05	0,05	-9,95	1426		
3,0	225,0	22,9	0,5	2,3	429,6	337,0	74,3	99,6	298,3	444,4	445,8	430,7	528,8	0,18	75,81	75,74	75,02	0,18	76,17	76,37	74,71	0,05	0,06	-7,18	1433		
4,0	226,0	22,7	0,5	5,5	433,8	376,2	74,1	101,0	334,4	442,4	440,6	425,6	526,1	0,18	75,79	75,71	75,11	0,18	76,17	76,37	74,82	0,05	0,06	-2,94	9908		
5,0	227,0	22,4	0,5	6,0	437,4	380,4	74,3	99,2	350,3	444,3	441,5	415,3	524,2	0,18	75,78	75,69	75,33	0,18	76,18	76,37	74,94	0,05	0,07	3,21	1668		
6,0	228,0	22,3	0,5	6,0	433,8	398,1	74,5	100,3	367,0	446,3	432,0	415,2	520,8	0,18	75,77	75,71	75,33	0,18	76,19	76,41	75,08	0,05	0,07	-0,50	3375		
7,0	229,0	22,1	0,5	6,5	437,8	414,7	74,7	101,1	385,1	447,6	427,9	410,7	517,6	0,18	75,73	75,68	75,43	0,18	76,18	76,40	75,21	0,05	0,07	0,10	6449		
8,0	230,0	22,0	0,5	7,0	440,4	438,1	75,0	102,8	409,1	448,2	425,0	404,8	515,1	0,18	75,76	75,68	75,58	0,18	76,20	76,43	75,37	0,05	0,07	3,65	8228		
9,0	231,0	21,8	0,6	8,1	446,0	461,4	74,8	104,1	442,6	448,8	422,6	402,3	513,6	0,18	75,77	75,71	75,74	0,18	76,24	76,47	75,55	0,05	0,08	9,19	7784		
10,0	232,0	21,6	0,7	8,5	449,9	475,3	75,1	104,8	467,0	449,5	420,5	400,8	511,6	0,18	75,74	75,69	75,85	0,18	76,21	76,45	75,71	0,05	0,08	13,09	8181		
11,0	233,0	21,4	0,7	8,8	452,1	474,9	75,0	104,2	482,8	449,8	418,6	399,5	509,8	0,18	75,76	75,70	76,01	0,18	76,22	76,48	75,85	0,05	0,08	15,34	4507		
12,0	234,0	21,3	0,8	7,8	451,0	471,4	75,3	103,1	480,7	449,8	417,6	398,6	508,6	0,18	75,75	75,72	76,16	0,18	76,22	76,50	76,02	0,05	0,08	14,26	6803		
13,0	235,0	21,0	0,8	7,9	448,6	460,4	75,4	102,4	474,4	449,3	415,6	396,8	507,0	0,18	75,78	75,73	76,31	0,18	76,26	76,52	76,15	0,05	0,07	11,86	3806		
14,0	236,0	21,0	0,8	7,0	444,9	448,0	75,5	101,3	461,0	447,6	414,5	394,9	506,2	0,18	75,84	75,74	76,45	0,18	76,28	76,55	76,30	0,05	0,07	8,00	2904		
15,0	237,0	20,8	0,8	6,5	442,0	444,1	75,7	100,8	450,2	446,7	414,3	393,3	505,2	0,18	75,93	75,77	76,60	0,18	76,35	76,59	76,47	0,05	0,08	5,24	3544		
16,0	238,0	20,6	0,7	6,7	443,8	454,6	75,5	101,2	463,4	445,4	413,3	392,1	504,6	0,18	75,97	75,81	76,75	0,18	76,37	76,63	76,62	0,05	0,08	7,00	0085		
17,0	239,0	20,5	0,8	7,6	448,0	463,2	75,8	101,6	488,4	444,1	412,0	391,5	504,2	0,18	75,98	75,83	76,90	0,18	76,39	76,79	76,79	0,05	0,08	11,26	413		
18,0	240,0	20,4	0,8	7,7	448,4	464,6	75,8	101,7	493,4	442,7	411,6	390,8	503,5	0,18	76,03	75,83	77,05	0,18	76,42	76,66	76,92	0,05	0,08	11,64	0863		
19,0	241,0	20,2	0,9	7,4	446,4	460,1	75,7	101,8	486,3	441,8	410,7	390,3	503,0	0,18	76,07	75,86	77,20	0,18	76,45	76,69	77,07	0,05	0,08	9,63	6292		
20,0	242,0	20,1	0,9	7,0	444,0	456,1	75,8	101,6	478,0	440,6	409,6	389,3	502,3	0,18	76,17	75,90	77,33	0,18	76,50	76,72	77,24	0,05	0,08	7,18	5084		
21,0	243,0	19,9	0,9	7,0	442,4	455,0	75,5	101,6	473,8	439,7	408,0	388,9	501,5	0,18	76,25	75,93	77,47	0,18	76,55	76,77	77,35	0,05	0,08	5,60	3146		
22,0	244,0	19,8	0,9	7,2	441,3	456,6	75,4	101,1	471,5	438,4	407,2	388,1	501,0	0,18	76,30	75,97	77,59	0,18	76,61	76,79	77,49	0,05	0,08	4,49	1926		
23,0	245,0	19,6	0,9	7,1	440,0	455,0	75,8	101,9	467,0	438,0	406,4	387,9	500,7	0,18	76,34	76,00	77,75	0,18	76,64	76,82	77,62	0,05	0,08	3,21	1668		
24,0	246,0	19,5	0,9	6,9	437,3	448,3	76,0	101,0	456,0	437,8	405,7	387,1	499,8	0,18	76,37	76,04	77,86	0,18	76,67	76,87	77,76	0,05	0,07	0,51	8894		
25,0	247,0	19,4	0,9	6,6	436,5	447,4	76,0	101,4	452,8	438,7	405,0	386,8	498,3	0,18	76,39	76,06	77,98	0,18	76,71	76,88	77,88	0,05	0,08	-0,25	1428		
26,0	248,0	19,2	0,9	7,6	438,9	465,2	75,9	102,8	465,7	438,9	404,3	386,9	498,8	0,18	76,46	76,09	78,12	0,18	76,76	76,91	78,02	0,05	0,08	2,17	2546		
27,0	249,0	19,0	1,1	9,7	446,0	497,1	75,8	104,3	500,5	439,5	404,9	386,7	498,2	0,18	76,51	76,13	78,25	0,18	76,80	76,94	78,17	0,05	0,08	9,20	6312		
28,0	250,0	18,8	1,1	11,0	459,2	538,3	76,2	106,0	564,3	440,6	406,2	387,3	497,6	0,18	76,57	76,18	78,38	0,18	76,87	76,98	78,32	0,05	0,09	22,41	3727		
29,0	251,0	18,6	1,2	12,6	474,1	577,4	76,0	108,8	635,6	442,1	407,0	389,0	496,8	0,18	76,63	76,21	78,52	0,18	76,91	77,01	78,49	0,05	0,09	37,30	9406		
30,0	252,0	18,3	0,7	13,0	482,4	598,2	76,3	110,8	673,7	443,6	408,8	390,1	495,7	0,18	76,69	76,25	78,67	0,18	76,95	77,05	78,63	0,05	0,09	45,60	4199		
31,0	253,0	18,2	0,7	12,4	489,0	612,8	76,2	112,5	701,7	445,6	411,3	391,8	494,7	0,18	76,76	76,28	78,79	0,18	77,00	77,10	78,79	0,04	0,09	52,23	1854		
32,0	254,0	17,9	0,8	12,4	495,3	625,8	76,0	114,4	724,9	448,4	414,2	394,3	494,5	0,18	76,82	76,32	78,95	0,18	77,06	77,14	78,96	0,05	0,09	58,50	5798		
33,0	255,0	17,7	0,8	12,3	499,4	634,6	76,6	115,6	738,4	451,7	417,2	396,4	493,5	0,18	76,87	76,36	79,12	0,18	77,09	77,15	79,13	0,05	0,09	62,67	4402		
34,0	256,0	17,5	0,8	12,1	503,8	641,2	76,9	116,3	750,9	454,4	420,9	399,5	493,1	0,18	76,92	76,41	79,28	0,18	77,15	77,22	79,31	0,05	0,09	66,98	902		
35,0	257,0	17,4	0,8	12,1	508,8	649,6	76,9	117,0	764,9	457,2	421,8	400,0	492,4	0,18	76,95	76,41	79,40	0,18	77,21	77,28	79,47	0,05	0,09	71,30	886		
36,0	258,0	17,2	0,7	12,1	510,8	656,3	77,5	118,8	768,5	461,3	422,2	405,1	491,6	0,18	77,07	76,48	79,64	0,18	77,29	77,30	79,66	0,04	0,09	73,98	379		
37,0	259,0	16,9	0,6	12,1	514,0	663,3	77,0	119,9	774,9	465,0	423,5	408,2	491,2	0,18	77,14	76,54	79,81	0,18	77,35	77,33	79,82	0,05	0,09	77,18	1464		
38,0	260,0	16,7	0,6	12,1	517,6	669,2	77,7	120,9	782,3	468,4	425,0	411,5	490,6	0,18	77,21	76,57	79,99	0,18	77,40	77,37	79,99	0,05	0,10	80,80	388		
39,0	261,0	16,5	0,6	12,1	520,7	674,4	77,3	121,9	787,9	472,2	428,8	414,7	489,9	0,18	77,26	76,61	80,14	0,18	77,44	77,42	80,20	0,04	0,10	83,92	7405		
40,0	262,0	16,2	0,5	12,2	524,2	677,7	77,1	122,4	794,8	476,3	442,8	417,8	489,4	0,18	77,31	76,67	80,29	0,18	77,51	77,45	80,35	0,05	0,09	87,44	0014		
41,0	263,0	16,0	0,5	12,2	528,8	681,7	77,1	123,1	807,6	479,4	447,9	420,7	489,3	0,18	77,38	76,72	80,47	0,18	77,56	77,51	80,53	0,04	0,10	90,01	9965		
42,0	264,0	15,8	0,5	12,2	529,3	685,2	77,8	123,5	798,9	482,9	451,2	424,6	489,0	0,18	77,47	76,76	80,66	0,18	77,61	77,55	80,70	0,05	0,10	92,55	1624		
43,0	265,0	15,7	0,5	12,2	531,8	689,7	77,6	124,7	801,1	486,6	454,9	427,9	488,5	0,18	77,52	76,80	80,83	0,18	77,65	77,59	80,90	0,04	0,09	95,05	152		
44,0	266,0	15,3	0,5	12,4	535,1	692,2	78,4	126,4	805,9	490,4	459,2	431,3	488,6	0,18	77,62	76,84	81,03	0,18	77,71	77,63	81,08	0,04	0,10	98,31	2402		
45,0	267,0	15,2	0,5	12,4	537,4	694,0	77,3	125,6	806,4	494,0	463,1	434,8	488,6	0,18	77,66	76,90	81,20	0,18	77,78	77,71	81,23	0,05	0,10	100,62	477		
46,0	268,0																										

96,0	318,0	5,6	0,1	11,9	676,9	710,3	80,7	131,7	786,2	722,2	686,8	629,4	560,2	0,18	79,61	79,11	85,93	0,18	80,02	80,00	87,54	0,05	0,10	240,17813
97,0	319,0	5,5	0,1	11,6	676,5	703,4	80,2	131,0	777,8	723,1	688,1	631,7	561,7	0,18	79,59	79,13	86,04	0,18	80,01	80,02	87,52	0,05	0,09	239,72007
98,0	320,0	5,4	0,1	11,7	675,8	697,7	80,7	130,5	767,3	723,7	680,5	630,6	564,9	0,18	79,62	79,17	86,17	0,18	80,04	80,06	87,59	0,05	0,09	239,07643
99,0	321,0	5,3	0,1	10,7	674,7	687,5	80,5	129,5	753,5	724,6	689,5	635,9	567,9	0,17	79,63	79,19	86,25	0,18	80,05	80,08	87,58	0,05	0,09	237,89043
100,0	322,0	5,3	0,2	10,3	673,3	676,2	81,2	128,4	735,7	726,6	693,3	638,8	572,2	0,18	79,66	79,24	86,37	0,18	80,10	80,12	87,58	0,04	0,09	236,54103
101,0	323,0	5,2	0,3	10,0	671,0	668,2	81,2	127,9	723,1	726,9	694,5	635,3	575,0	0,18	79,69	79,26	86,45	0,18	80,13	80,15	87,62	0,05	0,09	234,17972
102,0	324,0	5,1	0,4	9,9	669,6	660,2	80,9	127,5	711,6	727,0	694,8	636,1	578,8	0,18	79,65	79,29	86,54	0,18	80,12	80,17	87,64	0,05	0,09	232,87898
103,0	325,0	5,0	0,4	9,7	668,7	655,0	79,5	126,9	701,2	726,9	697,8	634,9	582,6	0,17	79,65	79,32	86,59	0,18	80,12	80,19	87,63	0,05	0,09	231,90183
104,0	326,0	4,9	0,5	9,6	668,3	647,6	81,0	126,6	693,1	726,8	690,0	634,4	587,3	0,18	79,65	79,35	86,65	0,18	80,13	80,16	87,64	0,05	0,09	231,57966
105,0	327,0	4,8	0,5	9,4	667,2	642,0	81,0	126,5	687,3	727,4	701,7	632,9	592,0	0,18	79,69	79,39	86,70	0,18	80,11	80,25	87,64	0,05	0,09	230,48189
106,0	328,0	4,7	0,5	9,4	665,2	638,0	81,0	126,5	675,0	727,8	703,5	624,0	595,8	0,18	79,58	79,39	86,75	0,18	80,11	80,28	87,64	0,05	0,09	228,44565
107,0	329,0	4,7	0,5	9,5	664,4	631,1	80,5	124,8	669,5	727,7	704,8	619,7	600,4	0,18	79,56	79,41	86,79	0,18	80,11	80,31	87,61	0,05	0,09	227,64703
108,0	330,0	4,6	0,5	9,3	664,8	626,7	81,0	124,5	667,6	729,0	704,8	619,3	602,6	0,18	79,52	79,43	86,81	0,18	80,09	80,33	87,59	0,05	0,09	228,07148
109,0	331,0	4,5	0,5	9,4	664,1	624,7	80,7	124,0	661,0	728,6	705,5	618,8	606,8	0,18	79,54	79,46	86,83	0,18	80,09	80,36	87,55	0,05	0,09	227,35873
110,0	332,0	4,4	0,4	9,4	664,2	624,0	80,1	123,8	654,9	728,0	707,6	619,6	610,9	0,18	79,53	79,49	86,87	0,18	80,10	80,37	87,55	0,05	0,09	227,42471
111,0	333,0	4,3	0,4	9,5	664,5	621,5	79,8	123,1	651,4	729,1	707,6	620,2	614,2	0,18	79,53	79,49	86,89	0,18	80,10	80,38	87,52	0,05	0,09	227,72378
112,0	334,0	4,2	0,4	9,5	664,7	618,8	80,0	122,9	646,0	728,9	709,5	620,7	618,3	0,18	79,57	79,52	86,88	0,18	80,12	80,41	87,47	0,05	0,09	227,90959
113,0	335,0	4,2	0,5	9,4	665,0	616,3	81,0	121,4	640,6	729,4	710,8	621,7	622,3	0,18	79,56	79,54	86,90	0,18	80,11	80,43	87,43	0,05	0,09	228,18951
114,0	336,0	4,1	0,5	9,3	667,0	607,1	82,0	121,6	645,6	729,8	712,0	621,9	625,7	0,18	79,60	79,55	86,91	0,18	80,13	80,47	87,39	0,05	0,09	230,23971
115,0	337,0	4,0	0,6	8,8	667,4	602,9	81,3	121,2	642,6	730,0	712,4	622,3	629,6	0,18	79,58	79,58	86,91	0,18	80,13	80,50	87,34	0,05	0,09	230,62201
116,0	338,0	4,0	0,7	8,5	667,0	596,0	79,9	120,5	638,3	729,6	711,1	622,7	633,4	0,18	79,55	79,60	86,91	0,18	80,14	80,50	87,31	0,05	0,09	230,24677
117,0	339,0	3,9	0,8	8,2	666,3	590,2	80,5	119,8	631,5	728,2	711,3	622,8	637,5	0,18	79,53	79,61	86,90	0,18	80,11	80,51	87,26	0,05	0,09	229,48123
118,0	340,0	3,9	0,8	8,1	665,4	587,2	80,4	119,5	624,6	727,4	711,8	621,5	641,5	0,18	79,51	79,62	86,85	0,18	80,09	80,54	87,20	0,05	0,09	228,58944
119,0	341,0	3,8	0,8	8,2	664,7	581,3	81,0	118,6	618,4	726,0	711,9	620,8	646,3	0,18	79,50	79,66	86,88	0,18	80,08	80,54	87,17	0,05	0,09	227,90151
120,0	342,0	3,7	0,9	8,1	662,6	574,8	79,4	117,9	609,5	725,3	708,6	620,3	649,2	0,18	79,55	79,67	86,87	0,18	80,11	80,56	87,13	0,05	0,09	228,78899
121,0	343,0	3,7	1,0	7,9	661,0	569,5	80,3	118,2	600,0	723,9	707,6	619,5	654,0	0,17	79,54	79,68	86,85	0,18	80,09	80,57	87,08	0,05	0,09	224,24187
122,0	344,0	3,6	1,0	7,7	659,6	565,0	81,0	117,5	592,1	723,2	707,5	619,7	659,2	0,18	79,57	79,52	86,87	0,18	80,09	80,58	87,07	0,05	0,09	224,04798
123,0	345,0	3,6	1,0	7,6	657,8	562,8	80,4	116,9	580,3	723,6	706,9	619,5	658,5	0,18	79,49	79,71	86,76	0,18	80,07	80,61	86,94	0,05	0,09	221,00509
124,0	346,0	3,6	1,1	7,5	656,4	550,0	80,7	116,4	571,4	724,5	706,2	618,4	661,2	0,18	79,46	79,73	86,72	0,18	80,08	80,63	86,87	0,05	0,09	219,58936
125,0	347,0	3,5	1,1	7,4	655,1	544,7	81,1	116,4	562,7	725,1	705,4	617,6	664,5	0,18	79,45	79,74	86,69	0,18	80,06	80,64	86,87	0,05	0,09	218,30438
126,0	348,0	3,5	1,1	7,4	653,9	540,0	80,5	115,9	556,1	726,5	703,9	617,3	665,5	0,18	79,43	79,76	86,65	0,18	80,08	80,66	86,77	0,05	0,09	217,09342
127,0	349,0	3,4	1,1	7,4	653,0	535,4	80,2	114,5	549,2	727,7	703,2	616,5	668,6	0,18	79,39	79,76	86,60	0,18	80,03	80,67	86,68	0,05	0,09	216,26654
128,0	350,0	3,4	1,1	7,4	652,0	530,7	79,9	114,3	544,0	728,3	704,3	616,3	671,9	0,18	79,39	79,77	86,53	0,18	80,03	80,67	86,53	0,05	0,09	215,20161
129,0	351,0	3,3	1,2	7,3	650,8	526,3	81,2	114,5	539,1	728,6	700,6	616,1	669,6	0,18	79,38	79,77	86,50	0,18	80,05	80,67	86,57	0,05	0,09	214,03744
130,0	352,0	3,3	1,2	7,4	649,7	522,7	80,6	114,1	534,4	728,6	699,9	615,8	669,6	0,18	79,40	79,80	86,42	0,18	80,04	80,69	86,50	0,05	0,09	212,89122
131,0	353,0	3,3	1,2	7,4	649,1	520,9	80,8	113,7	530,9	729,2	698,7	615,5	671,4	0,18	79,39	79,81	86,38	0,18	80,05	80,72	86,43	0,05	0,09	212,37347
132,0	354,0	3,2	1,1	7,3	648,4	517,8	81,2	113,4	528,7	728,6	696,8	615,3	672,6	0,18	79,39	79,83	86,33	0,18	80,06	80,73	86,40	0,05	0,09	211,64319
133,0	355,0	3,2	1,0	7,3	647,6	515,7	81,1	112,6	526,8	727,9	694,7	615,0	673,7	0,18	79,39	79,84	86,28	0,18	80,07	80,74	86,31	0,05	0,09	210,84133
134,0	356,0	3,1	1,0	7,3	646,3	510,4	80,9	112,1	525,9	729,3	693,9	614,9	675,7	0,18	79,37	79,85	86,21	0,18	80,08	80,75	86,28	0,05	0,09	210,23379
135,0	357,0	3,1	1,0	7,3	645,6	504,4	80,3	112,4	523,0	729,3	689,9	613,7	675,5	0,18	79,37	79,86	86,17	0,18	80,05	80,76	86,19	0,05	0,09	209,51934
136,0	358,0	3,0	1,0	7,3	645,7	509,3	80,8	112,0	521,4	730,0	687,2	613,8	675,8	0,18	79,37	79,89	86,12	0,18	80,08	80,79	86,09	0,05	0,09	208,88875
137,0	359,0	3,0	1,0	7,3	645,0	507,9	80,9	111,7	519,1	730,9	685,3	612,4	677,4	0,18	79,36	79,91	86,08	0,18	80,07	80,81	86,02	0,05	0,09	208,23947
138,0	360,0	2,9	1,0	7,3	644,4	506,5	81,2	111,8	517,9	730,6	683,6	612,2	677,7	0,18	79,39	79,92	86,01	0,18	80,09	80,82	85,95	0,05	0,09	207,62253
139,0	361,0	2,9	1,0	7,3	643,8	505,2	80,6	111,5	516,8	730,2	681,9	612,0	678,1	0,18	79,39	79,94	85,96	0,18	80,10	80,82	85,87	0,05	0,09	207,01407
140,0	362,0	2,8	1,0	7,3	643,3	503,7	80,4	111,3	516,1	729,5	681,9	611,7	679,2	0,18	79,41	79,95	85,91	0,18	80,11	80,87	85,85	0,05	0,09	206,69698
141,0	363,0	2,8	1,0	7,3	642,4	502,8	81,0	111,5	514,1	727,2	677,9	611,8	681,1	0,18	79,40	79,99	85,85	0,18	80,13	80,90	85,75	0,05	0,09	205,67225
142,0	364,0	2,8	1,0	7,3	641,5	500,4	80,4	111,5	512,5	728,8	676,9	610,5	682,0	0,18	79,40	80,01	85,82	0,18	80,12	80,92	85,68	0,05	0,09	204,76748
143,0	365,0	2,7	1,0	7,3	640,9	497,8	80,1	111,0	510,6	728,0	675,4	609,7	683,9	0,18	79,43	80,04	85,77	0,18	80,14	80,92	85,62	0,05	0,09	204,13314
144,0	366,0	2,7	1,0	7,2	640,1	497,8	80,2	111,0	510,8	722,9	673,6	609,5	683,9	0,18	79,48	80,05	85,71	0,18	80,17	80,94	85,55	0,05	0,09	203,36444
145,0	367,0	2,7	1,1	7,2	639,2	496,1	80,8	110,7	508,8	722,6	672,0	608,7	6											

197,0	419,0	0,8	1,0	6,5	586,4	457,9	80,7	105,9	470,7	607,6	601,8	562,9	689,0	0,18	79,33	80,47	84,05	0,18	80,18	81,36	83,85	0,05	0,07	149,62812
198,0	420,0	0,9	1,0	6,5	585,3	457,2	80,3	106,2	469,0	605,1	600,3	561,6	690,5	0,18	79,32	80,46	84,02	0,18	80,17	81,36	83,83	0,04	0,07	148,52524
199,0	421,0	0,8	1,0	6,4	584,7	456,0	80,5	105,8	467,9	603,1	599,6	560,3	692,5	0,18	79,34	80,48	84,00	0,18	80,16	81,35	83,83	0,05	0,07	147,90309
200,0	422,0	0,8	1,0	6,4	583,9	456,6	80,6	105,4	466,9	600,8	598,8	558,5	694,4	0,18	79,39	80,48	84,01	0,18	80,18	81,37	83,81	0,05	0,07	147,10943
201,0	423,0	0,7	1,1	6,4	583,4	457,0	80,1	105,0	466,3	598,8	597,8	558,2	695,6	0,18	79,43	80,49	83,99	0,18	80,19	81,35	83,81	0,05	0,07	146,58374
202,0	424,0	0,7	1,1	6,4	582,5	456,8	80,1	105,5	465,2	597,1	597,7	556,5	696,2	0,18	79,47	80,48	83,99	0,18	80,22	81,35	83,76	0,05	0,07	145,77073
203,0	425,0	0,6	1,1	6,4	581,9	456,5	79,7	105,9	464,5	596,0	597,2	555,6	696,0	0,18	79,53	80,50	84,00	0,18	80,23	81,36	83,76	0,05	0,07	145,10457
204,0	426,0	0,7	1,1	6,4	581,3	454,8	80,2	105,8	463,6	594,6	595,6	554,3	698,2	0,18	79,54	80,51	83,98	0,18	80,25	81,36	83,79	0,05	0,07	144,49108
205,0	427,0	0,6	1,1	6,4	580,7	453,5	80,6	105,4	461,9	592,5	595,7	554,4	698,9	0,18	79,58	80,50	84,00	0,18	80,28	81,37	83,78	0,05	0,07	143,93068
206,0	428,0	0,6	1,1	6,3	580,2	452,6	80,5	105,1	461,1	591,2	595,0	554,4	699,3	0,18	79,57	80,52	83,98	0,18	80,29	81,37	83,77	0,05	0,07	143,43654
207,0	429,0	0,5	1,2	6,3	579,6	451,9	80,5	105,3	459,7	589,7	594,2	553,4	700,7	0,18	79,55	80,53	83,98	0,18	80,28	81,40	83,74	0,05	0,07	142,78031
208,0	430,0	0,5	1,2	6,3	578,9	450,7	80,4	105,0	459,9	588,3	592,8	551,6	701,7	0,17	79,54	80,54	83,94	0,18	80,29	81,39	83,73	0,05	0,07	142,09225
209,0	431,0	0,5	1,2	6,3	578,5	449,6	80,7	105,1	458,7	587,7	591,9	551,6	702,7	0,18	79,54	80,54	83,97	0,18	80,30	81,41	83,74	0,05	0,07	141,76114
210,0	432,0	0,4	1,2	6,2	577,6	449,0	80,6	104,9	458,3	587,1	590,7	550,0	702,0	0,17	79,54	80,56	83,96	0,18	80,30	81,42	83,74	0,05	0,07	140,83227
211,0	433,0	0,5	1,2	6,2	576,8	448,5	80,0	105,3	457,8	586,4	590,1	549,0	700,6	0,18	79,58	80,56	83,95	0,18	80,31	81,43	83,76	0,05	0,07	140,02282
212,0	434,0	0,4	1,2	6,2	576,4	448,8	80,6	104,7	457,6	586,2	588,8	549,3	700,3	0,18	79,57	80,58	83,94	0,18	80,35	81,44	83,74	0,05	0,07	139,64253
213,0	435,0	0,3	1,3	6,2	575,7	448,1	80,2	104,8	456,8	585,7	588,0	548,2	699,7	0,18	79,59	80,58	83,93	0,18	80,34	81,45	83,76	0,05	0,07	138,90642
214,0	436,0	0,3	1,3	6,1	575,1	446,1	80,3	105,0	455,9	584,9	587,2	547,3	700,2	0,18	79,59	80,57	83,92	0,18	80,35	81,45	83,75	0,05	0,07	138,3362
215,0	437,0	0,3	1,2	6,0	574,2	444,0	80,8	105,1	454,4	584,0	586,2	546,6	700,0	0,18	79,58	80,58	83,91	0,18	80,33	81,43	83,75	0,05	0,07	137,46898
216,0	438,0	0,3	1,2	6,0	573,0	442,3	80,7	104,6	453,0	583,4	585,4	545,3	698,1	0,18	79,60	80,58	83,90	0,18	80,32	81,44	83,73	0,05	0,07	136,26866
217,0	439,0	0,2	1,3	5,9	572,4	441,2	80,5	104,5	451,3	582,8	584,3	544,9	698,4	0,18	79,60	80,57	83,93	0,18	80,32	81,45	83,72	0,05	0,07	135,5962
218,0	440,0	0,2	1,3	5,8	571,2	438,5	80,0	104,4	449,1	582,3	583,4	544,1	696,9	0,18	79,60	80,58	83,91	0,18	80,33	81,44	83,70	0,05	0,07	134,40027
219,0	441,0	0,2	1,3	5,6	569,8	435,9	80,4	104,4	446,0	580,5	582,2	543,7	696,7	0,18	79,62	80,60	83,91	0,18	80,35	81,45	83,69	0,05	0,07	133,03704
220,0	442,0	0,2	1,3	5,5	568,2	433,4	80,6	104,0	443,1	578,9	580,9	542,5	695,8	0,18	79,60	80,57	83,89	0,18	80,34	81,43	83,68	0,05	0,07	131,45946
221,0	443,0	0,2	1,3	5,5	566,9	431,3	80,3	103,8	441,5	577,2	579,7	540,9	695,4	0,18	79,59	80,60	83,90	0,18	80,36	81,44	83,67	0,05	0,07	130,17045
222,0	444,0	0,2	1,4	5,5	565,2	429,7	80,5	104,0	438,7	575,8	578,3	539,8	693,4	0,18	79,59	80,60	83,90	0,18	80,35	81,46	83,63	0,05	0,07	128,41367
223,0	445,0	0,2	1,4	5,4	563,4	427,9	80,5	103,8	435,6	574,4	577,3	538,0	691,6	0,18	79,59	80,61	83,90	0,18	80,35	81,46	83,66	0,05	0,07	126,60532
224,0	446,0	0,2	1,4	5,3	561,9	426,3	80,4	103,2	433,3	572,5	576,1	537,1	690,5	0,18	79,59	80,60	83,89	0,18	80,34	81,46	83,62	0,05	0,07	125,11798
225,0	447,0	0,0	1,4	5,3	560,6	425,2	80,1	103,2	432,3	570,9	573,7	536,4	689,5	0,18	79,59	80,61	83,88	0,18	80,34	81,46	83,62	0,05	0,07	123,78714

Manufacturer: foyer supreme  
Model: 38 fsc

Run: 6  
Project #: pi 20160  
Test Duration: 225 min

Note: In the "Input data", "Calc. % O<sub>2</sub>", "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

Overall Heating Efficiency: 65,51%  
Combustion Efficiency: 95,06%  
Heat Transfer Efficiency: 68,91%

	HHV	LHV
Eff	65,51%	70,80%
Comb Eff	95,06%	95,06%
HT Eff	68,91%	74,48%
Output	30 175	kJ/h
Burn Rate	2,33	kg/h
Grams CO	613	g
Input	46 063	kJ/h
MC wet	16,81	

Ultimate CO<sub>2</sub>  
CO<sub>2-ult</sub> 19,64  
F<sub>0</sub>  
1,062

Heat Output:	28 625 Btu/h
Heat Input:	43 696 Btu/h
Burn Duration:	3,75 h
Burn Rate:	5,12 lb/h
Stack Temp:	561,1 Deg. F

Averages		0,80	8,96	1,17	20,30	10,93	293,24	26,29	92,3%	68,2%	#DIV/0!
INPUT DATA		Oxygen Calculation					Input Data		Combust	Heat	Net
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO <sub>2</sub> [d]	Excess Air EA	Total O <sub>2</sub>	Calc. % O <sub>2</sub> [g]	Flue Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %
0,00	10,48	0,28	10,17	88,0%	20,25	9,94	130,9	23,7	98,0%	82,3%	80,7%
1,00	10,45	0,33	2,89	511,3%	20,73	17,68	130,7	23,6	93,0%	66,8%	62,1%
2,00	10,49	0,62	4,69	270,0%	20,59	15,59	147,1	23,6	91,1%	72,7%	66,2%
3,00	10,41	0,55	2,34	581,1%	20,75	18,14	169,5	23,5	86,0%	52,2%	44,9%
4,00	10,31	0,46	5,47	231,3%	20,55	14,85	191,2	23,4	94,2%	69,6%	65,6%
5,00	10,17	0,53	6,39	184,0%	20,48	13,83	193,6	23,5	94,2%	71,9%	67,7%
6,00	10,13	0,53	6,05	198,6%	20,51	14,19	203,4	23,6	93,8%	70,0%	65,7%
7,00	10,04	0,51	6,54	178,7%	20,47	13,68	212,6	23,7	94,5%	70,4%	66,5%
8,00	10,00	0,52	6,97	162,3%	20,45	13,22	225,6	23,9	94,7%	70,2%	66,4%
9,00	9,91	0,62	8,13	124,6%	20,36	11,93	238,6	23,8	94,4%	71,5%	67,5%
10,00	9,81	0,68	8,52	113,5%	20,33	11,47	246,3	24,0	94,1%	71,6%	67,4%
11,00	9,72	0,70	8,78	107,0%	20,31	11,18	246,1	23,9	94,1%	71,0%	67,8%
12,00	9,68	0,76	7,84	128,3%	20,37	12,15	244,1	24,1	93,0%	70,4%	65,4%
13,00	9,59	0,77	7,86	127,6%	20,37	12,13	238,0	24,1	92,9%	71,0%	65,9%
14,00	9,55	0,85	6,99	150,7%	20,42	13,01	231,1	24,2	91,4%	69,6%	63,6%
15,00	9,45	0,78	6,46	171,5%	20,46	13,62	229,0	24,3	91,5%	68,4%	62,6%
16,00	9,36	0,73	6,74	163,2%	20,45	13,35	234,8	24,2	92,4%	68,6%	63,4%
17,00	9,32	0,78	7,56	135,4%	20,39	12,44	239,6	24,3	92,5%	70,2%	65,0%
18,00	9,27	0,79	7,66	132,4%	20,38	12,33	240,4	24,3	92,6%	70,4%	65,1%
19,00	9,18	0,89	7,40	136,9%	20,39	12,55	237,8	24,3	91,4%	70,0%	64,0%
20,00	9,13	0,91	7,01	147,8%	20,42	12,95	235,6	24,3	90,8%	69,3%	62,9%
21,00	9,05	0,92	7,02	147,6%	20,42	12,94	235,0	24,1	90,8%	69,3%	62,9%
22,00	9,00	0,93	7,17	142,8%	20,41	12,78	235,9	24,1	90,9%	69,6%	63,2%
23,00	8,91	0,94	7,15	142,8%	20,41	12,79	235,0	24,4	90,7%	69,6%	63,2%
24,00	8,87	0,94	6,90	150,5%	20,42	13,05	231,3	24,4	90,5%	69,4%	62,8%
25,00	8,82	0,93	6,61	160,7%	20,44	13,37	230,8	24,4	90,2%	68,7%	61,9%
26,00	8,72	0,90	7,60	131,2%	20,38	12,33	240,7	24,4	91,5%	70,2%	64,2%
27,00	8,64	1,09	9,67	82,4%	20,23	10,01	258,4	24,3	91,8%	72,4%	66,5%
28,00	8,55	1,10	11,05	61,8%	20,14	8,54	281,3	24,6	92,6%	72,7%	67,4%
29,00	8,45	0,82	12,63	46,1%	20,05	7,02	303,0	24,5	95,0%	73,2%	69,6%
30,00	8,32	0,71	13,04	42,8%	20,03	6,64	314,6	24,6	95,8%	73,0%	69,9%
31,00	8,28	0,71	12,44	49,4%	20,07	7,28	322,7	24,5	95,6%	71,9%	68,7%
32,00	8,14	0,79	12,44	48,5%	20,07	7,23	329,9	24,5	95,2%	71,4%	67,9%
33,00	8,05	0,78	12,27	50,5%	20,08	7,42	334,8	24,8	95,1%	70,9%	67,4%
34,00	7,96	0,78	12,08	52,7%	20,09	7,62	338,5	25,0	95,1%	70,5%	67,0%
35,00	7,87	0,73	12,03	53,9%	20,10	7,70	343,1	24,8	95,4%	70,1%	66,8%
36,00	7,78	0,67	12,10	53,9%	20,10	7,66	346,8	25,3	95,8%	70,0%	67,0%
37,00	7,69	0,60	12,10	54,6%	20,10	7,70	350,7	25,0	96,2%	69,7%	67,1%
38,00	7,55	0,60	12,13	54,3%	20,10	7,67	354,0	25,4	96,2%	69,6%	66,9%
39,00	7,47	0,58	12,13	54,6%	20,10	7,68	356,9	25,1	96,3%	69,4%	66,9%
40,00	7,37	0,55	12,25	53,5%	20,10	7,57	358,7	25,1	96,5%	69,4%	67,0%
41,00	7,28	0,51	12,17	54,9%	20,10	7,68	360,9	25,8	96,7%	69,2%	67,0%
42,00	7,19	0,49	12,23	54,4%	20,10	7,63	362,9	25,4	96,9%	69,2%	67,1%
43,00	7,10	0,47	12,23	54,6%	20,10	7,63	365,4	25,4	97,0%	69,0%	67,0%
44,00	6,96	0,47	12,39	52,8%	20,09	7,47	366,8	25,8	97,1%	69,2%	67,2%
45,00	6,92	0,46	12,36	53,1%	20,09	7,50	367,8	25,1	97,1%	69,1%	67,1%
46,00	6,82	0,43	12,41	52,9%	20,09	7,46	369,7	25,8	97,3%	69,1%	67,2%
47,00	6,71	0,43	12,62	50,4%	20,08	7,24	372,7	25,7	97,4%	69,1%	67,3%
48,00	6,60	0,44	12,64	50,2%	20,08	7,21	373,4	25,5	97,3%	69,1%	67,3%
49,00	6,51	0,43	12,53	51,6%	20,08	7,34	373,5	25,6	97,4%	69,0%	67,1%
50,00	6,42	0,44	12,40	53,1%	20,09	7,48	374,7	25,5	97,3%	68,7%	66,8%
51,00	6,33	0,43	12,40	53,2%	20,09	7,48	375,4	26,1	97,3%	68,7%	66,9%
52,00	6,24	0,40	12,63	50,8%	20,08	7,25	376,1	26,2	97,5%	69,0%	67,3%
53,00	6,10	0,42	12,61	50,7%	20,08	7,26	378,5	26,4	97,4%	68,8%	67,0%
54,00	6,02	0,41	12,74	49,4%	20,07	7,13	378,9	26,3	97,5%	69,0%	67,3%
55,00	5,92	0,42	12,82	48,3%	20,07	7,03	382,4	26,0	97,5%	68,8%	67,1%
56,00	5,83	0,39	12,97	47,0%	20,06	6,89	384,0	26,2	97,7%	68,9%	67,4%
57,00	5,79	0,35	13,27	44,2%	20,04	6,59	387,8	26,1	97,9%	69,1%	67,7%
58,00	5,70	0,36	13,42	42,5%	20,03	6,43	389,3	26,3	97,9%	69,2%	67,8%
59,00	5,60	0,32	13,75	39,6%	20,01	6,10	393,4	26,4	98,2%	69,4%	68,1%
60,00	5,47	0,31	14,09	36,4%	19,99	5,74	398,3	26,5	98,3%	69,5%	68,3%
61,00	5,38	0,34	14,04	36,6%	19,99	5,78	400,4	25,8	98,1%	69,3%	68,0%
62,00	5,24	0,33	14,09	36,2%	19,99	5,73	402,4	26,9	98,2%	69,3%	68,0%
63,00	5,15	0,32	14,16	35,6%	19,98	5,66	405,2	26,4	98,2%	69,2%	68,0%
64,00	5,11	0,31	14,23	35,1%	19,98	5,60	406,1	26,0	98,3%	69,2%	68,0%
65,00	4,98	0,30	14,19	35,5%	19,98	5,64	405,8	27,0	98,4%	69,4%	68,1%
66,00	4,88	0,29	14,34	34,2%	19,97	5,48	407,9	26,8	98,4%	69,3%	68,2%
67,00	4,79	0,31	14,49	32,7%	19,96	5,32	409,0	26,6	98,3%	69,3%	68,2%
68,00	4,70	0,31	14,41	33,5%	19,97	5,41	407,2	26,8	98,3%	69,4%	68,2%
69,00	4,61	0,30	14,29	34,6%	19,98	5,53	405,8	27,1	98,4%	69,3%	68,2%
70,00	4,56	0,29	14,11	36,4%	19,99	5,74	405,4	26,3	98,4%	69,1%	68,0%
71,00	4,43	0,25	14,10	36,9%	19,99	5,77	405,0	26,5	98,6%	69,1%	68,2%
72,00	4,34	0,24	14,03	37,7%	20,00	5,85	404,8	26,6	98,7%	69,1%	68,2%
73,00	4,25	0,24	13,93	38,7%	20,00	5,96	402,6	26,7	98,7%	69,1%	68,2%
74,00	4,16	0,22	13,90	39,1%	20,01	6,00	401,7	27,2	98,8%	69,1%	68,3%
75,00	4,11	0,22	13,86	39,5%	20,01	6,04	402,0	26,7	98,8%	69,1%	68,2%
76,00	4,02	0,21	13,88	39,4%	20,01	6,03	400,9	27,2	98,9%	69,2%	68,4%
77,00	3,93	0,21	13,78	40,4%	20,02	6,13	400,8	26,6	98,9%	69,0%	68,2%
78,00	3,84	0,20	13,76	40,6%	20,02	6,15	399,5	27,4	98,9%	69,1%	68,4%
79,00	3,75	0,21	13,57	42,6%	20,03	6,36	399,6	26,9	98,9%	68,8%	68,1%
80,00	3,66	0,21	13,66	41,6%	20,02	6,26	400,0	27,3	98,9%	69,0%	68,2%
81,00	3,62	0,19	13,78	40,6%	20,02	6,14	400,3	27,0	99,0%	69,1%	68,4%
82,00	3,53	0,17	13,83	40,3%	20,02	6,10	399,7	27,2	99,1%	69,2%	68,5%
83,00	3,43	0,17	13,85	40,2%	20,01	6,08	398,9	26,4	99,1%	69,2%	68,6%
84,00	3,34	0,16	13,90	39,8%	20,01	6,04	399,9	27,1	99,2%	69,2%	68,7%
85,00	3,30	0,15	13,88	40,0%	20,01	6,06	399,3	27,4	99,2%	69,3%	68,7%
86,00	3,21	0,15	13,87	40,2%	20,01	6,08	397,9	27,6	99,2%	69,4%	68,8%
87,00	3,16	0,15	13,85	40,4%	20,02	6,10	398,5	27,9	99,2%	69,3%	68,8%
88,00	3,07	0,15	13,88	40,1%	20,01	6,06	397,6	27,8	99,2%	69,4%	68,9%
89,00	3,02	0,15	13,81	40,7%	20,02	6,13	396,7	27,7	99,2%	69,4%	68,8%
90,00	2,91	0,13	13,68	42,3%	20,03	6,29	394,9	27,4	99,3%	69,3%	68,8%
91,00	2,85	0,10	13,58	43,5%	20,04	6,40	392,1	26,9	99,5%	69,3%	69,0%
92,00	2,80	0,10	13,38	45,8%	20,05	6,62	387,8	26,7	99,5%	69,3%	69,0%

93,00	2,71	0,12	12,47	56,0%	20,11	7,58	383,2	26,8	99,4%	68,4%	68,0%
94,00	2,66	0,11	12,18	59,8%	20,13	7,89	380,1	27,2	99,4%	68,2%	67,8%
95,00	2,62	0,11	11,88	63,8%	20,15	8,21	378,6	27,7	99,4%	67,9%	67,5%
96,00	2,56	0,07	11,86	64,6%	20,15	8,25	376,9	27,0	99,7%	67,9%	67,7%
97,00	2,49	0,07	11,60	68,3%	20,17	8,53	373,0	26,8	99,7%	67,8%	67,6%
98,00	2,43	0,10	11,12	75,0%	20,20	9,03	369,8	27,1	99,5%	67,2%	66,9%
99,00	2,39	0,14	10,69	81,3%	20,22	9,46	364,2	26,9	99,1%	66,9%	66,3%
100,00	2,39	0,21	10,28	87,3%	20,25	9,86	357,9	27,4	98,6%	66,6%	65,6%
101,00	2,35	0,33	10,05	89,3%	20,25	10,04	353,5	27,4	97,6%	66,4%	64,8%
102,00	2,30	0,37	9,87	91,8%	20,26	10,21	349,0	27,2	97,2%	66,4%	64,5%
103,00	2,26	0,44	9,72	93,4%	20,27	10,33	346,1	26,4	96,7%	66,2%	64,0%
104,00	2,21	0,45	9,59	95,6%	20,28	10,46	342,0	26,7	96,5%	66,3%	64,0%
105,00	2,17	0,48	9,49	97,0%	20,28	10,55	338,9	27,2	96,2%	66,4%	63,9%
106,00	2,12	0,49	9,41	98,4%	20,29	10,63	336,6	27,2	96,1%	66,4%	63,8%
107,00	2,12	0,49	9,47	97,2%	20,28	10,56	332,8	26,9	96,2%	66,8%	64,2%
108,00	2,07	0,51	9,29	100,4%	20,29	10,75	330,4	27,2	95,9%	66,6%	63,9%
109,00	2,03	0,48	9,36	99,7%	20,29	10,69	329,3	27,1	96,2%	66,8%	64,3%
110,00	1,98	0,44	9,42	99,1%	20,29	10,64	328,9	26,7	96,5%	67,0%	64,6%
111,00	1,94	0,42	9,49	98,3%	20,29	10,59	327,5	26,6	96,8%	67,2%	65,0%
112,00	1,90	0,42	9,52	97,7%	20,28	10,55	326,0	26,7	96,8%	67,4%	65,2%
113,00	1,89	0,48	9,41	98,7%	20,29	10,64	324,6	27,2	96,2%	67,3%	64,8%
114,00	1,85	0,49	9,32	100,1%	20,29	10,72	319,5	27,8	96,1%	67,6%	64,9%
115,00	1,81	0,61	8,81	108,4%	20,32	11,20	317,2	27,4	94,9%	66,6%	63,2%
116,00	1,81	0,69	8,52	113,4%	20,33	11,47	313,4	26,6	94,1%	66,2%	62,2%
117,00	1,76	0,75	8,18	119,9%	20,35	11,79	310,1	26,9	93,3%	65,7%	61,3%
118,00	1,76	0,78	8,05	122,3%	20,36	11,91	308,5	26,9	92,9%	65,5%	60,8%
119,00	1,71	0,81	8,17	118,9%	20,35	11,78	305,1	27,2	92,8%	66,1%	61,3%
120,00	1,67	0,87	8,09	119,4%	20,35	11,83	301,5	26,3	92,3%	66,1%	61,0%
121,00	1,67	0,98	7,86	122,3%	20,36	12,01	298,6	26,9	91,1%	65,8%	59,9%
122,00	1,62	1,03	7,67	125,6%	20,37	12,17	294,7	27,2	90,5%	65,7%	59,4%
123,00	1,62	1,04	7,61	127,2%	20,37	12,24	291,2	26,9	90,4%	65,8%	59,5%
124,00	1,62	1,07	7,53	128,5%	20,37	12,31	287,8	27,1	90,0%	65,9%	59,3%
125,00	1,58	1,11	7,43	130,0%	20,38	12,39	284,8	27,3	89,5%	65,9%	59,0%
126,00	1,58	1,10	7,41	130,9%	20,38	12,42	282,2	27,0	89,6%	66,1%	59,2%
127,00	1,53	1,08	7,43	130,9%	20,38	12,41	279,7	26,8	89,8%	66,4%	59,6%
128,00	1,53	1,09	7,41	131,0%	20,38	12,42	276,6	26,6	89,7%	66,6%	59,7%
129,00	1,49	1,18	7,35	130,5%	20,38	12,44	274,6	27,3	88,9%	66,6%	59,2%
130,00	1,49	1,18	7,43	128,2%	20,37	12,35	272,6	27,0	88,0%	67,0%	59,6%
131,00	1,49	1,19	7,44	127,5%	20,37	12,33	271,6	27,1	88,9%	67,2%	59,7%
132,00	1,44	1,07	7,33	134,0%	20,39	12,52	269,9	27,3	89,8%	67,0%	60,2%
133,00	1,44	1,04	7,33	134,7%	20,39	12,54	268,7	27,3	90,0%	67,2%	60,5%
134,00	1,39	1,03	7,33	135,0%	20,39	12,54	267,3	27,1	90,1%	67,3%	60,6%
135,00	1,39	1,04	7,28	136,1%	20,39	12,59	265,8	26,8	90,0%	67,3%	60,5%
136,00	1,35	1,02	7,30	136,2%	20,39	12,58	265,2	27,1	90,2%	67,4%	60,8%
137,00	1,35	1,00	7,33	135,7%	20,39	12,56	264,4	27,2	90,4%	67,6%	61,1%
138,00	1,30	0,98	7,35	135,9%	20,39	12,55	263,6	27,3	90,6%	67,7%	61,3%
139,00	1,30	0,99	7,33	136,1%	20,39	12,56	262,9	27,0	90,5%	67,7%	61,3%
140,00	1,26	0,98	7,33	136,2%	20,39	12,57	262,0	26,9	90,5%	67,8%	61,4%
141,00	1,26	0,99	7,32	136,3%	20,39	12,57	261,6	27,2	90,4%	67,8%	61,3%
142,00	1,26	1,01	7,32	135,9%	20,39	12,57	260,2	26,9	90,3%	67,9%	61,3%
143,00	1,22	1,04	7,25	136,8%	20,39	12,62	258,8	26,7	89,9%	67,8%	61,0%
144,00	1,22	1,03	7,23	137,9%	20,39	12,65	258,8	26,8	90,0%	67,8%	61,0%
145,00	1,22	1,05	7,23	137,3%	20,39	12,64	257,8	27,1	89,8%	67,9%	61,0%
146,00	1,21	1,10	7,08	140,3%	20,40	12,77	256,9	27,1	89,2%	67,6%	60,3%
147,00	1,17	1,13	6,96	142,8%	20,41	12,88	256,5	26,9	88,8%	67,3%	59,8%
148,00	1,17	1,15	6,94	143,1%	20,41	12,90	255,1	27,1	88,6%	67,4%	59,7%
149,00	1,13	1,16	6,88	144,3%	20,41	12,95	254,4	27,3	88,5%	67,3%	59,5%
150,00	1,13	1,17	6,89	143,8%	20,41	12,94	253,8	26,6	88,3%	67,3%	59,4%
151,00	1,13	1,19	6,87	143,7%	20,41	12,94	252,6	27,0	88,1%	67,4%	59,4%
152,00	1,12	1,22	6,85	143,5%	20,41	12,95	252,3	26,7	87,9%	67,4%	59,2%
153,00	1,08	1,23	6,86	143,1%	20,41	12,94	251,3	26,2	87,8%	67,4%	59,2%
154,00	1,08	1,22	6,87	142,9%	20,41	12,93	250,5	26,3	87,9%	67,5%	59,4%
155,00	1,03	1,24	6,84	143,1%	20,41	12,95	250,2	26,9	87,6%	67,5%	59,2%
156,00	1,03	1,25	6,85	142,3%	20,40	12,92	249,2	25,7	87,6%	67,6%	59,2%
157,00	1,02	1,26	6,78	144,0%	20,41	12,99	249,1	26,6	87,4%	67,5%	58,9%
158,00	0,99	1,31	6,87	140,3%	20,40	12,88	248,1	26,5	87,1%	67,8%	59,1%
159,00	0,99	1,32	6,85	140,5%	20,40	12,89	249,0	25,8	87,0%	67,6%	58,8%
160,00	0,99	1,33	6,84	140,6%	20,40	12,90	248,1	26,2	86,9%	67,7%	58,8%
161,00	0,94	1,33	6,84	140,5%	20,40	12,90	247,9	26,5	86,9%	67,7%	58,8%
162,00	0,94	1,34	6,85	139,9%	20,40	12,88	247,5	26,1	86,9%	67,8%	58,9%
163,00	0,90	1,36	6,80	140,9%	20,40	12,93	247,3	26,3	86,6%	67,6%	58,6%
164,00	0,90	1,42	6,60	144,8%	20,41	13,10	246,7	25,9	85,7%	67,1%	57,5%
165,00	0,90	1,42	6,62	144,5%	20,41	13,08	245,2	26,3	85,8%	67,3%	57,8%
166,00	0,90	1,43	6,59	144,8%	20,41	13,10	245,4	26,8	85,7%	67,3%	57,7%
167,00	0,85	1,41	6,60	145,2%	20,41	13,11	245,1	26,4	85,8%	67,3%	57,8%
168,00	0,85	1,43	6,57	145,4%	20,41	13,12	244,1	26,7	85,6%	67,3%	57,6%
169,00	0,85	1,48	6,47	146,9%	20,41	13,20	243,4	26,7	85,0%	67,1%	57,0%
170,00	0,81	1,51	6,42	147,9%	20,42	13,24	243,0	26,7	84,7%	67,0%	56,8%
171,00	0,81	1,50	6,40	148,6%	20,42	13,27	242,4	26,2	84,7%	67,0%	56,7%
172,00	0,76	1,50	6,40	148,7%	20,42	13,27	241,5	26,4	84,8%	67,1%	56,8%
173,00	0,76	1,52	6,35	149,5%	20,42	13,31	241,3	26,7	84,5%	67,0%	56,6%
174,00	0,72	1,53	6,33	150,0%	20,42	13,33	240,7	27,0	84,3%	67,0%	56,5%
175,00	0,72	1,54	6,29	150,8%	20,42	13,36	240,5	26,5	84,2%	66,8%	56,2%
176,00	0,72	1,56	6,27	150,8%	20,42	13,37	239,4	26,4	84,0%	66,9%	56,2%
177,00	0,67	1,55	6,21	153,3%	20,43	13,45	239,4	26,1	83,9%	66,7%	56,0%
178,00	0,67	1,55	6,16	154,8%	20,43	13,50	239,1	26,6	83,8%	66,6%	55,8%
179,00	0,67	1,57	6,14	154,8%	20,43	13,51	239,1	26,6	83,7%	66,5%	55,7%
180,00	0,67	1,20	6,45	156,7%	20,43	13,38	238,2	26,7	87,4%	67,6%	59,1%
181,00	0,62	0,94	6,83	152,8%	20,43	13,13	238,1	26,7	90,4%	68,7%	62,1%
182,00	0,58	0,81	6,42	171,5%	20,46	13,63	238,6	26,6	91,1%	67,6%	61,6%
183,00	0,58	0,84	6,24	177,5%	20,47	13,81	239,3	26,8	90,7%	67,0%	60,7%
184,00	0,58	0,86	6,28	175,3%	20,47	13,76	239,1	26,5	90,5%	67,1%	60,7%
185,00	0,54	0,89	6,31	172,9%	20,46	13,71	239,0	26,5	90,2%	67,2%	60,6%
186,00	0,54	0,91	6,34	170,9%	20,46	13,67	239,2	26,3	90,0%	67,2%	60,5%
187,00	0,54	0,93	6,32	170,8%	20,46	13,67	238,8	26,3	89,8%	67,2%	60,3%
188,00	0,54	0,94	6,37	168,6%	20,46	13,62	238,7	26,4	89,7%	67,4%	60,4%
189,00	0,49	0,96	6,39	167,4%	20,45	13,59	238,4	26,7	89,6%	67,5%	60,5%
190,00	0,49	0,97	6,40	166,4%	20,45	13,57	238,3	26,5	89,5%	67,5%	60,4%
191,00	0,45	0,98	6,44	164,8%	20,45	13,52	237,9	26,5	89,5%	67,6%	60,5%
192,00	0,49	1,00	6,44	164,1%	20,45	13,51	237,8	26,4	89,3%	67,6%	60,4%
193,00	0,45	1,02	6,46	162,4%	20,45	13,47	237,3	26,5	89,1%	67,8%	60,4%
194,00	0,45	1,04	6,46	162,1%	20,45	13,47	236,9	26,5	89,0%	67,8%	60,3%
195,00	0,40	1,04	6,48	161,2%	20,44	13,44	237,1	26,7	88,9%	67,9%	60,3%
196,00	0,40	1,04	6,54	159,0%							



207,00	0,22	1,15	6,35	161,9%	20,44	13,52	233,3	27,0	87,7%	67,9%	59,5%
208,00	0,22	1,17	6,35	161,2%	20,44	13,51	232,6	26,9	87,5%	67,9%	59,4%
209,00	0,22	1,18	6,35	160,8%	20,44	13,50	232,0	27,0	87,4%	68,0%	59,5%
210,00	0,17	1,20	6,24	163,8%	20,45	13,60	231,6	27,0	87,1%	67,7%	59,0%
211,00	0,22	1,22	6,23	163,7%	20,45	13,61	231,4	26,7	86,9%	67,7%	58,8%
212,00	0,17	1,25	6,23	162,8%	20,45	13,60	231,6	27,0	86,6%	67,7%	58,6%
213,00	0,13	1,27	6,16	164,5%	20,45	13,66	231,2	26,8	86,3%	67,5%	58,3%
214,00	0,13	1,28	6,14	164,7%	20,45	13,67	230,1	26,8	86,2%	67,6%	58,2%
215,00	0,13	1,23	6,00	171,6%	20,46	13,85	228,9	27,1	86,4%	67,3%	58,1%
216,00	0,13	1,24	5,97	172,7%	20,46	13,88	227,9	27,1	86,3%	67,3%	58,0%
217,00	0,09	1,28	5,86	175,1%	20,47	13,97	227,4	26,9	85,7%	67,0%	57,4%
218,00	0,09	1,31	5,80	176,4%	20,47	14,02	225,8	26,7	85,2%	66,9%	57,0%
219,00	0,09	1,30	5,59	185,1%	20,49	14,25	224,4	26,9	84,9%	66,4%	56,3%
220,00	0,08	1,32	5,47	189,1%	20,49	14,36	223,0	27,0	84,5%	66,1%	55,8%
221,00	0,08	1,33	5,46	189,5%	20,49	14,37	221,9	26,9	84,4%	66,2%	#DIV/0!
222,00	0,08	1,36	5,45	188,4%	20,49	14,36	220,9	27,0	84,1%	66,3%	#DIV/0!
223,00	0,08	1,38	5,39	190,2%	20,49	14,42	220,0	26,9	83,7%	66,1%	#DIV/0!
224,00	0,08	1,39	5,33	192,3%	20,50	14,47	219,1	26,9	83,5%	66,0%	55,1%
225,00	0,00	1,42	5,32	191,4%	20,49	14,47	218,4	26,7	83,1%	66,0%	54,9%

time acquisition minutes	Flue	Room	Tunnel	scale	Tunnel Velocity	Flue draft	Right	Back	bottom	Top	Left
	temp	temp	dry bulb		Pressure	Pressure					
	°F	°F	°F	lbs	in. Wc	in. Wc	°F	°F	°F	°F	°F
1	68.96	68.51	72.30	31.92	0.0505	0.00	68.89	69.10	69.09	69.00	69.12
2	75.66	68.64	72.76	31.93	0.0494	0.00	69.01	69.33	69.12	72.94	69.12
3	86.98	68.78	73.96	31.91	0.0498	0.01	69.27	69.83	69.35	83.42	69.17
4	111.75	68.77	77.12	31.51	0.0494	0.02	69.50	70.97	69.94	106.13	69.25
5	167.33	68.79	88.03	31.52	0.0480	0.03	70.95	74.47	71.45	138.61	69.63
6	296.34	68.76	114.88	31.41	0.0453	0.06	81.67	80.17	75.38	234.47	70.46
7	403.77	68.87	139.67	31.01	0.0453	0.07	104.02	85.52	83.07	348.40	72.78
8	470.39	68.83	159.25	30.62	0.0453	0.07	120.60	96.34	94.94	413.96	77.45
9	529.63	68.96	178.91	30.11	0.0434	0.08	127.59	109.08	110.62	475.06	85.16
10	554.94	69.14	193.97	29.73	0.0397	0.08	134.33	117.80	128.87	507.22	96.16
11	477.32	69.11	127.00	29.02	0.0453	0.07	146.95	130.17	146.99	461.06	107.53
12	428.60	69.01	151.52	29.31	0.0446	0.06	147.09	133.58	160.48	408.78	116.58
13	395.58	69.16	123.40	28.04	0.0439	0.06	153.36	136.14	171.46	381.64	121.44
14	379.48	69.14	116.27	27.92	0.0463	0.06	156.96	134.33	180.92	354.78	123.28
15	381.00	69.18	138.13	27.62	0.0444	0.06	159.13	132.99	191.34	361.59	124.26
16	499.09	69.47	164.59	27.40	0.0434	0.08	163.91	138.42	207.05	436.90	124.52
17	675.01	69.66	201.49	26.73	0.0416	0.09	175.76	151.52	230.18	565.09	128.43
18	787.72	69.88	232.90	26.13	0.0394	0.09	191.66	166.93	258.22	692.89	135.41
19	807.64	69.80	245.53	25.83	0.0399	0.09	206.26	182.82	284.81	717.59	143.93
20	802.71	70.30	254.51	25.43	0.0351	0.09	219.68	197.69	303.52	726.97	153.05
21	827.17	70.72	267.47	24.81	0.0378	0.09	232.96	212.07	323.46	759.33	162.56
22	845.63	70.78	271.54	24.33	0.0390	0.09	246.37	226.16	346.63	798.81	173.13
23	769.34	70.29	181.67	24.33	0.0416	0.10	258.67	239.94	367.37	786.49	182.84
24	657.18	70.54	152.11	24.02	0.0434	0.09	268.63	250.50	384.11	658.73	191.18
25	597.02	70.27	135.79	23.83	0.0446	0.09	275.08	258.74	396.88	579.34	199.34
26	555.44	70.24	126.99	23.63	0.0451	0.08	280.10	264.82	406.25	528.03	206.39
27	525.52	70.39	121.30	23.43	0.0448	0.08	285.01	269.37	413.01	492.53	212.95
28	506.02	70.46	117.79	23.22	0.0453	0.08	289.49	272.81	418.35	468.04	219.18
29	491.09	70.01	115.96	22.93	0.0453	0.08	293.49	275.20	423.63	450.69	225.65
30	482.10	69.91	113.90	22.68	0.0456	0.08	297.89	276.85	429.71	438.28	232.32
31	474.65	70.41	112.67	22.43	0.0456	0.08	302.27	278.76	436.70	433.27	239.26
32	468.50	70.09	111.81	22.23	0.0458	0.08	307.38	280.91	443.89	430.39	246.11
33	463.55	70.29	110.93	21.94	0.0446	0.08	311.63	283.61	451.07	427.26	252.59
34	463.35	70.27	110.72	21.73	0.0446	0.08	315.79	286.69	458.01	427.06	259.57
35	464.90	70.55	110.57	21.43	0.0465	0.08	320.31	289.88	464.43	429.57	266.06
36	551.62	70.18	115.53	21.14	0.0468	0.09	323.73	292.02	468.29	531.60	271.06
37	598.72	70.40	118.32	20.83	0.0465	0.09	327.00	293.79	468.65	629.41	275.20
38	605.59	70.79	119.07	20.73	0.0463	0.09	329.11	295.35	466.79	659.49	278.71
39	607.80	70.52	119.88	20.44	0.0458	0.09	330.71	296.82	464.56	667.38	281.56
40	610.97	70.78	118.06	20.25	0.0458	0.09	332.04	298.26	463.03	670.06	284.16
41	605.20	70.85	117.32	20.04	0.0463	0.09	333.26	300.10	462.30	662.22	286.87
42	596.44	70.64	115.46	19.83	0.0458	0.09	334.62	301.44	462.82	649.45	288.90
43	583.76	70.27	115.56	19.55	0.0463	0.09	335.18	303.27	465.39	600.25	290.75
44	582.89	70.12	116.19	19.33	0.0456	0.09	336.46	305.51	469.57	570.42	293.32
45	583.40	70.88	115.75	19.14	0.0463	0.09	338.47	307.78	476.15	556.04	295.90
46	589.19	70.70	115.94	18.94	0.0456	0.09	340.92	310.43	483.62	550.80	298.71
47	596.58	71.27	117.67	18.75	0.0463	0.09	343.14	313.81	492.23	553.52	302.42
48	609.65	70.07	118.03	18.43	0.0451	0.09	345.54	317.68	502.12	563.29	305.78
49	632.83	69.89	120.42	18.24	0.0458	0.09	348.29	321.62	512.19	586.12	309.62
50	659.24	70.41	121.65	17.95	0.0453	0.10	352.32	326.43	522.30	614.12	313.52
51	689.23	70.57	124.86	17.64	0.0456	0.10	355.90	332.41	532.22	654.69	317.53
52	726.41	71.13	127.78	17.35	0.0458	0.10	360.26	338.55	542.00	725.89	322.24
53	769.63	71.48	129.42	17.15	0.0448	0.10	365.35	344.64	549.80	805.04	326.42
54	807.58	71.59	133.51	16.84	0.0456	0.10	370.28	351.91	556.89	860.78	331.97
55	826.33	72.38	137.37	16.55	0.0446	0.10	376.18	359.30	563.36	892.37	337.30
56	838.57	71.51	139.24	16.24	0.0451	0.11	380.87	367.42	568.96	911.06	343.06
57	843.31	71.83	139.48	15.95	0.0448	0.11	387.52	375.51	574.40	920.80	348.85
58	852.50	71.79	136.81	15.65	0.0448	0.11	393.82	383.76	578.83	925.70	354.04
59	849.80	71.98	137.44	15.34	0.0444	0.10	399.36	392.30	582.25	931.47	359.91
60	846.13	72.55	136.82	15.15	0.0453	0.11	406.06	399.82	586.69	937.00	365.56
61	842.62	72.78	137.88	14.85	0.0446	0.10	411.78	408.03	591.20	953.22	371.23
62	846.51	72.59	138.49	14.65	0.0453	0.11	418.17	416.08	595.71	957.35	377.12
63	855.69	73.34	139.61	14.35	0.0453	0.10	424.34	424.07	601.19	963.63	383.21
64	861.78	73.55	139.12	14.06	0.0446	0.11	431.26	433.04	607.51	966.37	389.17
65	870.48	72.97	139.56	13.84	0.0446	0.11	439.25	441.88	613.67	966.16	395.46
66	880.07	73.61	143.25	13.55	0.0453	0.11	446.51	451.57	620.79	970.02	402.63
67	891.65	73.59	144.14	13.26	0.0448	0.11	454.08	461.17	626.52	973.29	408.95
68	903.69	73.96	145.73	12.95	0.0439	0.11	460.90	471.43	634.14	974.81	415.60
69	913.74	74.06	146.46	12.73	0.0444	0.11	468.78	480.51	639.86	978.57	421.88
70	917.69	74.02	146.56	12.46	0.0446	0.11	477.07	487.32	646.33	978.04	428.64
71	919.82	74.60	148.18	12.15	0.0446	0.11	485.13	494.00	653.30	978.87	435.78
72	918.88	75.20	147.90	11.86	0.0439	0.11	493.37	502.10	659.79	979.69	443.56
73	918.89	74.72	147.55	11.67	0.0453	0.11	501.34	510.20	663.87	979.96	450.16
74	914.24	74.41	148.21	11.40	0.0439	0.11	509.37	519.00	670.06	984.15	457.54
75	908.43	75.01	147.95	11.16	0.0448	0.11	517.16	527.96	674.42	983.09	464.66
76	902.71	74.77	147.15	10.85	0.0448	0.11	525.14	536.29	679.88	982.71	472.42
77	897.67	74.42	147.26	10.66	0.0456	0.11	533.21	544.07	685.46	981.90	480.25
78	891.24	74.67	146.58	10.36	0.0446	0.11	540.76	551.70	690.01	978.05	487.61
79	880.35	74.68	145.40	10.17	0.0448	0.11	546.22	559.13	695.58	972.78	495.21
80	869.03	74.95	143.86	9.96	0.0446	0.11	553.78	565.95	700.28	966.69	501.22
81	855.81	74.71	143.19	9.76	0.0446	0.10	560.14	572.51	705.23	953.82	508.30
82	839.13	74.34	142.24	9.57	0.0451	0.10	565.80	579.33	709.89	934.33	515.74
83	823.30	75.37	140.60	9.37	0.0444	0.10	570.62	585.57	714.85	911.81	522.41
84	807.06	75.08	138.39	9.16	0.0448	0.10	576.57	590.31	720.14	894.49	527.37
85	789.70	74.58	138.57	9.06	0.0448	0.10	582.19	594.81	722.75	881.71	531.81
86	779.21	75.03	137.40	8.86	0.0446	0.10	585.23	600.37	728.35	865.90	537.34
87	766.71	74.50	135.48	8.67	0.0451	0.10	589.24	605.84	733.38	852.90	543.53
88	752.97	74.05	134.26	8.58	0.0446	0.10	593.68	611.54	739.21	830.14	549.77
89	738.42	74.75	133.72	8.36	0.0448	0.10	598.33	618.82	745.67	813.37	555.47
90	724.19	74.87	132.44	8.26	0.0446	0.10	604.63	627.25	753.37	800.11	560.65
91	711.89	74.70	131.31	8.07	0.0451	0.10	611.07	636.54	761.23	787.57	566.02
92	703.32	74.15	129.43	7.97	0.0463	0.10	618.89	645.89	770.66	784.07	568.36
93	697.57	74.66	128.91	7.78	0.0463	0.09	624.91	656.45	779.64	790.45	566.35
94	691.42	74.45	127.26	7.66							

96	675.64	74.96	126.41	7.37	0,0463	0,09	644,26	681,59	810,77	781,07	579,51
97	667.85	73.98	125.42	7.37	0,0458	0,09	649,90	687,60	820,30	769,26	585,13
98	655.52	74.79	187.75	8.64	0,0361	0,07	653,95	694,62	828,43	721,21	590,07
99	757.43	74.81	161.20	6.77	0,0375	0,10	659,38	699,11	833,19	804,04	594,77
100	758.49	74.75	139.41	6.66	0,0375	0,10	665,18	700,15	834,59	866,18	599,29
101	750.47	75.11	134.01	6.47	0,0387	0,10	668,84	699,61	830,93	863,09	603,80
102	740.41	74.48	130.99	6.38	0,0382	0,10	670,85	697,55	825,34	840,63	607,97
103	728.92	75.67	128.60	6.28	0,0387	0,10	673,55	695,21	819,39	815,81	611,57
104	713.13	75.39	126.81	6.28	0,0394	0,10	675,62	692,38	812,55	799,13	614,04
105	697.68	74.58	125.77	6.07	0,0390	0,09	676,09	689,85	807,75	763,33	616,26
106	676.73	74.63	124.37	6.06	0,0392	0,09	676,35	686,91	802,62	729,79	617,92
107	621.97	76.12	204.65	10,88	0,0356	0,07	675,35	685,42	801,26	653,70	620,31
108	591.45	75.63	172.17	5.68	0,0375	0,09	674,50	685,32	799,10	596,51	620,05
109	605.61	75.51	132.57	5.68	0,0378	0,09	674,33	683,53	798,13	615,77	619,61
110	595.67	74.61	103.52	5.68	0,0000	0,09	673,48	682,53	791,92	609,10	623,26
111	582.19	74.66	87.36	5.68	0,0000	0,08	670,70	681,84	786,76	595,55	625,32
112	570.57	74.81	109.47	5.58	0,0392	0,08	668,86	679,72	779,96	582,92	626,94
113	557.89	75.07	113.51	5.58	0,0427	0,08	666,57	677,14	771,78	569,74	625,45
114	546.64	75.08	113.05	5.58	0,0434	0,08	663,96	673,16	764,76	558,20	626,42
115	534.83	74.95	112.13	5.58	0,0436	0,08	660,91	669,51	756,83	544,69	624,82
116	524.16	74.31	111,92	5.58	0,0426	0,08	655,43	666,07	750,43	533,69	623,00
117	515.67	74.38	110,95	5.48	0,0434	0,08	650,70	661,78	743,25	522,86	619,81
118	506.63	74.22	110,09	5.48	0,0424	0,08	646,33	656,21	736,64	513,32	615,31
119	498.10	73.88	108,67	5.48	0,0439	0,08	642,80	650,14	727,72	503,62	613,31
120	488.72	74.45	108,40	5.48	0,0424	0,08	638,10	645,72	720,57	491,69	609,02
121	480.27	74.45	107,39	5.48	0,0436	0,08	633,51	641,16	714,79	481,96	605,78
122	472.96	74.69	106,44	5.36	0,0436	0,08	629,23	634,65	708,01	473,51	601,03
123	465.79	74.87	106,12	5.36	0,0433	0,07	624,53	628,93	701,77	466,28	596,98
124	459.22	74.39	105,24	5.36	0,0436	0,07	619,91	623,33	695,97	460,76	593,85
125	454.20	74.64	104,23	5.36	0,0436	0,07	616,61	617,23	690,89	454,51	588,88
126	448.90	74.53	103,48	5.36	0,0434	0,07	613,29	611,68	685,97	448,85	585,09
127	443,30	74,58	103,48	5,36	0,0434	0,07	607,28	607,17	680,85	444,34	581,30
128	437.71	74.32	102.52	5.36	0,0446	0,07	603,32	601,31	675,65	440,71	576,68
129	432.08	73.82	102,65	5,27	0,0446	0,07	600,62	595,42	669,65	435,11	572,77
130	427.52	74.88	102,05	5.27	0,0448	0,07	595,28	591,27	664,21	430,55	568,70
131	422.83	74.18	101,45	5.27	0,0444	0,07	591,04	585,94	659,83	426,44	563,87
132	417.51	74.02	100,79	5.17	0,0448	0,07	587,23	580,78	653,83	422,04	560,42
133	412.88	74.46	99,26	5.17	0,0448	0,07	582,57	576,21	650,54	417,87	556,75
134	408.56	74.43	98,88	5.26	0,0448	0,07	578,01	571,29	646,78	413,48	552,55
135	403.67	74.30	98,39	5.17	0,0456	0,07	574,99	566,43	642,34	409,46	548,77
136	398.06	74.19	98,31	5.17	0,0451	0,07	570,80	562,06	637,64	405,05	544,42
137	393.68	74.54	97,91	5.17	0,0444	0,07	567,18	557,16	634,00	401,44	540,61
138	389.47	74.42	97,76	5.07	0,0451	0,06	562,75	553,18	629,39	398,07	537,18
139	383.04	74.07	97,11	5.07	0,0458	0,06	558,47	548,56	625,28	393,15	533,61
140	378.76	74.34	96,42	5.07	0,0456	0,06	555,56	543,76	621,22	388,36	529,98
141	373.85	74.17	96,03	5.07	0,0458	0,06	551,54	539,94	617,23	384,71	526,13
142	369.74	74.33	95,61	5.07	0,0451	0,06	546,63	535,87	613,48	380,67	522,75
143	365.46	74.23	95,27	5.07	0,0453	0,06	542,57	531,11	610,15	376,86	518,53
144	362.77	74.61	95,10	4.97	0,0448	0,06	539,39	526,40	606,28	373,44	515,29
145	359.73	74.41	94,45	4.97	0,0444	0,06	535,92	522,21	602,59	370,02	511,09
146	355.90	74.63	94,36	4.97	0,0451	0,06	532,31	517,95	598,92	366,05	507,47
147	352.88	74.76	93,83	4.97	0,0456	0,06	529,26	514,35	594,34	362,57	503,98
148	348.97	74.48	93,97	4.97	0,0465	0,06	525,15	510,83	591,19	359,70	500,59
149	345.98	74.22	93,82	4.97	0,0458	0,06	520,44	507,28	587,64	356,89	497,24
150	343.06	74.02	93,17	4.97	0,0465	0,06	516,65	502,63	584,75	354,05	493,99
151	340.34	74.53	92,17	4.97	0,0463	0,06	513,32	498,99	581,11	350,60	491,01
152	337.65	74.05	91,82	4.97	0,0463	0,06	509,24	494,85	577,25	348,38	487,34
153	334.71	74.33	91,42	4.88	0,0459	0,06	506,63	491,43	574,38	345,53	484,14
154	331.77	74.36	92,45	4.88	0,0453	0,06	502,77	487,70	571,67	343,27	481,30
155	329.43	74.30	91,42	4.87	0,0458	0,06	499,07	484,48	568,91	340,97	477,96
156	326.63	74.27	91,62	4.87	0,0458	0,06	495,65	480,57	564,93	338,91	474,57
157	323.87	74.39	91,59	4.87	0,0458	0,06	492,89	477,37	561,83	336,86	470,54
158	321.26	74.24	91,40	4.88	0,0465	0,06	489,24	473,46	558,69	334,13	467,32
159	318.98	74.01	91,09	4.88	0,0463	0,06	486,09	469,94	555,41	331,64	464,52
160	316.75	74.12	90,40	4.88	0,0463	0,06	482,96	466,49	552,14	328,37	461,48
161	313.63	74.04	90,62	4.87	0,0453	0,06	479,81	463,56	549,83	326,99	458,09
162	311.46	74.38	90,22	4.87	0,0453	0,06	476,95	459,99	547,45	325,68	455,36
163	309.17	74.15	89,44	4.88	0,0463	0,05	474,27	457,04	544,45	323,50	453,01
164	306.76	74.48	89,88	4.78	0,0453	0,05	470,25	453,94	540,74	321,90	449,73

Date: 2018-03-22 Manufacturer: Fogon Supreme Model: 38 FSC  
 Project #: PT 20164 Run: 6 Tech: mn Reviewer: Dr

LEFJ slitting 0  
 32 LBS no kneeling STAIR FIRE NO FAIL  
 - 11 25 LBS close DOOR  
 11 16 LBS close air in 15°  
 11 7,2 LBS Brassier tapochu  
 11 65 LBS feet channel de preparation Final  
 11 48 LBS insert load  
 Open air in  
 close DOOR immediately

TEST LOAD CONFIGURATION

NO FAIL ; Fail (cat. 4)

## PRE / POST CHECKS

 Date: 2018-03-22

 Manufacturer: Fogco Supreme

 Model: 38 FSC

 Project #: PI 20164

 Run: 6

 Tech: mm

 Reviewer: DP

Moisture Meter Calibration Check:

### Facility Conditions:

Air Velocity from less than 2 feet .....

Smoke Capture Check.....

Picture.....

### Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....

Date Dilution Tunnel Cleaned.....

Induced Draft Check (max 0.005 H2O).....

Traverse before ignition.....

Flow Rate 140 cfm ±10%.....

### Temperature System:

Ambient (65°-90°F).....

Wood Heater Surface (±125°F).....

### Proportional Checks:

Thermocouple check.....

Pitot Clean.....

Pitot verification.....

### Sampling Train ID Numbers:

Probe.....

Filter Front.....

Filter Back.....

Filter Thermocouple.....

Filter (&lt;90°F).....

Equipment #	Time	12%	22%
<u>Em-121</u>	<u>7:00</u>	<u>ok</u>	<u>ok</u>

Pre-Test

Post-Test

	4 (max50 Fpm)	8 (max50 Fpm)
	<u>ok</u>	<u>ok</u>
4 sides	<u>ok</u>	<u>ok</u>

<u>2018-03-13</u>
<u>2018-03-13</u>
<u>ok</u>
<u>ok</u>

<u>ok</u>
-----------

<u>ok</u>	°F
<u>ok</u>	°F

<u>ok</u>
<u>ok</u>
<u>ok</u>

Train 1 <sup>st</sup> hour	Train 1	Train 2
<u>001</u>	<u>03</u>	<u>13</u>
<u>226</u>	<u>228</u>	<u>230</u>
<u>227</u>	<u>229</u>	<u>231</u>
<u>11</u>	<u>11</u>	<u>11</u>
<u>ok</u>	<u>ok</u>	<u>ok</u>



### SAMPLING EQUIPMENT CHECK OUT

Date: 2018-03-22 Manufacturer: Fogon Supreme Model: 38 FSC  
 Project #: PI 20164 Run: 6 Tech: MM Reviewer: BO

#### Leakage Checks Tunnel Samplers

	System 1 <sup>st</sup> hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Vacuum (inches Hg.)	- 15	- 15	- 15	- 15	- 15	- 15
Final 1minute DGM (Liter)	648331.88	649527.16	648332.28	649527.06	592169.62	593394.72
Initial 1minute DGM (Liter)	648331.88	649527.15	648332.28	649527.25	592169.62	593394.72
Change © (Liter)	0	0.01	0.10	0.01	0	0
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

#### Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	- 5	- 5
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	ok	ok

#### Leakage Checks Pitot

Plugged Probe	Pre Test 3 H <sub>2</sub> O static	Pre Test 0.4-0.5 H <sub>2</sub> O velocity	Post Test 3 H <sub>2</sub> O Static	Post Test 0.4-0.5 H <sub>2</sub> O velocity
Vacuum (inches Hg.)	3	.4	mm 3	mm 5
Check OK (no change after 15 sec.)	ok	ok	ok	ok

**PRE-TEST SCALE AUDIT**

Date: 2018-03-22      Manufacturer: Foyer Supreme      Model: 38 FSC  
 Project #: PI 20164      Run: 6      Tech: MM      Reviewer: DP

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Wood	EM-090	44 lbs, Class F	44 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

**LIMITS OF WEIGHT RANGES**

**ANALYTICAL SCALE:** ..... 50%-150% of dry filter weight,  $\pm 0.1$  mg  
**PLATFORM SCALE:** ..... 20%-80% of ideal test load weight,  $\pm 0.1$  lbs or 1%  
**WOOD SCALE:** ..... 20%-80% of ideal test load weight,  $\pm 0.01$  lbs or 1%



Date: 2018-03-22 Manufacturer: Fogco Supreme Model: 38 FSC  
 Project #: PI 20164 Run: 6 Tech: MM Reviewer: DP

FOR TUNNELS &lt; 12 in

 Barometric pressure ( $P_{bar}$ ) 101.1 (KPa.) Static pressure ( $P_q$ ) 0.15 (inches w.c.)  
 Inside diameter: Port A \_\_\_\_\_ Port B \_\_\_\_\_  
 Tunnel cross sectional area: .1963Ft<sup>2</sup>  
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head $\Delta_p$ (inches H <sub>2</sub> O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0049	72.09
B - Centroid	3.00	3.50	4	0050	71.80
A-1	0.40	0.50	0.50	0045	71.90
A-2	1.50	1.75	2	0050	71.51
A-3	4.50	5.25	6	0056	71.26
A-4	5.60	6.5	7.5	0044	71.01
B-1	0.40	0.50	0.50	0042	71.55
B-2	1.50	1.75	2	0052	71.77
B-3	4.50	5.25	6	0053	71.58
B-4	5.60	6.5	7.5	0047	71.37
				AVERAGE	

$$v_s = K_p C_p (\sqrt{\Delta_p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

Where,

 $C_p$  = pitot tube coefficient, dimension less = 0.99 for standard pitot.

 $\Delta_p$  = manometer reading (inches H<sub>2</sub>O)

 $T_s$  = average absolute dilution tunnel temperature (°F + 460)

 $P_s$  = absolute dilution tunnel gas pressure or  $P_{bar} + P_{qg}$ 
 $P_q$  = static pressure in. H<sub>2</sub>O  
 { 13.6 }

 $M_s$  = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)

 $K_p$  = 85.49 pitot tube constant, (conversion factor for English units)

 $\Delta_p$  avg. = average of the square roots of the velocity heads ( $\Delta_p$ ) measured at each traverse point.

**CONTINUOUS ANALYZERS**

Date: 2018-03-22 Manufacturer: Foyca Supreme Model: 38 fsc  
 Project #: PZ 20164 Run: 0 Tech: MR Reviewer: SP

**Pre-Test (Adjust and Record)**

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2998	3000	1007	1000
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO <sub>2</sub>	0	0	1791	1800	972	
Tolerance CO <sub>2</sub>		+/- 0.02		+/- 0.5		+/- 0.5
O <sub>2</sub> informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

**Post Test (Record Only)**

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0006	3006	1007	0006	0.02	0006	0.15	0005	0.05	✓	
CO <sub>2</sub>	000	1793	972	0	0.02	002	0.5	004	0.5	✓	



**TEST DATA LOG**

Date: 2018-03-22 Manufacturer: Fogor Supreme Model: 38 Fes F50 m.r.  
 Project #: p2 20164 Run: 6 Tech: mm Reviewer: DP

**RAW DRY GAS METER READINGS**

	System 1	System 2	Blanck
Final (Liter)	649 526, 19	593393, 75	190, 81
Initial (Liter)	648332, 11	592173, 08	171, 78

**AMBIENT CONDITIONS**

	Before	After
Barometer (kPa):	101,0	<del>100,8</del> 100,8 mm
Dry Bulb (F):	70,70	79,88
Humidity (%):	24,2	22,3

**Flow Meter**

	Start	End
Flow meter reading	N.A	N.A

**Flow Meter Verification**

	Before	After
Flow meter Check (liters)	N.A	N.A
Scale Weight ( Kg)	N.A	N.A



### FUEL DATA

Date: 2018-03-22 Manufacturer: Fogon Supreme Model: 38 Fsc  
 Project #: PI 20164 Run: 6 Tech: MM Reviewer: BR

#### FUEL DESCRIPTION:

Type of wood:

#### PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
2 x 4 x 10 in.	1,472 lbs.	21.6	21.0	21.0	20.3	20.4
2 x 4 x 10 in.	1,464 lbs.	19.9	19.6	20.0	20.0	21.9
2 x 4 x 10 in.	1,400 lbs.	22.6	22.3	22.1	22.3	22.2
2 x 4 x 10 in.	1,306 lbs.	22.0	22.3	22.6	22.8	22.4
2 x 4 x 10 in.	1,279 lbs.	21.4	21.6	21.9	21.7	21.8
2 x 4 x 10 in.	1,210 lbs.	20.9	21.0	21.1	21.3	21.8
2 x 4 x 10 in.	1,236 lbs.	20.6	20.3	20.4	20.8	20.4
2 x 4 x 10 in.	1,282 lbs.	21.4	21.6	21.9	21.2	21.4
2 x 4 x 10 in.	1,242 lbs.	22.3	22.4	22.6	22.3	22.8
2 x 4 x 10 in.	1,280 lbs.	21.6	21.3	21.4	21.8	21.6
2 x 4 x 10 in.	1,334 lbs.	22.8	22.1	21.6	21.9	22.0
2 x 4 x 10 in.	1,304 lbs.	22.9	23.0	22.5	22.7	22.8
2 x 4 x 15 in.	2,398 lbs.	22.8	22.6	22.7	22.8	22.4
2 x 4 x 15 in.	2,250 lbs.	23.0	23.3	23.2	23.4	23.1
2 x 4 x 15 in.	2,244 lbs.	21.8	21.6	21.0	21.3	21.2
2 x 4 x 15 in.	2,286 lbs.	22.0	22.3	22.4	22.6	22.8
2 x 4 x 15 in.	2,114 lbs.	21.0	21.9	21.9	21.8	21.9
2 x 4 x 15 in.	2,066 lbs.	21.8	21.6	21.3	21.9	22.0
2 x 4 x 15 in.	2,223 lbs.	21.6	21.4	21.4	21.8	21.7
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 31,37 lbs



**FUEL DATA**

Date: 2018-03-22 Manufacturer: Foga Supreme Model: 38 F50  
 Project #: PT 20164 Run: 6 Tech: MM Reviewer: DP

**FUEL DESCRIPTION:**

Type of wood :

**TEST LOAD**

Piece Size			Weight	Meter Moisture Content (% dry)*				
3 1/2	x 3 1/2	x 19 in.	4506 lbs.	193	206	211	204	203
3 1/2	x 3 1/2	x 19 in.	4012 lbs.	191	206	203	192	192
3 1/2	x 3 1/2	x 19 in.	4034 lbs.	200	206	203	209	205
3 1/2	x 3 1/2	x 19 in.	3992 lbs.	191	196	192	193	192
3 1/2	x 3 1/2	x 19 in.	4616 lbs.	211	193	210	210	212
1 1/2	x 3/4	x 5 in.	0092 lbs.			205		
1 1/2	x 3/4	x 5 in.	0106 lbs.			203		
1 1/2	x 3/4	x 5 in.	0094 lbs.			194		
1 1/2	x 3/4	x 5 in.	0094 lbs.			196		
1 1/2	x 3/4	x 5 in.	0098 lbs.			198		
1 1/2	x 3/4	x 5 in.	0088 lbs.			204		
1 1/2	x 3/4	x 5 in.	0100 lbs.			209		
1 1/2	x 3/4	x 5 in.	0094 lbs.			209		
1 1/2	x 3/4	x 5 in.	0088 lbs.			208		
1 1/2	x 3/4	x 5 in.	0026 lbs.			200		
1 1/2	x 3/4	x 5 in.	0094 lbs.			193		
1 1/2	x 3/4	x 5 in.	0098 lbs.			211		
1 1/2	x 3/4	x 5 in.	6104 lbs.			216		
1 1/2	x 3/4	x 5 in.	0090 lbs.			205		
1 1/2	x 3/4	x 5 in.	0026 lbs.			200		
1 1/2	x 3/4	x 5 in.	0092 lbs.			202		
1 1/2	x 3/4	x 5 in.	0094 lbs.			196		
1 1/2	x 3/4	x 5 in.	0102 lbs.			193		
1 1/2	x 3/4	x 5 in.	0112 lbs.			20		
1 1/2	x 3/4	x 5 in.	0106 lbs.			20		
x	x	in.	lbs.					
x	x	in.	lbs.					

TEST LOAD WEIGHT: 23104 lbs Min 20%: 462 Max 25%: 578



Date: 2018-03-21 Manufacturer: foyer supreme Model: 38 Fsc  
 Project #: PI 20164 Run: 6 Tech: MM Reviewer: RP

		SYSTEM 1 - 1 <sup>st</sup> hour					SYSTEM 1				
Pre-test Weight Record	Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
	2018-03-21	19:00	610675	01270	01272	35 2100	614559	01268	01267	35 3350	01273
	2018-03-21	10:00	<del>610676</del>	01271	01273	35 2099	614560	01268	01267	35 3351	01274

		SYSTEM 1 - 1 <sup>st</sup> hour					SYSTEM 1				
Post-test Weight Record	Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
	2018-03-22	16:00	610682	01385	01274	35 2118	614567	01271	01263	35 3374	01276
	2018-03-26	8:00	610678	01379	01273	<del>35 2111</del> 35 2111 m.m.	614564	01271	01262	35 3368	01276
	2018-03-30	8:00	610678	01379	01273	35 2111	614564	01271	01262	35 3368	01276

Date: 2018-03-21 Project #: PI 20164 Run: 6  
 Manufacturer: foyer supreme Model: 38 FSC  
 Tech: MM Reviewer: RL

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time				
2018-03-21	19:00	951490	01291	01287	351797
2018-03-22	10:00	951489	01291	01286	351796

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time				
2018-03-20	16:00	951512	01398	01286	351815
2018-03-26	8:00	951505	01398	01285	351807
2018-03-30	8:00	951505	01398	01285	351807

## APPENDIX 2: Proportionality results



	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	99,55	98,09	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
15,649	535,2	535,6			0,172	0,174	0	0,2352373
15,519	535,1	535,6	100,34	98,18	0,173	0,175	1	0,2348051
15,488	535,1	535,6	99,50	97,79	0,173	0,175	2	0,234805
15,480	535,1	535,6	100,56	98,30	0,173	0,175	3	0,2348052
15,373	535,1	535,6	100,08	98,77	0,173	0,175	4	0,2330702
15,463	535,1	535,6	100,54	98,65	0,173	0,175	5	0,2341557
15,351	535,0	535,6	101,04	99,55	0,173	0,175	6	0,2319801
15,348	535,0	535,6	102,54	99,93	0,173	0,175	7	0,2315419
15,558	535,0	535,6	100,35	99,07	0,173	0,175	8	0,2341564
15,524	535,0	535,6	101,44	99,83	0,172	0,175	9	0,2330701
15,504	535,0	535,6	101,55	100,81	0,172	0,175	10	0,2319799
15,494	535,0	535,6	102,78	101,34	0,172	0,175	11	0,2311038
15,619	535,0	535,6	104,05	100,41	0,174	0,175	12	0,2326346
15,598	535,1	535,7	104,22	100,88	0,175	0,175	13	0,2319796
15,619	535,1	535,7	104,47	101,07	0,175	0,175	14	0,2319801
15,574	535,2	535,7	102,78	101,97	0,173	0,175	15	0,2311036
15,587	535,2	535,8	105,02	101,30	0,173	0,175	16	0,2311031
15,580	535,3	535,8	104,61	101,14	0,175	0,174	17	0,231103
15,575	535,3	535,8	102,33	102,06	0,173	0,175	18	0,2311035
15,520	535,3	535,9	103,26	102,40	0,171	0,175	19	0,2300036
15,581	535,4	535,9	105,42	102,00	0,173	0,175	20	0,2304439
15,640	535,4	536,0	102,80	102,11	0,173	0,175	21	0,2311034
15,579	535,5	536,0	105,39	102,40	0,172	0,175	22	0,2300039
15,597	535,5	536,1	104,38	102,43	0,174	0,175	23	0,2304437
15,518	535,6	536,1	103,87	103,08	0,172	0,175	24	0,2293415
15,546	535,6	536,2	103,69	102,39	0,171	0,175	25	0,2300041
15,539	535,6	536,2	102,88	102,66	0,171	0,175	26	0,230004
15,461	535,7	536,2	106,03	102,69	0,173	0,175	27	0,2288987
15,644	535,7	536,3	104,61	101,23	0,175	0,174	28	0,231542
15,670	535,8	536,3	104,46	101,22	0,174	0,174	29	0,2319804
15,573	535,8	536,3	102,93	102,42	0,173	0,175	30	0,230444
15,647	535,8	536,4	104,24	101,62	0,172	0,175	31	0,2315422
15,629	535,9	536,4	102,99	101,76	0,172	0,175	32	0,2311043
15,568	535,9	536,5	105,17	101,83	0,173	0,174	33	0,2300041
15,546	536,0	536,5	105,21	102,42	0,174	0,174	34	0,229342
15,566	536,0	536,5	103,50	103,45	0,172	0,175	35	0,2293412
15,572	536,0	536,6	103,31	103,32	0,170	0,175	36	0,2293419
15,515	536,0	536,6	105,59	103,16	0,171	0,175	37	0,2284556
15,501	536,1	536,6	106,40	103,12	0,174	0,174	38	0,2284556
15,549	536,1	536,7	104,30	102,86	0,173	0,174	39	0,2293421
15,436	536,2	536,7	106,21	103,23	0,173	0,174	40	0,2277878
15,500	536,2	536,7	103,80	102,81	0,172	0,174	41	0,2288993
15,518	536,2	536,8	102,54	103,03	0,170	0,175	42	0,2293419
15,634	536,2	536,8	102,79	102,25	0,170	0,175	43	0,231103
15,665	536,2	536,8	102,13	101,84	0,170	0,175	44	0,2315423
15,662	536,3	536,8	103,02	101,37	0,171	0,174	45	0,2315424
15,599	536,3	536,9	103,31	102,62	0,171	0,175	46	0,2304444
15,650	536,3	536,9	101,90	102,15	0,170	0,175	47	0,2311042
15,580	536,4	536,9	102,40	102,74	0,169	0,175	48	0,2300042
15,598	536,4	536,9	102,83	102,79	0,169	0,175	49	0,2300049
15,649	536,5	537,0	102,77	103,06	0,170	0,175	50	0,2304455
15,516	536,5	537,0	103,90	103,88	0,170	0,175	51	0,2283781
15,543	536,5	537,0	103,39	103,16	0,170	0,175	52	0,2288992
15,567	536,5	537,1	103,08	103,00	0,170	0,175	53	0,2293426
15,555	536,6	537,1	103,12	102,91	0,170	0,175	54	0,2293419
15,595	536,6	537,1	102,50	102,58	0,169	0,175	55	0,2300049

15,544	536,6	537,1	102,98	102,98	0,169	0,175	56	0,2293427
15,537	536,6	537,2	104,71	102,95	0,171	0,175	57	0,2293426
15,501	536,7	537,2	103,10	102,85	0,171	0,175	58	0,2288992
15,528	536,7	537,2	103,17	102,91	0,170	0,175	59	0,2293431
15,484	536,7	537,2	104,67	102,95	0,171	0,175	60	0,2288997
15,638	536,7	537,2	104,21	101,61	0,173	0,174	61	0,2311054
15,523	536,7	537,3	104,81	102,26	0,173	0,174	62	0,2293427
15,567	536,8	537,3	104,37	102,36	0,173	0,174	63	0,2300052
15,568	536,8	537,3	103,10	101,85	0,172	0,174	64	0,2300051
15,641	536,8	537,3	101,95	101,48	0,170	0,174	65	0,2311053
15,518	536,8	537,3	102,68	102,70	0,169	0,174	66	0,2293428
15,642	536,8	537,3	102,13	101,86	0,170	0,175	67	0,231106
15,639	536,8	537,4	103,51	102,09	0,171	0,175	68	0,2311053
15,461	536,9	537,4	104,81	103,08	0,172	0,175	69	0,2284562
15,565	536,9	537,4	102,77	102,10	0,171	0,174	70	0,2300058
15,595	536,9	537,4	104,24	101,86	0,171	0,174	71	0,2304459
15,641	536,9	537,4	103,70	101,78	0,172	0,174	72	0,2311056
15,674	536,9	537,4	102,06	101,25	0,171	0,174	73	0,2315438
15,465	536,9	537,5	104,48	103,46	0,171	0,174	74	0,2284565
15,564	536,9	537,5	104,47	102,05	0,172	0,174	75	0,2298903
15,528	536,9	537,5	105,38	102,57	0,173	0,174	76	0,2293492
15,506	536,9	537,5	103,32	102,25	0,172	0,174	77	0,2288904
15,654	537,0	537,5	102,23	102,16	0,170	0,174	78	0,2311058
15,583	537,0	537,5	103,70	102,71	0,171	0,175	79	0,2300055
15,616	537,0	537,6	102,67	101,62	0,171	0,174	80	0,2304461
15,543	537,0	537,6	104,92	102,54	0,171	0,174	81	0,2293429
15,619	537,0	537,6	102,61	102,19	0,171	0,174	82	0,230446
15,514	537,1	537,6	102,94	103,00	0,169	0,174	83	0,2289
15,599	537,1	537,6	104,51	102,39	0,171	0,174	84	0,2300058
15,546	537,1	537,7	104,59	102,98	0,172	0,174	85	0,2293431
15,549	537,1	537,7	104,60	102,45	0,172	0,174	86	0,2293436
15,596	537,2	537,7	104,05	102,04	0,172	0,174	87	0,2300059
15,524	537,2	537,7	105,54	102,95	0,173	0,174	88	0,2289001
15,600	537,2	537,8	105,02	102,39	0,173	0,174	89	0,2300061
15,676	537,2	537,8	104,28	101,97	0,173	0,174	90	0,2311065
15,557	537,3	537,8	103,30	102,32	0,171	0,174	91	0,2293437
15,554	537,3	537,8	103,05	102,35	0,170	0,174	92	0,2293439
15,666	537,3	537,8	104,18	101,58	0,171	0,174	93	0,2311066
15,667	537,3	537,8	102,27	101,95	0,171	0,174	94	0,2311067
15,597	537,3	537,8	102,14	102,34	0,169	0,174	95	0,2300067
15,529	537,3	537,9	105,07	103,22	0,171	0,174	96	0,2289004
15,496	537,4	537,9	104,05	102,83	0,172	0,174	97	0,2284577
15,602	537,4	537,9	103,78	102,56	0,171	0,174	98	0,2300068
15,629	537,4	538,0	102,30	101,46	0,170	0,174	99	0,230447
15,556	537,4	538,0	103,52	102,79	0,170	0,174	100	0,2293449
15,664	537,5	538,0	104,25	102,16	0,172	0,175	101	0,2311074
15,616	537,5	538,0	103,94	102,62	0,172	0,175	102	0,2304469
15,604	537,5	538,1	104,35	102,20	0,172	0,175	103	0,2304476
15,573	537,5	538,1	102,30	102,33	0,171	0,174	104	0,2300078
15,606	537,5	538,1	104,51	102,43	0,171	0,175	105	0,2304476
15,592	537,5	538,1	104,14	101,79	0,173	0,174	106	0,2304478
15,638	537,5	538,1	102,02	101,69	0,171	0,174	107	0,2311075
15,513	537,5	538,1	102,75	102,23	0,170	0,174	108	0,2293446
15,685	537,5	538,1	103,47	101,35	0,171	0,174	109	0,2319832
15,643	537,5	538,1	101,52	101,42	0,171	0,174	110	0,2315453
15,540	537,5	538,1	103,03	102,00	0,170	0,174	111	0,2300907
15,476	537,5	538,1	104,48	102,23	0,172	0,174	112	0,2293448
15,528	537,5	538,1	103,96	101,74	0,173	0,174	113	0,2301533
15,616	537,5	538,1	103,33	101,64	0,173	0,175	114	0,2315455
15,574	537,5	538,1	101,53	101,09	0,171	0,174	115	0,2311072
15,568	537,5	538,1	103,02	101,32	0,171	0,174	116	0,2311074

15,617	537,4	538,1	100,86	100,44	0,171	0,174	117	0,2319835
15,340	537,4	538,1	104,41	102,54	0,170	0,174	118	0,2277912
15,565	537,5	538,1	101,93	100,69	0,171	0,174	119	0,2311075
15,487	537,5	538,1	102,59	101,31	0,170	0,173	120	0,2300079
15,483	537,5	538,1	103,22	101,72	0,171	0,174	121	0,2300072
15,479	537,5	538,1	104,03	101,90	0,172	0,175	122	0,2300075
15,374	537,5	538,1	102,15	101,59	0,171	0,174	123	0,2284583
15,504	537,5	538,2	102,00	101,29	0,169	0,174	124	0,2304478
15,464	537,6	538,2	101,35	100,93	0,169	0,174	125	0,2300045
15,532	537,6	538,2	100,73	100,25	0,169	0,173	126	0,2311071
15,353	537,6	538,2	103,46	102,04	0,170	0,173	127	0,2284586
15,226	537,6	538,2	104,33	102,88	0,171	0,174	128	0,2266745
15,515	537,6	538,2	100,90	100,54	0,170	0,174	129	0,2311076
15,508	537,6	538,2	100,97	100,64	0,169	0,174	130	0,2311073
15,352	537,6	538,2	101,73	101,36	0,169	0,174	131	0,2289016
15,453	537,6	538,2	103,04	100,90	0,171	0,174	132	0,2304473
15,488	537,6	538,2	101,48	100,61	0,171	0,174	133	0,2311074
15,476	537,6	538,2	102,00	100,68	0,171	0,174	134	0,2311076
15,423	537,6	538,2	102,94	101,03	0,172	0,174	135	0,2304478
15,403	537,6	538,2	100,60	100,15	0,170	0,174	136	0,2302404
15,407	537,6	538,2	100,70	100,11	0,169	0,173	137	0,2304477
15,493	537,6	538,2	100,09	99,49	0,169	0,173	138	0,2319842
15,531	537,5	538,2	102,14	99,68	0,171	0,174	139	0,2326387
15,416	537,5	538,1	100,15	99,90	0,171	0,174	140	0,2311078
15,516	537,5	538,1	101,02	99,47	0,170	0,174	141	0,2326394
15,361	537,5	538,1	101,38	100,01	0,171	0,174	142	0,230448
15,497	537,5	538,1	101,39	99,19	0,171	0,174	143	0,2326385
15,417	537,4	538,1	101,69	99,78	0,172	0,174	144	0,2315452
15,410	537,4	538,0	101,67	99,89	0,172	0,174	145	0,2315457
15,407	537,4	538,0	100,09	99,92	0,171	0,174	146	0,2315808
15,393	537,4	538,0	100,99	99,33	0,170	0,174	147	0,2315455
15,460	537,4	538,0	100,29	99,21	0,171	0,174	148	0,2326393
15,458	537,4	538,0	99,71	99,21	0,170	0,174	149	0,2326392
15,410	537,3	538,0	101,50	99,64	0,171	0,174	150	0,2319842
15,449	537,3	538,0	101,42	98,97	0,173	0,174	151	0,2326389
15,398	537,3	538,0	101,49	99,57	0,173	0,174	152	0,2319834
15,443	537,3	538,0	99,04	98,85	0,171	0,174	153	0,2326382
15,438	537,3	538,0	99,64	99,20	0,169	0,174	154	0,2326389
15,388	537,3	537,9	99,17	99,16	0,169	0,174	155	0,2319841
15,529	537,2	537,9	98,87	98,01	0,169	0,174	156	0,2341597
15,351	537,2	537,9	99,97	99,13	0,170	0,174	157	0,2315455
15,375	537,2	537,9	99,65	99,46	0,170	0,174	158	0,2319827
15,337	537,2	537,8	101,43	99,17	0,171	0,174	159	0,2315454
15,364	537,1	537,8	101,35	99,39	0,173	0,174	160	0,2319838
15,507	537,1	537,8	100,42	98,34	0,173	0,175	161	0,2341598
15,430	537,1	537,8	98,65	98,41	0,171	0,174	162	0,2330736
15,430	537,1	537,8	100,91	98,75	0,171	0,174	163	0,2330736
15,540	537,1	537,7	97,90	97,27	0,171	0,174	164	0,2348089
15,293	537,1	537,7	99,43	98,90	0,169	0,173	165	0,2311072
15,562	537,0	537,7	97,63	97,01	0,169	0,173	166	0,2352409
15,387	537,0	537,7	100,66	98,88	0,171	0,174	167	0,2326385
15,527	537,0	537,6	99,19	97,52	0,172	0,174	168	0,2348083
15,481	536,9	537,6	97,89	97,86	0,170	0,174	169	0,2341591
15,322	536,9	537,6	100,71	98,94	0,170	0,174	170	0,2318171
15,374	536,9	537,6	100,52	98,54	0,172	0,174	171	0,2326384
15,372	536,8	537,5	100,05	98,61	0,172	0,174	172	0,2326384
15,472	536,8	537,5	97,73	97,89	0,170	0,174	173	0,2341584
15,511	536,8	537,5	100,26	97,97	0,171	0,174	174	0,2348079
15,466	536,8	537,5	99,37	97,50	0,172	0,174	175	0,2341584
15,464	536,8	537,4	98,29	97,64	0,170	0,174	176	0,2341587
15,318	536,7	537,4	101,07	98,84	0,171	0,174	177	0,2319825

15,313	536,7	537,4	101,01	98,96	0,173	0,174	178	0,2319825
15,353	536,7	537,4	98,53	98,55	0,171	0,174	179	0,2326378
15,497	536,7	537,4	98,61	98,02	0,170	0,175	180	0,234808
15,522	536,7	537,3	99,92	97,19	0,172	0,174	181	0,2352399
15,492	536,6	537,3	100,24	97,37	0,173	0,174	182	0,2348076
15,347	536,6	537,3	101,31	98,44	0,174	0,174	183	0,2326375
15,375	536,6	537,3	98,87	98,12	0,172	0,174	184	0,2330724
15,484	536,6	537,2	98,26	97,32	0,170	0,174	185	0,2348071
15,482	536,6	537,2	97,95	97,70	0,170	0,174	186	0,2348078
15,507	536,6	537,2	99,24	97,22	0,171	0,174	187	0,2352395
15,366	536,5	537,2	98,27	98,28	0,171	0,174	188	0,2330726
15,507	536,5	537,2	97,20	97,28	0,169	0,174	189	0,2352398
15,436	536,5	537,1	98,18	97,85	0,169	0,174	190	0,2341548
15,432	536,5	537,1	99,87	97,60	0,171	0,174	191	0,2341581
15,502	536,4	537,1	97,80	97,67	0,171	0,174	192	0,2352398
15,405	536,4	537,0	98,89	98,54	0,170	0,175	193	0,2338084
15,470	536,4	537,0	99,84	97,40	0,172	0,175	194	0,2348075
15,470	536,4	537,0	99,80	97,64	0,173	0,174	195	0,2348077
15,467	536,3	537,0	97,88	97,62	0,171	0,175	196	0,234807
15,467	536,3	537,0	97,84	97,64	0,170	0,175	197	0,2348076
15,280	536,3	536,9	100,97	98,77	0,171	0,175	198	0,231982
15,520	536,3	536,9	97,51	96,89	0,171	0,174	199	0,2356695
15,348	536,3	536,9	99,60	98,63	0,171	0,175	200	0,2330721
15,399	536,3	536,9	97,82	98,05	0,170	0,175	201	0,2338534
15,490	536,3	536,9	97,40	97,43	0,169	0,175	202	0,2352395
15,458	536,2	536,9	98,77	97,03	0,170	0,174	203	0,234807
15,458	536,2	536,9	97,65	97,53	0,170	0,174	204	0,2348065
15,485	536,2	536,8	98,55	97,50	0,170	0,175	205	0,2352387
15,483	536,2	536,8	99,49	97,53	0,172	0,175	206	0,2352389
15,453	536,2	536,8	99,73	97,35	0,173	0,175	207	0,2348065
15,309	536,1	536,8	100,47	98,31	0,173	0,174	208	0,2326373
15,406	536,1	536,7	99,73	97,14	0,173	0,174	209	0,234158
15,551	536,1	536,7	98,83	96,41	0,173	0,174	210	0,2363145
15,504	536,1	536,7	97,08	97,27	0,171	0,174	211	0,2356688
15,448	536,1	536,7	99,31	97,08	0,171	0,174	212	0,2348066
15,477	536,1	536,7	97,24	97,49	0,171	0,174	213	0,2352389
15,262	536,1	536,7	100,94	98,60	0,171	0,175	214	0,2319817
15,448	536,1	536,7	98,08	97,79	0,172	0,175	215	0,2348069
15,473	536,1	536,7	98,06	97,37	0,170	0,175	216	0,235239
15,474	536,1	536,6	97,47	97,52	0,170	0,175	217	0,2352388
15,395	536,1	536,6	98,20	97,61	0,170	0,175	218	0,2340409
15,331	536,0	536,6	100,24	97,61	0,171	0,174	219	0,2330723
15,330	536,0	536,6	100,56	98,34	0,173	0,174	220	0,2330716
15,500	536,0	536,6	97,03	97,19	0,171	0,175	221	0,2356689
15,449	536,0	536,6	97,63	97,20	0,169	0,174	222	0,2349277
15,440	536,0	536,6	97,38	97,92	0,169	0,175	223	0,2348069
15,439	536,0	536,6	99,03	97,22	0,171	0,175	224	0,2348064
15,467	536,0	536,5	97,68	97,03	0,171	0,174	225	0,2352386
15,439	535,9	536,5	99,73	97,28	0,172	0,174	226	0,234806
15,438	535,9	536,5	97,70	97,30	0,172	0,174	227	0,2348061
15,438	535,9	536,5	99,37	97,09	0,171	0,174	228	0,2348059
15,493	535,9	536,5	97,41	97,10	0,171	0,174	229	0,2356682
15,436	535,8	536,4	99,72	97,09	0,172	0,174	230	0,2348063
15,434	535,8	536,4	99,89	96,80	0,173	0,174	231	0,2348064
15,462	535,8	536,4	99,38	96,77	0,173	0,174	232	0,235238
15,462	535,8	536,4	97,28	97,36	0,171	0,174	233	0,2352379
15,489	535,8	536,4	97,36	97,25	0,170	0,175	234	0,235668
15,388	535,8	536,4	99,61	97,58	0,171	0,175	235	0,2341564
15,244	535,8	536,3	100,77	98,43	0,173	0,174	236	0,231981
15,485	535,8	536,3	97,66	97,14	0,172	0,175	237	0,2356685
15,428	535,7	536,3	97,77	97,47	0,170	0,175	238	0,2348056

15,312	535,7	536,3	98,89	97,87	0,170	0,174	239	0,2330708
15,427	535,7	536,3	97,41	97,74	0,170	0,175	240	0,2348054
15,382	535,7	536,3	98,61	97,77	0,170	0,175	241	0,2341572
15,139	535,7	536,3	101,39	99,01	0,172	0,175	242	0,2304453
15,311	535,7	536,2	98,10	98,35	0,171	0,175	243	0,233071
15,454	535,7	536,2	98,60	96,99	0,171	0,175	244	0,2352377
15,453	535,7	536,2	98,39	97,15	0,172	0,174	245	0,2352377
15,551	535,7	536,2	97,04	96,90	0,171	0,175	246	0,2367422
15,423	535,7	536,2	97,70	97,90	0,170	0,175	247	0,2348059
15,383	535,7	536,2	99,16	97,52	0,171	0,175	248	0,234157
15,522	535,7	536,2	97,69	96,75	0,171	0,174	249	0,2363133
15,452	535,7	536,2	99,48	96,93	0,172	0,174	250	0,2352379
15,422	535,7	536,2	99,68	96,80	0,173	0,174	251	0,2348039
15,450	535,7	536,2	99,33	96,97	0,173	0,174	252	0,235238
15,449	535,7	536,2	97,50	97,25	0,172	0,174	253	0,2352382
15,448	535,7	536,2	98,26	97,12	0,171	0,175	254	0,2352382
15,477	535,6	536,2	98,96	96,76	0,172	0,174	255	0,2356689
15,307	535,6	536,2	100,03	97,89	0,173	0,174	256	0,2330712
15,421	535,7	536,2	97,82	97,34	0,171	0,174	257	0,2348087
15,421	535,6	536,2	99,61	97,03	0,172	0,174	258	0,2348056
15,421	535,6	536,2	97,88	97,52	0,172	0,174	259	0,2348059
15,446	535,6	536,2	98,38	97,11	0,171	0,175	260	0,2352381
15,476	535,6	536,2	97,42	97,11	0,171	0,175	261	0,2356687
15,517	535,6	536,2	96,71	96,72	0,170	0,175	262	0,2363139
15,418	535,6	536,2	97,67	97,62	0,170	0,175	263	0,2348057
15,516	535,6	536,2	97,58	96,65	0,170	0,175	264	0,2363135
15,473	535,6	536,2	97,37	96,93	0,170	0,175	265	0,2356683
15,444	535,6	536,2	97,35	97,46	0,170	0,175	266	0,2352382
15,416	535,6	536,2	97,52	97,54	0,170	0,175	267	0,2348053
15,273	535,6	536,2	99,64	97,98	0,171	0,175	268	0,2326356
15,301	535,6	536,2	98,33	98,22	0,171	0,175	269	0,2330709
15,414	535,6	536,1	99,40	97,32	0,171	0,175	270	0,2348058
15,443	535,6	536,1	97,27	97,51	0,171	0,175	271	0,2352374
15,470	535,6	536,1	97,58	97,02	0,170	0,175	272	0,2356686
15,371	535,5	536,1	97,44	97,64	0,170	0,175	273	0,234157
15,469	535,5	536,1	99,28	96,48	0,171	0,174	274	0,2356685
15,468	535,5	536,1	98,75	96,95	0,173	0,174	275	0,2356686
15,298	535,5	536,1	98,09	98,13	0,171	0,175	276	0,2330713
15,467	535,5	536,1	97,22	97,27	0,170	0,175	277	0,2356686
15,507	535,5	536,0	98,42	96,59	0,171	0,175	278	0,2363137
15,435	535,5	536,0	97,97	97,10	0,172	0,175	279	0,2352012
15,408	535,5	536,0	97,32	97,44	0,170	0,175	280	0,2348058
15,367	535,5	536,0	97,66	97,86	0,169	0,175	281	0,2341568
15,409	535,5	536,0	99,79	97,04	0,172	0,175	282	0,2348059
15,408	535,5	536,0	99,26	97,15	0,173	0,174	283	0,2348062
15,436	535,4	536,0	99,02	96,85	0,173	0,174	284	0,2352369
15,366	535,4	536,0	97,76	97,70	0,171	0,175	285	0,2341566
15,506	535,4	536,0	99,09	96,13	0,172	0,174	286	0,2363138
15,434	535,4	536,0	99,54	96,83	0,174	0,174	287	0,2352381
15,435	535,4	535,9	99,52	96,80	0,174	0,174	288	0,2352377
15,504	535,4	535,9	97,57	96,71	0,172	0,174	289	0,2363139
15,504	535,4	535,9	97,98	96,86	0,171	0,175	290	0,2363132
15,363	535,4	535,9	99,14	97,41	0,172	0,175	291	0,2341568
15,432	535,3	535,9	97,55	97,18	0,171	0,175	292	0,235238
15,462	535,4	535,9	97,38	96,73	0,170	0,175	293	0,2356687
15,460	535,4	535,9	99,20	96,69	0,172	0,174	294	0,2356682
15,433	535,3	535,9	99,70	97,05	0,174	0,174	295	0,2352379
15,361	535,3	535,9	98,00	97,57	0,172	0,175	296	0,2341567
15,262	535,3	535,9	98,49	98,70	0,170	0,175	297	0,2326356
15,402	535,3	535,8	97,33	97,52	0,170	0,175	298	0,234806
15,459	535,3	535,9	97,33	97,22	0,170	0,175	299	0,2356684



15,459	535,3	535,9	97,94	97,19	0,171	0,175	300	0,2356681
15,469	535,3	535,9	99,07	96,39	0,172	0,175	301	0,2358406
15,499	535,3	535,8	97,22	97,10	0,172	0,175	302	0,2363134
15,429	535,3	535,8	99,63	97,18	0,172	0,175	303	0,2352378
15,457	535,3	535,8	97,55	97,30	0,172	0,175	304	0,2356682
15,400	535,3	535,9	97,79	97,04	0,170	0,175	305	0,2348047
15,455	535,3	535,8	98,88	96,97	0,172	0,175	306	0,235668
15,484	535,3	535,9	97,45	96,58	0,172	0,175	307	0,2360871
15,499	535,3	535,8	97,20	96,82	0,171	0,175	308	0,2363138
15,400	535,3	535,8	99,56	96,92	0,172	0,175	309	0,2348059
15,399	535,3	535,8	97,75	97,40	0,172	0,175	310	0,2348051
15,399	535,3	535,8	97,87	97,13	0,170	0,175	311	0,2348055
15,356	535,3	535,8	98,42	97,31	0,171	0,174	312	0,2341564
15,398	535,3	535,8	99,89	96,95	0,172	0,174	313	0,2348055
15,498	535,3	535,8	97,00	96,39	0,172	0,174	314	0,2363135
15,455	535,3	535,8	99,26	96,65	0,172	0,174	315	0,2356676
15,498	535,3	535,8	99,28	96,36	0,174	0,174	316	0,2363135
15,524	535,3	535,8	99,00	96,65	0,174	0,175	317	0,236742
15,407	535,3	535,8	97,82	96,87	0,172	0,175	318	0,2349312
15,455	535,3	535,8	97,16	96,68	0,170	0,174	319	0,2356678
15,398	535,2	535,8	99,21	97,26	0,171	0,174	320	0,2348056
15,398	535,2	535,8	98,51	97,56	0,172	0,175	321	0,2348056
15,398	535,2	535,7	97,37	97,30	0,171	0,175	322	0,2348056
15,397	535,2	535,7	98,05	97,47	0,170	0,175	323	0,2348051
15,454	535,2	535,7	99,00	96,76	0,172	0,175	324	0,2356677
15,453	535,2	535,7	99,30	96,50	0,173	0,174	325	0,2356672
15,495	535,2	535,7	96,92	96,44	0,172	0,174	326	0,2363131
15,398	535,2	535,7	98,09	97,44	0,170	0,175	327	0,234805
15,398	535,2	535,7	97,79	97,32	0,171	0,175	328	0,2348045
15,453	535,2	535,7	99,36	97,22	0,172	0,175	329	0,2356675
15,283	535,2	535,7	98,15	97,99	0,172	0,175	330	0,2330705
15,495	535,2	535,7	99,36	96,75	0,172	0,175	331	0,2363127
15,495	535,2	535,7	99,05	96,52	0,174	0,175	332	0,2363131
15,391	535,2	535,7	97,47	97,19	0,172	0,175	333	0,2347362
15,422	535,2	535,7	99,69	97,05	0,172	0,175	334	0,2352377
15,494	535,2	535,7	98,50	97,06	0,173	0,175	335	0,2363129
15,353	535,1	535,7	99,58	97,81	0,173	0,175	336	0,2341568
15,522	535,1	535,7	96,96	96,35	0,172	0,175	337	0,2367419
15,281	535,1	535,6	100,50	98,15	0,172	0,175	338	0,2330702
15,421	535,1	535,7	99,30	96,54	0,174	0,174	339	0,2352375
15,394	535,2	535,7	97,35	97,00	0,172	0,174	340	0,2348054
15,279	535,2	535,7	98,10	97,96	0,170	0,174	341	0,2330705
15,492	535,1	535,6	96,95	96,42	0,170	0,175	342	0,2363133
15,421	535,1	535,6	98,30	96,85	0,171	0,174	343	0,2352376
15,451	535,1	535,6	98,72	97,03	0,172	0,175	344	0,235668
15,422	535,1	535,6	99,52	96,98	0,173	0,175	345	0,2352373
15,350	535,1	535,6	100,31	97,51	0,174	0,175	346	0,2341566
15,448	535,1	535,6	99,30	96,76	0,174	0,175	347	0,2356684
15,421	535,1	535,6	99,63	96,99	0,174	0,175	348	0,2352376
15,350	535,1	535,6	100,05	97,63	0,174	0,175	349	0,2341566
15,490	535,1	535,6	99,15	96,79	0,174	0,175	350	0,2363138
15,490	535,1	535,6	98,94	96,80	0,174	0,175	351	0,2363135
15,518	535,0	535,6	98,87	96,38	0,174	0,175	352	0,2367412
15,348	535,0	535,5	97,78	97,49	0,172	0,175	353	0,2341556
15,390	535,0	535,5	98,83	96,87	0,171	0,174	354	0,2348051
15,390	535,0	535,5	99,67	97,16	0,173	0,174	355	0,2348048
15,488	534,9	535,5	97,01	96,13	0,172	0,174	356	0,2363126
15,488	534,9	535,5	98,85	96,36	0,172	0,174	357	0,2363127
15,445	534,9	535,4	99,07	96,68	0,173	0,174	358	0,2356677
15,390	534,9	535,4	99,65	97,29	0,174	0,175	359	0,2348229
15,174	534,9	535,4	98,95	98,46	0,172	0,175	360	0,2315418

15,416	534,9	535,4	99,60	97,22	0,172	0,175	361	0,2352367
15,416	534,9	535,4	99,54	97,63	0,174	0,175	362	0,2352371
15,486	534,9	535,4	97,21	96,36	0,172	0,175	363	0,236313
15,415	534,9	535,4	99,31	97,48	0,172	0,175	364	0,2352374
15,485	534,9	535,4	98,50	96,65	0,173	0,175	365	0,2363128
15,514	534,9	535,4	98,88	96,37	0,173	0,175	366	0,2367412
15,443	534,8	535,4	97,96	96,56	0,173	0,174	367	0,2356676
15,443	534,8	535,3	97,21	96,57	0,171	0,174	368	0,2356671
15,415	534,8	535,3	99,53	97,36	0,172	0,175	369	0,2352372
15,386	534,8	535,3	97,03	96,79	0,172	0,175	370	0,2348042
15,414	534,8	535,3	99,70	97,43	0,172	0,175	371	0,2352364
15,513	534,8	535,3	99,23	96,73	0,174	0,175	372	0,2367408
15,386	534,8	535,3	99,75	97,32	0,174	0,175	373	0,2348045
15,484	534,8	535,3	99,38	96,95	0,174	0,175	374	0,2363127
15,385	534,8	535,3	99,95	97,39	0,174	0,175	375	0,234805
15,385	534,8	535,3	99,56	97,53	0,174	0,175	376	0,2348049
15,412	534,8	535,3	97,32	96,97	0,172	0,175	377	0,235237
15,412	534,8	535,3	99,75	97,72	0,172	0,175	378	0,2352375
15,511	534,8	535,3	98,82	96,53	0,174	0,175	379	0,2367414
15,412	534,8	535,3	99,35	97,01	0,174	0,175	380	0,2352343
15,482	534,8	535,3	96,84	96,54	0,172	0,175	381	0,2363125
15,510	534,8	535,3	96,23	95,92	0,170	0,174	382	0,2367415
15,440	534,8	535,3	97,12	96,28	0,170	0,174	383	0,2356676
15,410	534,8	535,3	97,00	96,47	0,170	0,174	384	0,2352371
15,481	534,8	535,3	98,96	96,83	0,172	0,175	385	0,236313
15,481	534,8	535,3	97,20	96,76	0,172	0,175	386	0,2363131
15,409	534,8	535,3	99,51	97,08	0,172	0,175	387	0,2352373
15,508	534,8	535,3	97,36	96,13	0,173	0,175	388	0,236741
15,409	534,8	535,3	99,35	97,17	0,172	0,175	389	0,2352371
15,479	534,8	535,2	98,32	96,35	0,173	0,175	390	0,2363132
15,408	534,8	535,3	98,43	97,18	0,172	0,175	391	0,2352371
15,479	534,8	535,3	99,09	96,58	0,173	0,175	392	0,2363129
15,478	534,8	535,2	97,18	96,51	0,172	0,175	393	0,2363128
15,478	534,7	535,2	97,00	96,19	0,170	0,174	394	0,2363125
15,375	534,7	535,2	99,43	97,44	0,172	0,175	395	0,2347446
15,436	534,8	535,2	97,95	96,64	0,172	0,175	396	0,2356671
15,407	534,7	535,2	97,25	96,52	0,171	0,174	397	0,2352381
15,377	534,7	535,2	99,09	97,16	0,171	0,174	398	0,2348044
15,405	534,7	535,2	97,27	96,70	0,171	0,175	399	0,235237
15,475	534,7	535,2	96,93	95,91	0,170	0,174	400	0,2363128
15,504	534,7	535,2	99,29	96,66	0,172	0,174	401	0,2367406
15,405	534,7	535,2	97,25	96,52	0,172	0,175	402	0,2352368
15,405	534,7	535,2	99,65	97,05	0,172	0,174	403	0,2352371
15,334	534,7	535,1	97,89	97,17	0,172	0,175	404	0,2341557
15,502	534,6	535,1	98,95	96,49	0,172	0,175	405	0,2367408
15,501	534,6	535,1	96,86	96,00	0,172	0,175	406	0,2367414
15,232	534,6	535,1	100,96	98,18	0,172	0,175	407	0,232635
15,430	534,6	535,1	99,59	97,02	0,174	0,175	408	0,2356674
15,429	534,6	535,1	98,29	96,70	0,173	0,175	409	0,2356671
15,429	534,6	535,1	98,77	96,78	0,173	0,175	410	0,235667
15,500	534,6	535,1	99,04	96,55	0,174	0,175	411	0,236741
15,471	534,6	535,1	97,29	96,62	0,173	0,175	412	0,2363128
15,188	534,6	535,0	100,80	98,74	0,172	0,175	413	0,2319793
15,471	534,5	535,0	96,80	96,51	0,172	0,175	414	0,2363124
15,400	534,6	535,0	97,20	96,64	0,170	0,174	415	0,2352364
15,428	534,5	535,0	99,33	97,02	0,172	0,175	416	0,2356673
15,427	534,5	535,0	99,29	97,01	0,174	0,175	417	0,2356672
15,469	534,5	535,0	98,38	96,40	0,173	0,175	418	0,2363119
15,399	534,5	535,0	97,83	96,56	0,172	0,174	419	0,2352364
15,427	534,5	535,0	99,53	96,83	0,173	0,174	420	0,2356665
15,399	534,5	535,0	99,78	97,10	0,174	0,175	421	0,2352363

15,256	534,5	535,0	100,81	98,17	0,175	0,175	422	0,2330694
15,468	534,5	535,0	96,96	96,52	0,172	0,175	423	0,2363127
15,261	534,5	534,9	98,00	97,83	0,170	0,175	424	0,2331463
15,426	534,5	534,9	97,25	96,66	0,170	0,175	425	0,2356668
15,397	534,5	534,9	97,18	96,77	0,170	0,175	426	0,2352365
15,396	534,5	534,9	97,45	96,88	0,170	0,175	427	0,2352365
15,467	534,5	534,9	98,77	96,91	0,172	0,175	428	0,2363122
15,397	534,4	534,9	97,61	96,72	0,172	0,175	429	0,2352361
15,467	534,4	534,9	97,02	96,24	0,171	0,174	430	0,2363119
15,494	534,4	534,9	98,98	96,32	0,172	0,175	431	0,2367399
15,495	534,4	534,9	98,62	96,69	0,174	0,175	432	0,2367404
15,424	534,4	534,9	97,57	96,89	0,172	0,175	433	0,2356671
15,466	534,4	534,8	98,96	96,63	0,172	0,175	434	0,2363122
15,423	534,3	534,8	97,13	96,46	0,172	0,175	435	0,2356647
15,493	534,3	534,8	97,36	95,83	0,171	0,174	436	0,23674
15,464	534,3	534,8	98,86	96,61	0,173	0,174	437	0,2363122
15,464	534,3	534,8	96,82	96,57	0,172	0,175	438	0,2363122
15,394	534,3	534,8	99,35	96,84	0,172	0,175	439	0,2352357
15,463	534,3	534,8	98,34	96,29	0,173	0,175	440	0,2363124
15,420	534,3	534,8	98,28	97,24	0,173	0,175	441	0,2356666
15,464	534,3	534,8	99,49	96,68	0,174	0,175	442	0,2363118
15,421	534,3	534,8	97,04	96,61	0,172	0,175	443	0,2356663
15,365	534,3	534,8	99,76	97,27	0,172	0,175	444	0,2348044
15,463	534,3	534,7	97,48	96,51	0,173	0,175	445	0,2363117
15,420	534,3	534,7	97,15	96,63	0,171	0,175	446	0,2356663
15,463	534,3	534,7	98,75	96,11	0,172	0,174	447	0,2363117
15,422	534,3	534,7	98,13	96,38	0,173	0,174	448	0,2356663
15,462	534,2	534,7	97,04	96,42	0,171	0,174	449	0,2363116
15,364	534,3	534,7	97,77	96,80	0,171	0,174	450	0,2348036
15,462	534,2	534,7	97,43	96,05	0,171	0,174	451	0,2363118
15,363	534,2	534,7	99,55	97,18	0,173	0,174	452	0,2348038
15,363	534,2	534,7	99,92	97,02	0,174	0,175	453	0,2348043
15,235	534,2	534,7	100,44	98,04	0,174	0,175	454	0,2328614
15,363	534,2	534,6	98,88	97,65	0,173	0,175	455	0,2348038
15,461	534,2	534,6	98,91	96,15	0,173	0,175	456	0,2363123
15,419	534,2	534,6	98,79	96,35	0,173	0,174	457	0,2356667
15,460	534,2	534,6	96,72	96,39	0,172	0,174	458	0,236312
15,460	534,2	534,6	96,94	96,41	0,170	0,175	459	0,2363119
15,361	534,2	534,6	99,64	97,26	0,172	0,175	460	0,2348046
15,419	534,2	534,6	99,44	96,77	0,174	0,175	461	0,2356666
15,461	534,2	534,6	99,12	96,56	0,174	0,175	462	0,236312
15,390	534,1	534,6	97,14	97,02	0,172	0,175	463	0,235233
15,488	534,1	534,6	99,23	96,18	0,172	0,175	464	0,2367402
15,361	534,1	534,6	97,81	97,33	0,173	0,175	465	0,2348035
15,460	534,2	534,6	98,44	96,36	0,172	0,175	466	0,2363112
15,460	534,1	534,6	97,78	96,36	0,172	0,175	467	0,2363111
15,459	534,1	534,6	97,11	96,57	0,171	0,175	468	0,2363111
15,487	534,1	534,6	97,03	96,97	0,171	0,176	469	0,2367399
15,487	534,1	534,5	98,89	95,97	0,172	0,175	470	0,2367399
15,361	534,1	534,5	99,50	97,20	0,174	0,175	471	0,2348035
15,459	534,1	534,5	96,50	96,60	0,172	0,175	472	0,2363117
15,459	534,0	534,5	97,45	96,35	0,170	0,175	473	0,2363116
15,361	534,0	534,5	99,40	96,73	0,172	0,174	474	0,2348037
15,361	534,0	534,5	98,77	97,24	0,173	0,175	475	0,2348036
15,487	534,0	534,4	97,01	96,39	0,172	0,175	476	0,23674
15,388	534,0	534,4	99,53	96,97	0,172	0,175	477	0,2352361
15,361	534,0	534,4	98,25	96,81	0,173	0,175	478	0,234809
15,388	534,0	534,4	99,16	96,54	0,173	0,174	479	0,2352359
15,388	534,0	534,4	97,36	97,05	0,172	0,175	480	0,2352358
15,486	534,0	534,4	98,98	96,48	0,172	0,175	481	0,2367403
15,457	533,9	534,4	98,97	96,04	0,174	0,175	482	0,2363114

15,415	533,9	534,4	99,08	96,29	0,174	0,174	483	0,2356662
15,414	533,9	534,4	97,08	97,10	0,172	0,175	484	0,2356661
15,359	533,9	534,4	97,54	97,21	0,170	0,175	485	0,2348029
15,359	533,9	534,3	99,29	97,25	0,172	0,175	486	0,2348028
15,486	533,9	534,3	97,05	96,81	0,172	0,175	487	0,2367402
15,415	533,9	534,3	98,97	96,42	0,172	0,175	488	0,2356655
15,414	533,9	534,3	96,98	96,97	0,172	0,175	489	0,2356663
15,245	533,9	534,3	98,48	97,82	0,170	0,175	490	0,2330745
15,415	533,8	534,3	99,24	96,84	0,172	0,175	491	0,2356659
15,415	533,8	534,3	99,03	96,50	0,174	0,175	492	0,235666
15,484	533,8	534,2	98,69	96,37	0,174	0,175	493	0,2367395
15,485	533,8	534,2	99,17	95,80	0,174	0,174	494	0,236739
15,386	533,8	534,2	99,71	96,89	0,175	0,174	495	0,2352323
15,386	533,8	534,2	99,38	96,73	0,174	0,175	496	0,2352353
15,385	533,8	534,2	99,35	96,98	0,174	0,175	497	0,2352358
15,385	533,8	534,2	97,74	97,15	0,172	0,175	498	0,2352349
15,455	533,7	534,2	99,31	96,14	0,173	0,175	499	0,2363112
15,413	533,7	534,2	99,44	96,78	0,174	0,175	500	0,2356656
15,455	533,7	534,2	97,02	96,69	0,172	0,175	501	0,2363111
15,384	533,7	534,1	98,54	97,24	0,172	0,175	502	0,2352356
15,454	533,7	534,1	98,96	96,46	0,173	0,175	503	0,2363107
15,356	533,7	534,1	98,44	97,21	0,173	0,175	504	0,2348028
15,454	533,7	534,1	97,63	96,49	0,172	0,175	505	0,2363103
15,481	533,7	534,1	98,65	96,36	0,173	0,175	506	0,2367394
15,454	533,7	534,1	99,11	96,32	0,174	0,175	507	0,2363111
15,383	533,6	534,1	99,48	96,99	0,174	0,175	508	0,2352355
15,383	533,6	534,0	99,80	96,58	0,174	0,175	509	0,2352363
15,453	533,6	534,0	98,95	96,43	0,174	0,175	510	0,2363108
15,382	533,6	534,0	99,94	96,45	0,174	0,174	511	0,2352352
15,383	533,6	534,0	97,49	97,11	0,173	0,175	512	0,2352352
15,482	533,6	534,0	97,67	96,51	0,171	0,175	513	0,2367393
15,450	533,6	534,0	97,21	96,67	0,171	0,175	514	0,2362669
15,452	533,6	534,0	97,07	96,84	0,171	0,175	515	0,2363115
15,479	533,6	534,0	97,15	96,48	0,171	0,175	516	0,2367389
15,452	533,6	534,0	98,41	96,61	0,172	0,175	517	0,2363103
15,452	533,6	534,0	98,73	96,45	0,173	0,175	518	0,2363105
15,451	533,5	534,0	96,92	96,82	0,172	0,175	519	0,2363105
15,479	533,5	534,0	98,87	96,43	0,172	0,175	520	0,2367388
15,479	533,5	533,9	96,72	96,69	0,172	0,175	521	0,2367388
15,381	533,5	533,9	99,27	97,05	0,172	0,175	522	0,2352351
15,478	533,5	533,9	96,79	96,54	0,172	0,175	523	0,2367388
15,352	533,5	533,9	100,16	96,72	0,173	0,175	524	0,2348027
15,478	533,5	533,9	98,98	96,13	0,175	0,174	525	0,236739
15,451	533,5	533,9	98,03	96,45	0,173	0,175	526	0,2363105
15,451	533,5	533,9	99,28	96,25	0,173	0,175	527	0,2363102
15,352	533,5	533,9	99,50	96,94	0,174	0,175	528	0,2348025
15,409	533,5	533,9	97,41	96,99	0,172	0,175	529	0,2356649
15,451	533,4	533,9	99,01	96,44	0,172	0,175	530	0,2363107
15,520	533,4	533,8	97,18	96,29	0,173	0,175	531	0,2373806
15,450	533,4	533,8	97,10	97,25	0,171	0,176	532	0,2363101
15,409	533,4	533,8	99,78	96,47	0,173	0,175	533	0,2356652
15,450	533,4	533,8	99,30	96,41	0,175	0,175	534	0,2363103
15,450	533,4	533,8	97,09	96,71	0,173	0,175	535	0,2363103
15,450	533,4	533,8	97,13	96,71	0,171	0,175	536	0,2363104
15,450	533,3	533,8	97,33	97,04	0,171	0,176	537	0,2363103
15,380	533,4	533,8	97,66	97,10	0,171	0,176	538	0,2352343
15,478	533,3	533,8	99,02	95,85	0,173	0,175	539	0,2367386
15,449	533,3	533,7	98,44	96,46	0,174	0,175	540	0,2363104
15,450	533,3	533,7	97,38	96,88	0,172	0,175	541	0,2363099
15,450	533,3	533,7	98,95	96,62	0,173	0,175	542	0,2363102
15,477	533,3	533,7	99,33	96,26	0,175	0,175	543	0,2367389

15,449	533,3	533,7	97,69	96,48	0,173	0,175	544	0,2363103
15,379	533,3	533,7	97,85	97,20	0,172	0,175	545	0,2352346
15,407	533,3	533,7	97,04	97,25	0,171	0,176	546	0,2356644
15,449	533,3	533,7	99,23	96,31	0,172	0,175	547	0,2363102
15,449	533,3	533,7	99,22	96,14	0,175	0,174	548	0,2363102
15,449	533,3	533,7	97,79	96,32	0,173	0,174	549	0,2363106
15,449	533,2	533,7	97,17	96,73	0,171	0,175	550	0,2363098
15,476	533,3	533,6	98,80	96,41	0,172	0,175	551	0,2367386
15,448	533,2	533,6	96,89	96,94	0,172	0,175	552	0,2363097
15,476	533,2	533,6	97,24	96,49	0,171	0,176	553	0,2367388
15,406	533,2	533,6	97,31	97,05	0,171	0,175	554	0,2356642
15,447	533,2	533,6	97,30	96,66	0,171	0,175	555	0,2363097
15,447	533,2	533,6	97,57	96,97	0,171	0,176	556	0,2363097
15,405	533,2	533,6	97,25	97,00	0,171	0,176	557	0,2356643
15,446	533,2	533,6	99,49	96,34	0,173	0,175	558	0,2363107
15,445	533,2	533,6	97,36	97,05	0,173	0,175	559	0,2363099
15,445	533,2	533,6	99,08	96,61	0,173	0,176	560	0,2363097
15,446	533,2	533,6	97,42	96,99	0,173	0,176	561	0,2363098
15,544	533,2	533,6	98,71	95,91	0,173	0,175	562	0,2378079
15,474	533,2	533,6	97,87	96,63	0,174	0,175	563	0,2367381
15,474	533,2	533,6	96,90	96,43	0,172	0,175	564	0,2367383
15,404	533,2	533,6	97,24	97,04	0,171	0,175	565	0,2356645
15,473	533,1	533,6	99,12	96,13	0,173	0,175	566	0,2367383
15,446	533,1	533,6	98,30	96,92	0,174	0,175	567	0,2363099
15,473	533,1	533,5	98,82	95,88	0,174	0,175	568	0,2367383
15,472	533,1	533,5	99,01	95,98	0,174	0,174	569	0,2367362
15,402	533,1	533,5	97,29	96,80	0,173	0,175	570	0,2356646
15,374	533,1	533,5	99,78	96,95	0,173	0,175	571	0,2352344
15,373	533,1	533,5	99,64	96,81	0,175	0,175	572	0,2352345
15,471	533,0	533,5	96,75	96,31	0,173	0,175	573	0,2367381
15,471	533,0	533,5	97,78	95,85	0,171	0,175	574	0,2367384
15,302	533,0	533,5	99,70	96,98	0,173	0,174	575	0,2341526
15,373	533,0	533,5	97,66	96,85	0,172	0,175	576	0,235234
15,471	533,0	533,4	98,93	96,56	0,173	0,175	577	0,2367377
15,443	533,0	533,4	99,16	96,38	0,174	0,175	578	0,2363097
15,471	533,0	533,4	97,08	96,67	0,173	0,175	579	0,2367379
15,472	533,0	533,5	99,21	96,27	0,173	0,175	580	0,2367379
15,443	533,0	533,4	99,11	96,29	0,175	0,175	581	0,2363096
15,443	533,0	533,4	97,71	96,92	0,173	0,175	582	0,2363098
15,472	533,0	533,4	98,27	96,92	0,173	0,176	583	0,2367383
15,443	533,0	533,4	97,04	96,59	0,172	0,176	584	0,2363096
15,470	533,0	533,4	98,66	96,67	0,172	0,175	585	0,2367383
15,443	533,0	533,4	98,21	97,00	0,173	0,176	586	0,2363096
15,343	533,0	533,4	99,89	97,41	0,174	0,176	587	0,2348017
15,442	533,0	533,4	99,06	96,29	0,174	0,175	588	0,2363096
15,344	533,0	533,4	98,04	97,41	0,173	0,175	589	0,2348011
15,512	533,0	533,4	97,65	96,59	0,172	0,176	590	0,23738
15,470	532,9	533,4	99,20	96,21	0,174	0,175	591	0,2367381
15,442	532,9	533,3	99,06	96,78	0,175	0,175	592	0,2363091
15,469	532,9	533,3	97,84	96,73	0,173	0,176	593	0,2367379
15,512	532,9	533,3	96,65	96,21	0,172	0,176	594	0,2373793
15,469	532,9	533,3	97,34	96,81	0,171	0,176	595	0,2367243
15,442	532,9	533,3	97,32	97,04	0,171	0,176	596	0,236309
15,399	532,9	533,3	99,42	97,11	0,173	0,176	597	0,2356643
15,469	532,9	533,3	99,19	96,21	0,175	0,175	598	0,2367379
15,442	532,8	533,3	99,33	96,52	0,175	0,175	599	0,2363096
15,370	532,8	533,3	99,71	96,81	0,175	0,175	600	0,2352338
15,469	532,8	533,3	99,33	96,51	0,175	0,175	601	0,236738
15,442	532,8	533,3	98,36	97,15	0,174	0,176	602	0,2363095
15,469	532,8	533,2	98,93	96,04	0,174	0,175	603	0,2367375
15,373	532,8	533,2	97,28	96,61	0,172	0,175	604	0,2352864



15,370	532,8	533,2	97,82	96,91	0,171	0,175	605	0,2352334
15,343	532,8	533,2	100,24	97,26	0,173	0,175	606	0,2348012
15,468	532,8	533,2	99,17	96,50	0,175	0,175	607	0,2367375
15,440	532,8	533,2	99,45	96,51	0,175	0,175	608	0,2363098
15,440	532,8	533,2	97,37	96,56	0,173	0,175	609	0,2363091
15,439	532,7	533,2	98,36	96,18	0,172	0,175	610	0,2363088
15,439	532,7	533,2	99,82	96,68	0,174	0,175	611	0,2363089
15,440	532,7	533,2	97,38	96,73	0,174	0,175	612	0,2363092
15,439	532,7	533,1	98,19	96,35	0,172	0,175	613	0,2363094
15,439	532,7	533,2	98,04	96,85	0,173	0,175	614	0,2363085
15,438	532,8	533,2	97,32	96,60	0,172	0,175	615	0,2363089
15,438	532,8	533,2	97,25	96,70	0,171	0,175	616	0,2363088
15,438	532,8	533,2	98,34	96,37	0,172	0,175	617	0,2363091
15,438	532,8	533,2	98,99	96,53	0,174	0,175	618	0,2363091
15,466	532,8	533,2	98,63	96,12	0,174	0,175	619	0,2367374
15,396	532,7	533,2	98,90	96,63	0,174	0,175	620	0,2356635
15,467	532,7	533,2	97,08	96,12	0,172	0,175	621	0,2367374
15,466	532,7	533,2	97,48	95,72	0,172	0,174	622	0,2367377
15,438	532,7	533,2	99,38	97,05	0,173	0,175	623	0,236309
15,467	532,7	533,1	99,43	96,38	0,175	0,176	624	0,2367376
15,340	532,7	533,1	98,15	96,95	0,173	0,175	625	0,2348011
15,440	532,6	533,1	97,21	96,49	0,171	0,175	626	0,2363298
15,439	532,6	533,1	99,45	96,55	0,173	0,175	627	0,2363095
15,369	532,6	533,1	97,56	96,85	0,173	0,175	628	0,2352335
15,438	532,6	533,1	98,62	96,47	0,172	0,175	629	0,2363093
15,339	532,6	533,1	98,51	96,95	0,173	0,175	630	0,2348069
15,436	532,6	533,1	99,70	96,65	0,174	0,175	631	0,2363092
15,437	532,6	533,1	99,14	96,83	0,175	0,176	632	0,2363094
15,437	532,6	533,1	97,03	96,26	0,173	0,175	633	0,2363091
15,226	532,6	533,1	100,74	98,07	0,173	0,175	634	0,2330673
15,437	532,6	533,1	97,43	95,98	0,173	0,175	635	0,2363094
15,465	532,6	533,1	99,14	96,55	0,173	0,175	636	0,236737
15,465	532,6	533,1	99,16	96,29	0,175	0,175	637	0,236738
15,338	532,6	533,1	100,01	97,11	0,175	0,175	638	0,2348014
15,465	532,7	533,1	96,83	96,38	0,173	0,175	639	0,2367373
15,437	532,7	533,1	97,54	96,71	0,171	0,175	640	0,2363092
15,395	532,6	533,1	99,68	96,81	0,173	0,175	641	0,2356638
15,225	532,6	533,1	98,90	97,82	0,173	0,175	642	0,2330664
15,464	532,6	533,1	97,71	96,56	0,172	0,175	643	0,2367373
15,464	532,6	533,1	98,41	96,52	0,173	0,176	644	0,2367377
15,435	532,6	533,1	99,36	96,51	0,174	0,175	645	0,2363096
15,505	532,6	533,1	96,53	95,89	0,173	0,175	646	0,2373794
15,464	532,6	533,1	97,08	96,25	0,171	0,175	647	0,2367373
15,436	532,7	533,1	98,58	96,54	0,172	0,175	648	0,2363089
15,468	532,7	533,0	99,21	96,49	0,174	0,175	649	0,2368055
15,436	532,7	533,0	97,74	96,72	0,174	0,176	650	0,2363092
15,463	532,7	533,0	99,41	96,77	0,174	0,176	651	0,2367379

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	99,15	98,46	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
15,642	531,2	531,6			0,178	0,179	0	0,2352304
15,556	531,2	531,6	100,39	98,19	0,179	0,179	1	0,2347982
15,572	531,2	531,6	98,40	98,35	0,177	0,178	2	0,2347977
15,503	531,2	531,7	100,20	98,69	0,176	0,178	3	0,2330634
15,689	531,2	531,7	100,26	98,39	0,177	0,178	4	0,2352306
15,725	531,2	531,7	101,10	98,43	0,179	0,178	5	0,2352305
15,628	531,2	531,7	100,23	100,14	0,177	0,178	6	0,2330634
15,604	531,2	531,7	102,89	100,45	0,177	0,178	7	0,2319734
15,728	531,2	531,7	102,56	100,30	0,178	0,178	8	0,2330632
15,770	531,2	531,7	102,25	100,64	0,178	0,178	9	0,2330633
15,659	531,2	531,7	104,28	101,33	0,178	0,177	10	0,2310974
15,741	531,2	531,7	101,51	100,99	0,177	0,178	11	0,2326285
15,620	531,3	531,7	102,73	102,37	0,176	0,178	12	0,2304372
15,762	531,3	531,8	102,60	102,06	0,176	0,178	13	0,2315351
15,641	531,3	531,8	102,99	102,99	0,176	0,178	14	0,2299971
15,714	531,4	531,9	103,34	101,63	0,176	0,178	15	0,2315356
15,690	531,4	531,9	103,90	101,18	0,178	0,178	16	0,2315352
15,746	531,5	531,9	102,73	100,60	0,178	0,177	17	0,2326288
15,577	531,5	532,0	102,05	101,84	0,176	0,178	18	0,2304378
15,655	531,6	532,0	103,08	100,94	0,176	0,178	19	0,2315355
15,508	531,7	532,1	102,03	102,67	0,176	0,178	20	0,2294036
15,505	531,7	532,1	102,47	102,38	0,175	0,178	21	0,2293358
15,664	531,8	532,2	103,45	101,07	0,177	0,178	22	0,2315356
15,701	531,8	532,2	100,92	101,38	0,176	0,178	23	0,231974
15,705	531,8	532,2	101,07	101,23	0,174	0,178	24	0,231974
15,578	531,8	532,2	103,08	101,88	0,175	0,178	25	0,229998
15,731	531,9	532,3	101,48	101,60	0,176	0,178	26	0,2319738
15,735	531,9	532,3	101,82	102,08	0,175	0,178	27	0,2315358
15,608	532,0	532,4	103,25	102,75	0,175	0,178	28	0,2293364
15,669	532,0	532,4	104,41	102,46	0,176	0,177	29	0,2299986
15,761	532,1	532,5	102,70	101,64	0,177	0,177	30	0,2315362
15,576	532,1	532,5	105,26	102,95	0,177	0,177	31	0,2288922
15,756	532,1	532,5	103,64	101,41	0,178	0,177	32	0,2315362
15,659	532,1	532,6	103,89	102,03	0,177	0,177	33	0,2304385
15,623	532,1	532,5	104,15	101,99	0,177	0,177	34	0,2299986
15,615	532,1	532,5	102,13	102,38	0,176	0,177	35	0,2299984
15,615	532,1	532,6	101,60	102,35	0,174	0,178	36	0,2299983
15,687	532,1	532,6	103,48	101,20	0,175	0,177	37	0,2310979
15,685	532,1	532,6	101,58	102,09	0,176	0,177	38	0,2310984
15,595	532,1	532,6	104,38	101,92	0,176	0,178	39	0,2299246
15,607	532,1	532,6	104,00	101,90	0,178	0,177	40	0,2299987
15,550	532,1	532,6	104,14	101,87	0,177	0,177	41	0,2293353
15,683	532,2	532,7	102,07	102,09	0,176	0,177	42	0,2310984
15,608	532,2	532,7	103,92	101,60	0,176	0,177	43	0,2299981
15,684	532,3	532,7	103,20	101,55	0,177	0,177	44	0,2310981
15,641	532,3	532,7	101,97	101,89	0,176	0,177	45	0,2304386
15,648	532,3	532,8	102,26	102,31	0,175	0,178	46	0,2304384
15,580	532,3	532,8	103,87	102,69	0,176	0,178	47	0,2293358
15,627	532,3	532,8	104,15	102,18	0,177	0,178	48	0,2299918
15,735	532,3	532,8	101,51	102,04	0,176	0,178	49	0,2315369
15,621	532,3	532,8	103,11	102,42	0,175	0,178	50	0,2299988
15,758	532,3	532,8	102,84	100,91	0,176	0,177	51	0,2319745
15,710	532,4	532,8	102,48	101,33	0,176	0,177	52	0,2310988
15,711	532,4	532,9	103,49	102,07	0,176	0,177	53	0,2310989
15,797	532,4	532,9	101,05	101,28	0,175	0,178	54	0,2323228
15,725	532,4	532,9	103,43	102,19	0,175	0,178	55	0,2310991

15,730	532,4	532,9	101,66	102,37	0,175	0,178	56	0,2311023
15,736	532,4	532,9	101,69	102,50	0,174	0,178	57	0,2310985
15,593	532,4	532,9	102,37	103,25	0,173	0,178	58	0,2288931
15,598	532,4	532,9	102,60	103,13	0,173	0,178	59	0,2288929
15,699	532,5	533,0	101,94	102,44	0,174	0,178	60	0,2304389
15,698	532,5	533,0	102,34	102,23	0,174	0,177	61	0,230439
15,747	532,5	533,0	103,53	102,11	0,176	0,177	62	0,2310985
15,676	532,5	533,0	104,79	102,55	0,177	0,178	63	0,2299987
15,671	532,5	533,0	104,26	102,74	0,178	0,178	64	0,2299697
15,608	532,5	533,1	103,46	102,82	0,176	0,177	65	0,2289399
15,676	532,6	533,1	104,34	102,67	0,176	0,177	66	0,2299988
15,627	532,6	533,1	103,22	102,41	0,176	0,177	67	0,2293357
15,674	532,6	533,1	102,48	102,39	0,175	0,177	68	0,2299987
15,635	532,6	533,1	102,55	103,27	0,174	0,178	69	0,2293364
15,607	532,6	533,1	102,33	103,13	0,173	0,178	70	0,2288929
15,601	532,6	533,1	104,81	102,78	0,175	0,177	71	0,2288928
15,595	532,6	533,1	104,87	103,04	0,177	0,177	72	0,2288929
15,594	532,6	533,1	102,21	102,81	0,175	0,177	73	0,2288929
15,668	532,6	533,1	101,99	102,29	0,173	0,177	74	0,2299985
15,622	532,7	533,2	102,31	103,10	0,173	0,178	75	0,2293363
15,670	532,7	533,2	104,03	102,22	0,175	0,177	76	0,2299989
15,671	532,7	533,2	102,33	102,16	0,175	0,177	77	0,229999
15,599	532,7	533,2	102,48	102,84	0,174	0,177	78	0,2288934
15,645	532,7	533,3	104,91	102,68	0,176	0,177	79	0,2296173
15,667	532,7	533,3	101,89	102,50	0,176	0,177	80	0,2299992
15,668	532,8	533,3	102,92	102,83	0,174	0,178	81	0,2299989
15,663	532,8	533,3	104,17	102,52	0,176	0,178	82	0,2299986
15,696	532,8	533,3	103,98	101,89	0,177	0,177	83	0,2304391
15,603	532,8	533,3	104,08	103,01	0,177	0,177	84	0,2293364
15,687	532,7	533,3	103,65	102,36	0,177	0,178	85	0,2304392
15,559	532,8	533,3	102,80	102,39	0,175	0,177	86	0,2286872
15,677	532,8	533,3	103,62	102,48	0,175	0,177	87	0,2304392
15,681	532,8	533,3	103,26	102,53	0,176	0,178	88	0,230439
15,653	532,8	533,3	104,12	102,62	0,177	0,178	89	0,229999
15,659	532,8	533,3	103,88	102,24	0,177	0,177	90	0,2299996
15,610	532,7	533,3	103,34	102,49	0,176	0,177	91	0,2293364
15,753	532,7	533,3	103,35	101,43	0,176	0,177	92	0,2315368
15,646	532,8	533,4	103,38	102,03	0,177	0,177	93	0,2300949
15,524	532,8	533,4	104,74	103,17	0,177	0,177	94	0,2284468
15,619	532,8	533,4	101,82	101,42	0,175	0,177	95	0,229999
15,611	532,8	533,4	104,05	102,35	0,176	0,177	96	0,2299262
15,714	532,8	533,4	103,36	101,53	0,177	0,178	97	0,231537
15,697	532,9	533,4	100,65	100,96	0,175	0,177	98	0,2315371
15,669	532,9	533,5	103,13	101,43	0,175	0,177	99	0,2310994
15,623	532,9	533,5	103,50	101,74	0,177	0,177	100	0,2304393
15,690	532,9	533,5	102,36	100,96	0,177	0,177	101	0,2315369
15,614	532,9	533,5	103,63	101,55	0,177	0,177	102	0,230439
15,534	532,9	533,5	103,85	102,33	0,177	0,177	103	0,2293367
15,606	532,9	533,5	102,58	101,38	0,176	0,177	104	0,2304392
15,648	532,9	533,5	100,69	101,46	0,174	0,177	105	0,2310998
15,640	532,8	533,5	101,21	101,50	0,174	0,178	106	0,2310994
15,591	532,8	533,5	103,34	101,70	0,176	0,178	107	0,2304391
15,554	532,8	533,5	103,31	101,78	0,177	0,178	108	0,229999
15,661	532,8	533,4	100,48	100,37	0,175	0,177	109	0,2318171
15,645	532,8	533,4	100,91	100,92	0,174	0,177	110	0,2315369
15,538	532,9	533,5	103,33	101,91	0,176	0,178	111	0,2299989
15,537	532,8	533,4	100,73	101,56	0,175	0,178	112	0,2299993
15,483	532,8	533,4	100,98	101,75	0,173	0,177	113	0,2293368
15,626	532,9	533,5	102,72	101,22	0,175	0,178	114	0,2315371
15,584	532,9	533,5	100,18	100,80	0,175	0,178	115	0,2310994
15,501	532,9	533,5	102,70	101,52	0,175	0,177	116	0,2299997

15,618	532,9	533,5	99,98	100,46	0,175	0,178	117	0,2319761
15,651	532,9	533,5	101,44	99,91	0,175	0,177	118	0,232629
15,637	532,9	533,5	100,39	100,27	0,176	0,178	119	0,2326305
15,550	532,9	533,5	99,79	99,82	0,174	0,177	120	0,2315374
15,574	532,9	533,5	99,45	99,78	0,173	0,177	121	0,2319757
15,608	533,0	533,5	100,95	99,99	0,175	0,177	122	0,2326305
15,563	532,9	533,5	100,79	99,89	0,176	0,177	123	0,2319754
15,557	533,0	533,6	101,59	100,19	0,176	0,177	124	0,2319755
15,552	533,0	533,6	99,42	99,41	0,175	0,177	125	0,2319753
15,584	533,0	533,6	99,21	99,36	0,173	0,177	126	0,2326307
15,507	533,0	533,6	100,38	100,00	0,174	0,177	127	0,2315366
15,590	533,0	533,6	100,29	99,02	0,175	0,177	128	0,2330662
15,583	532,9	533,6	99,54	98,95	0,175	0,177	129	0,2330663
15,541	532,9	533,6	99,32	99,08	0,174	0,177	130	0,2326311
15,388	532,9	533,6	100,11	100,15	0,174	0,177	131	0,2304395
15,486	532,9	533,5	100,92	99,68	0,175	0,177	132	0,231976
15,523	532,9	533,5	99,49	99,00	0,176	0,177	133	0,232631
15,468	532,9	533,5	99,47	99,47	0,174	0,177	134	0,2319758
15,608	532,9	533,5	100,07	98,79	0,176	0,178	135	0,2341514
15,499	532,9	533,5	98,92	98,94	0,175	0,178	136	0,2326303
15,431	532,8	533,5	98,91	99,17	0,174	0,177	137	0,2316645
15,517	532,8	533,5	100,51	99,28	0,175	0,178	138	0,2330657
15,586	532,8	533,5	97,98	98,15	0,175	0,178	139	0,2341516
15,505	532,8	533,4	98,13	98,64	0,173	0,177	140	0,2330656
15,575	532,8	533,4	99,80	98,36	0,175	0,177	141	0,2341514
15,636	532,8	533,4	99,39	98,16	0,177	0,178	142	0,2352327
15,463	532,7	533,4	100,33	99,08	0,177	0,178	143	0,2326306
15,359	532,8	533,4	100,46	99,66	0,176	0,178	144	0,2311068
15,385	532,7	533,4	100,90	99,39	0,176	0,178	145	0,2315375
15,303	532,7	533,4	101,28	99,98	0,177	0,178	146	0,2304394
15,478	532,7	533,3	100,06	98,71	0,177	0,178	147	0,2330657
15,427	532,7	533,3	98,88	98,85	0,176	0,178	148	0,2323973
15,440	532,7	533,3	98,23	98,47	0,174	0,177	149	0,2326306
15,363	532,7	533,3	98,59	98,68	0,173	0,177	150	0,2315373
15,354	532,7	533,3	100,56	99,38	0,175	0,177	151	0,2315371
15,380	532,6	533,2	98,24	98,43	0,175	0,177	152	0,2319755
15,418	532,6	533,2	98,51	98,46	0,174	0,177	153	0,2326305
15,617	532,6	533,2	96,97	97,00	0,174	0,177	154	0,2356628
15,437	532,6	533,2	99,35	98,43	0,175	0,177	155	0,2330654
15,441	532,6	533,2	98,26	98,10	0,175	0,177	156	0,2330653
15,364	532,6	533,2	98,23	98,52	0,174	0,177	157	0,2319775
15,506	532,6	533,2	98,64	97,94	0,174	0,177	158	0,2341515
15,405	532,6	533,2	99,97	98,50	0,176	0,177	159	0,2326307
15,546	532,6	533,2	97,34	97,41	0,175	0,177	160	0,2347998
15,430	532,5	533,1	99,60	98,36	0,175	0,177	161	0,2330654
15,541	532,5	533,1	97,77	97,41	0,176	0,177	162	0,2348003
15,353	532,5	533,1	98,41	98,25	0,174	0,177	163	0,2319853
15,560	532,5	533,1	98,94	97,74	0,175	0,177	164	0,2352325
15,491	532,4	533,1	97,40	97,55	0,175	0,178	165	0,2341508
15,533	532,4	533,1	97,11	97,07	0,174	0,177	166	0,2348
15,343	532,4	533,1	98,11	98,40	0,173	0,177	167	0,2319747
15,484	532,4	533,0	97,04	97,62	0,173	0,177	168	0,234151
15,410	532,4	533,0	99,75	98,51	0,175	0,178	169	0,2330648
15,306	532,3	533,0	100,61	99,16	0,177	0,178	170	0,2315368
15,404	532,3	532,9	99,95	98,55	0,177	0,178	171	0,2330649
15,517	532,3	532,9	97,18	97,01	0,176	0,177	172	0,2347995
15,401	532,2	532,9	99,75	98,56	0,175	0,177	173	0,2330648
15,398	532,2	532,9	97,73	98,07	0,175	0,178	174	0,2330649
15,540	532,2	532,8	97,74	97,32	0,174	0,178	175	0,2352315
15,467	532,1	532,8	98,77	97,78	0,176	0,178	176	0,2341504
15,506	532,1	532,8	99,26	97,50	0,177	0,178	177	0,2347996

15,392	532,1	532,7	97,58	98,05	0,176	0,178	178	0,2330646
15,290	532,1	532,7	100,54	98,89	0,175	0,178	179	0,2315367
15,461	532,1	532,7	97,15	97,48	0,175	0,178	180	0,2341501
15,460	532,1	532,7	97,29	97,33	0,174	0,177	181	0,2341499
15,528	532,1	532,7	98,95	97,28	0,176	0,177	182	0,2352319
15,457	532,1	532,7	99,06	97,92	0,177	0,178	183	0,23415
15,455	532,1	532,7	97,34	97,66	0,175	0,178	184	0,2341504
15,453	532,1	532,7	98,25	97,50	0,175	0,177	185	0,2341508
15,498	532,1	532,7	96,57	96,99	0,174	0,177	186	0,2347997
15,454	532,1	532,7	99,23	97,67	0,175	0,177	187	0,2341504
15,281	532,1	532,7	99,83	98,97	0,177	0,178	188	0,2315366
15,495	532,1	532,7	99,08	97,37	0,177	0,178	189	0,2347995
15,596	532,1	532,7	98,19	96,62	0,177	0,178	190	0,2363077
15,494	532,1	532,6	96,91	97,34	0,175	0,177	191	0,2347997
15,451	532,0	532,6	99,06	97,38	0,175	0,177	192	0,2341508
15,493	532,0	532,6	98,90	97,49	0,177	0,178	193	0,2347997
15,448	532,0	532,6	99,35	97,65	0,177	0,178	194	0,2341512
15,491	532,0	532,6	96,57	96,99	0,175	0,177	195	0,2347996
15,490	532,0	532,6	96,56	97,10	0,173	0,177	196	0,234799
15,445	531,9	532,5	97,50	97,65	0,174	0,177	197	0,2341507
15,371	531,9	532,5	99,67	98,41	0,176	0,178	198	0,2330643
15,586	531,9	532,5	98,40	96,88	0,177	0,178	199	0,2363075
15,442	531,9	532,5	96,96	97,31	0,175	0,178	200	0,2341498
15,370	531,9	532,5	97,83	98,03	0,174	0,177	201	0,2330641
15,480	531,8	532,5	99,24	97,30	0,176	0,178	202	0,2347995
15,292	531,8	532,4	98,23	98,29	0,176	0,178	203	0,2319745
15,436	531,8	532,4	99,16	97,72	0,176	0,178	204	0,2341516
15,341	531,8	532,4	97,74	97,59	0,176	0,177	205	0,2327522
15,507	531,8	532,4	96,33	97,13	0,173	0,177	206	0,2352316
15,504	531,8	532,4	98,26	97,37	0,175	0,178	207	0,2352316
15,476	531,8	532,4	99,29	97,32	0,177	0,178	208	0,234799
15,432	531,8	532,3	99,25	97,66	0,178	0,178	209	0,23415
15,529	531,7	532,3	96,49	96,89	0,176	0,178	210	0,2356619
15,602	531,8	532,4	95,90	96,45	0,174	0,178	211	0,2367355
15,501	531,8	532,4	97,11	96,37	0,174	0,177	212	0,2352313
15,503	531,7	532,3	99,09	96,88	0,176	0,177	213	0,2352311
15,473	531,7	532,3	96,74	97,23	0,176	0,177	214	0,2347987
15,429	531,7	532,3	96,93	97,34	0,173	0,178	215	0,23415
15,527	531,7	532,3	98,77	97,18	0,176	0,178	216	0,2356613
15,356	531,7	532,3	98,16	97,53	0,176	0,178	217	0,2330647
15,283	531,6	532,2	99,96	98,83	0,176	0,178	218	0,2319737
15,424	531,6	532,2	97,22	97,30	0,176	0,178	219	0,2341502
15,354	531,6	532,2	97,56	97,81	0,174	0,177	220	0,2330644
15,286	531,6	532,2	98,02	98,45	0,174	0,178	221	0,2321035
15,491	531,6	532,1	97,25	96,58	0,174	0,177	222	0,2352316
15,464	531,5	532,1	97,21	96,84	0,175	0,177	223	0,2347994
15,278	531,5	532,1	99,91	98,50	0,176	0,177	224	0,2319782
15,491	531,5	532,1	96,28	96,93	0,175	0,178	225	0,2352184
15,561	531,5	532,1	98,02	96,18	0,175	0,177	226	0,2363068
15,419	531,5	532,1	99,49	97,21	0,178	0,177	227	0,2341497
15,320	531,5	532,1	99,27	97,67	0,177	0,177	228	0,232629
15,519	531,5	532,1	98,84	96,91	0,177	0,177	229	0,2356612
15,417	531,6	532,1	99,46	97,25	0,178	0,178	230	0,2341498
15,464	531,6	532,1	98,87	97,23	0,178	0,178	231	0,2348344
15,460	531,6	532,1	97,28	97,73	0,176	0,178	232	0,234799
15,461	531,6	532,1	99,09	97,08	0,176	0,178	233	0,2347984
15,318	531,5	532,1	99,71	98,22	0,178	0,178	234	0,2326282
15,485	531,5	532,1	98,51	97,21	0,177	0,178	235	0,2352307
15,415	531,5	532,1	97,12	97,33	0,176	0,178	236	0,2341491
15,341	531,5	532,1	97,76	97,99	0,174	0,178	237	0,2330641
15,511	531,5	532,1	96,48	97,35	0,174	0,178	238	0,2356606



15,453	531,5	532,1	96,49	97,39	0,174	0,178	239	0,2347985
15,240	531,5	532,0	99,98	98,48	0,175	0,178	240	0,2315356
15,452	531,5	532,0	97,42	96,99	0,176	0,178	241	0,234798
15,409	531,5	532,0	97,02	97,90	0,174	0,178	242	0,234149
15,382	531,4	532,0	99,19	97,60	0,176	0,178	243	0,2337453
15,409	531,4	532,0	98,87	96,93	0,177	0,177	244	0,2341499
15,458	531,4	532,0	97,15	97,70	0,176	0,178	245	0,23474
15,491	531,5	532,0	96,75	97,14	0,174	0,178	246	0,2352306
15,515	531,5	532,0	98,56	96,50	0,176	0,178	247	0,2356612
15,416	531,5	532,0	99,46	97,26	0,178	0,177	248	0,2341498
15,459	531,5	532,0	98,71	96,73	0,178	0,177	249	0,2347985
15,312	531,5	532,0	100,02	97,95	0,178	0,177	250	0,232629
15,312	531,5	532,0	99,27	97,88	0,177	0,177	251	0,2326286
15,509	531,5	532,0	96,53	97,42	0,175	0,178	252	0,2356612
15,452	531,4	532,0	98,50	97,07	0,175	0,178	253	0,2347986
15,339	531,4	531,9	98,39	97,81	0,176	0,178	254	0,2330636
15,452	531,4	531,9	96,55	97,21	0,174	0,178	255	0,2348501
15,263	531,4	531,9	98,10	98,94	0,174	0,178	256	0,2319731
15,311	531,3	531,9	97,86	98,43	0,174	0,179	257	0,232693
15,448	531,3	531,8	98,81	97,28	0,176	0,178	258	0,234798
15,404	531,3	531,8	97,09	97,60	0,176	0,178	259	0,2341495
15,403	531,2	531,8	97,47	97,74	0,174	0,178	260	0,2341492
15,474	531,3	531,8	98,51	96,80	0,176	0,178	261	0,2352302
15,445	531,2	531,8	97,16	97,33	0,176	0,178	262	0,2347983
15,401	531,2	531,8	96,90	97,36	0,174	0,178	263	0,2341491
15,304	531,2	531,8	98,24	98,05	0,174	0,178	264	0,2326282
15,543	531,2	531,7	96,38	96,50	0,175	0,178	265	0,2363059
15,401	531,1	531,7	98,99	97,26	0,176	0,178	266	0,2341488
15,441	531,1	531,7	96,87	97,21	0,176	0,178	267	0,234798
15,256	531,1	531,7	98,69	98,59	0,175	0,178	268	0,2319768
15,437	531,1	531,6	97,31	97,05	0,175	0,178	269	0,2347641
15,438	531,1	531,6	98,29	96,86	0,176	0,178	270	0,2347981
15,447	531,0	531,6	99,27	96,88	0,178	0,177	271	0,234798
15,336	531,1	531,6	98,49	97,88	0,177	0,178	272	0,2330635
15,416	531,1	531,6	98,85	97,51	0,176	0,178	273	0,2343087
15,476	531,1	531,6	98,72	97,01	0,177	0,178	274	0,2352298
15,449	531,1	531,6	98,33	96,91	0,177	0,178	275	0,2347981
15,502	531,1	531,6	96,42	96,89	0,175	0,178	276	0,2356607
15,330	531,1	531,6	99,57	97,87	0,176	0,178	277	0,2330634
15,500	531,1	531,6	98,74	96,70	0,178	0,178	278	0,2356604
15,490	531,0	531,6	96,31	97,16	0,176	0,178	279	0,2355471
15,441	531,0	531,6	97,81	97,02	0,175	0,178	280	0,2347976
15,468	531,0	531,5	98,47	96,98	0,177	0,178	281	0,2352302
15,537	531,0	531,5	98,49	96,28	0,178	0,178	282	0,2363057
15,468	531,0	531,5	99,00	96,52	0,178	0,177	283	0,23523
15,396	530,9	531,5	97,26	97,89	0,176	0,178	284	0,2341488
15,537	530,9	531,5	96,77	96,70	0,175	0,178	285	0,2363049
15,438	530,9	531,5	98,99	97,16	0,177	0,178	286	0,2347979
15,465	530,9	531,5	96,45	97,35	0,176	0,178	287	0,2352303
15,493	530,9	531,4	98,28	96,44	0,176	0,178	288	0,2356601
15,294	530,9	531,4	99,78	97,78	0,178	0,177	289	0,2326282
15,393	530,9	531,4	97,16	97,69	0,176	0,178	290	0,2341483
15,464	530,8	531,4	98,74	96,51	0,176	0,178	291	0,23523
15,511	530,9	531,4	98,33	96,19	0,178	0,177	292	0,2359417
15,406	530,9	531,4	99,31	96,98	0,178	0,177	293	0,2341483
15,305	530,9	531,4	99,84	97,72	0,178	0,177	294	0,2326274
15,475	531,0	531,5	96,19	97,24	0,175	0,178	295	0,2352299
15,486	531,0	531,5	96,55	97,42	0,174	0,179	296	0,2354436
15,543	531,0	531,5	98,39	96,54	0,176	0,178	297	0,2363057
15,442	531,0	531,5	96,68	97,75	0,176	0,178	298	0,234798
15,497	531,0	531,5	96,42	97,06	0,174	0,179	299	0,23566

15,441	531,0	531,5	97,26	96,95	0,174	0,178	300	0,2347985
15,538	531,0	531,5	98,61	96,31	0,177	0,177	301	0,2363057
15,494	531,0	531,5	98,10	96,88	0,178	0,178	302	0,2356601
15,437	531,0	531,5	96,74	97,92	0,175	0,179	303	0,2347976
15,323	531,0	531,5	99,10	97,79	0,175	0,179	304	0,2330627
15,324	531,0	531,5	99,48	97,35	0,177	0,177	305	0,2330629
15,465	530,9	531,5	96,37	97,39	0,176	0,178	306	0,2352297
15,493	530,9	531,5	96,49	96,90	0,174	0,178	307	0,2356602
15,464	530,9	531,5	98,60	96,84	0,176	0,178	308	0,2352299
15,393	530,9	531,4	97,12	97,79	0,176	0,178	309	0,2341482
15,251	530,9	531,4	100,06	97,86	0,176	0,178	310	0,231973
15,464	530,9	531,4	98,86	96,94	0,178	0,177	311	0,2352302
15,435	530,9	531,4	98,20	97,29	0,177	0,178	312	0,2347974
15,535	530,9	531,4	97,18	96,79	0,176	0,178	313	0,2363057
15,492	530,9	531,4	98,54	96,56	0,177	0,178	314	0,2356598
15,464	530,9	531,4	98,75	96,87	0,178	0,178	315	0,2352302
15,534	530,9	531,4	98,39	96,24	0,178	0,178	316	0,2363043
15,534	530,9	531,4	98,00	96,62	0,178	0,178	317	0,2363058
15,405	530,9	531,4	96,99	97,85	0,176	0,178	318	0,2341481
15,405	531,0	531,5	98,88	97,67	0,175	0,178	319	0,2341488
15,506	531,0	531,5	98,44	96,29	0,177	0,178	320	0,2356603
15,474	531,1	531,5	98,24	97,31	0,177	0,178	321	0,2352302
15,333	531,1	531,6	99,96	97,97	0,178	0,178	322	0,233063
15,514	531,1	531,6	96,51	97,22	0,176	0,178	323	0,235854
15,500	531,1	531,6	96,47	97,14	0,174	0,179	324	0,2356601
15,542	531,1	531,6	96,34	97,07	0,174	0,179	325	0,236298
15,470	531,1	531,6	96,58	97,29	0,174	0,179	326	0,2352299
15,327	531,1	531,6	97,57	98,54	0,174	0,179	327	0,233063
15,297	531,1	531,6	98,74	97,89	0,175	0,178	328	0,2326278
15,468	531,0	531,6	96,87	97,17	0,175	0,178	329	0,2352294
15,467	531,0	531,6	98,66	96,39	0,176	0,178	330	0,2352297
15,495	531,0	531,5	98,42	96,87	0,178	0,177	331	0,23566
15,466	531,0	531,5	98,31	96,59	0,177	0,178	332	0,2352302
15,465	531,0	531,5	98,70	97,13	0,177	0,178	333	0,23523
15,466	531,0	531,5	96,78	97,34	0,176	0,178	334	0,2352301
15,466	531,0	531,6	97,42	96,83	0,175	0,178	335	0,2352297
15,466	531,0	531,6	98,57	97,20	0,177	0,178	336	0,2352296
15,465	531,0	531,6	98,08	96,23	0,177	0,177	337	0,2352298
15,253	531,0	531,6	98,16	98,50	0,176	0,177	338	0,2319731
15,465	531,0	531,6	98,73	96,91	0,176	0,178	339	0,23523
15,393	531,0	531,6	97,28	97,50	0,176	0,178	340	0,2341484
15,435	531,0	531,6	99,00	97,15	0,176	0,178	341	0,2347973
15,464	531,0	531,6	96,64	97,05	0,176	0,178	342	0,2352296
15,436	531,0	531,6	98,82	97,00	0,176	0,178	343	0,2347977
15,465	531,0	531,6	96,60	97,06	0,176	0,178	344	0,23523
15,435	531,0	531,6	98,75	97,20	0,176	0,178	345	0,2347976
15,463	531,0	531,6	96,26	97,06	0,176	0,178	346	0,2352298
15,392	531,0	531,5	97,27	97,42	0,174	0,178	347	0,2341485
15,434	531,0	531,5	96,93	97,53	0,174	0,178	348	0,234798
15,490	531,0	531,5	96,70	96,59	0,174	0,178	349	0,2356601
15,400	531,0	531,5	99,50	97,40	0,176	0,178	350	0,234149
15,442	531,0	531,5	96,26	97,17	0,176	0,178	351	0,234797
15,338	531,0	531,6	97,64	97,53	0,174	0,178	352	0,2332225
15,497	531,1	531,6	97,16	97,28	0,175	0,178	353	0,23566
15,487	531,1	531,6	97,13	97,16	0,175	0,179	354	0,2355256
15,439	531,1	531,6	97,04	97,38	0,175	0,178	355	0,2347979
15,223	531,1	531,6	98,44	98,74	0,175	0,178	356	0,231535
15,395	531,0	531,6	98,54	97,04	0,176	0,178	357	0,234149
15,330	531,0	531,5	99,72	97,71	0,177	0,177	358	0,2331907
15,435	531,0	531,5	98,92	97,37	0,178	0,178	359	0,234798
15,433	530,9	531,5	98,52	97,46	0,178	0,178	360	0,2347976

15,532	530,9	531,5	96,83	96,21	0,176	0,178	361	0,2363053
15,560	530,9	531,5	97,75	96,52	0,176	0,178	362	0,2367337
15,487	530,9	531,4	96,31	96,99	0,176	0,178	363	0,2356605
15,431	530,9	531,4	98,57	97,75	0,176	0,179	364	0,2347977
15,387	530,8	531,4	97,71	97,08	0,176	0,178	365	0,2341483
15,487	530,8	531,4	97,41	96,93	0,176	0,178	366	0,2356602
15,458	530,8	531,4	98,77	97,18	0,177	0,178	367	0,2352295
15,430	530,8	531,4	97,03	97,33	0,176	0,178	368	0,2347977
15,430	530,8	531,3	96,99	97,38	0,175	0,178	369	0,2347975
15,429	530,8	531,3	98,80	96,87	0,176	0,178	370	0,234798
15,457	530,7	531,3	96,40	96,64	0,176	0,177	371	0,2352301
15,385	530,7	531,3	96,67	97,29	0,174	0,178	372	0,2341484
15,463	530,7	531,3	98,99	97,24	0,176	0,178	373	0,2352299
15,395	530,8	531,3	97,49	97,69	0,177	0,178	374	0,2341484
15,396	530,9	531,4	97,18	97,61	0,175	0,178	375	0,2341482
15,438	530,9	531,4	96,80	97,21	0,174	0,178	376	0,2347978
15,465	530,9	531,4	99,06	97,10	0,176	0,178	377	0,2352301
15,535	530,9	531,4	96,41	96,95	0,176	0,178	378	0,2363055
15,249	530,9	531,4	98,63	98,21	0,175	0,178	379	0,2319739
15,462	530,9	531,4	97,40	97,57	0,175	0,178	380	0,2352298
15,489	530,9	531,4	97,03	96,74	0,175	0,178	381	0,2356603
15,318	530,9	531,4	97,58	97,86	0,175	0,178	382	0,2330641
15,558	530,9	531,4	98,02	96,68	0,176	0,178	383	0,2367343
15,458	530,9	531,4	98,63	97,15	0,178	0,178	384	0,2352298
15,486	530,9	531,4	97,90	96,97	0,177	0,178	385	0,2356597
15,527	530,9	531,4	96,24	96,43	0,176	0,178	386	0,2363055
15,484	530,8	531,4	98,82	96,80	0,176	0,178	387	0,2356605
15,427	530,8	531,4	98,66	97,17	0,178	0,178	388	0,2347926
15,427	530,8	531,3	96,43	96,84	0,176	0,178	389	0,2347971
15,426	530,8	531,3	98,59	97,38	0,175	0,178	390	0,2347793
15,455	530,8	531,3	98,63	97,42	0,178	0,179	391	0,2352292
15,483	530,7	531,3	97,12	96,47	0,177	0,178	392	0,2356598
15,552	530,7	531,3	98,40	96,58	0,177	0,178	393	0,2367342
15,552	530,7	531,3	95,80	96,34	0,176	0,178	394	0,2367324
15,451	530,7	531,3	96,82	96,91	0,174	0,178	395	0,23523
15,311	530,7	531,2	97,49	97,60	0,174	0,178	396	0,2330638
15,437	530,7	531,2	99,04	97,56	0,176	0,178	397	0,2347979
15,393	530,8	531,3	98,04	97,68	0,177	0,179	398	0,2341483
15,491	530,8	531,3	98,65	97,16	0,177	0,178	399	0,2356599
15,319	530,8	531,3	99,19	98,01	0,178	0,178	400	0,2330623
15,391	530,9	531,3	99,05	97,49	0,177	0,178	401	0,2341486
15,532	530,9	531,3	96,19	96,43	0,176	0,178	402	0,2363057
15,457	530,9	531,3	98,19	97,12	0,176	0,178	403	0,2351922
15,429	530,9	531,3	96,54	96,97	0,175	0,178	404	0,2347978
15,485	530,9	531,4	96,78	96,39	0,174	0,177	405	0,2356604
15,457	530,9	531,4	99,20	97,19	0,177	0,178	406	0,2352297
15,315	530,9	531,4	97,42	97,72	0,176	0,178	407	0,233067
15,385	530,9	531,4	98,95	97,43	0,176	0,178	408	0,2341485
15,526	530,9	531,4	98,17	96,60	0,178	0,178	409	0,2363054
15,426	530,8	531,4	98,51	97,30	0,178	0,178	410	0,2347979
15,524	530,8	531,3	96,46	96,39	0,176	0,178	411	0,2363058
15,426	530,8	531,3	96,99	96,76	0,175	0,178	412	0,2347977
15,384	530,8	531,3	97,47	97,34	0,175	0,178	413	0,2341486
15,383	530,8	531,3	97,03	97,24	0,175	0,178	414	0,2341485
15,424	530,7	531,3	96,84	97,14	0,174	0,178	415	0,2347973
15,480	530,7	531,2	98,28	97,00	0,176	0,178	416	0,2356596
15,480	530,7	531,2	98,44	96,74	0,178	0,178	417	0,2356601
15,521	530,7	531,2	98,31	96,79	0,178	0,178	418	0,2363053
15,480	530,7	531,2	98,47	96,94	0,178	0,178	419	0,2356601
15,521	530,7	531,2	96,50	96,20	0,176	0,178	420	0,2363058
15,531	530,7	531,2	96,80	96,50	0,175	0,178	421	0,2363051

15,390	530,8	531,2	97,72	97,46	0,175	0,178	422	0,2341507
15,490	530,8	531,3	96,22	96,51	0,174	0,178	423	0,23566
15,460	530,8	531,3	98,14	97,20	0,175	0,178	424	0,2352296
15,460	530,8	531,3	98,62	97,22	0,177	0,178	425	0,2352297
15,530	530,9	531,3	96,53	96,35	0,176	0,178	426	0,2363053
15,487	530,9	531,3	98,41	97,01	0,176	0,178	427	0,2356598
15,456	530,9	531,3	98,38	97,17	0,178	0,178	428	0,2352294
15,427	530,9	531,4	97,20	96,92	0,176	0,178	429	0,2347975
15,455	530,9	531,3	98,63	97,24	0,176	0,178	430	0,2352298
15,384	530,9	531,3	97,22	97,18	0,176	0,178	431	0,2341489
15,524	530,8	531,3	96,17	96,60	0,174	0,178	432	0,2363055
15,382	530,8	531,3	99,19	97,90	0,176	0,179	433	0,2341484
15,481	530,8	531,3	97,12	96,77	0,177	0,178	434	0,2356605
15,550	530,8	531,3	96,61	96,53	0,175	0,178	435	0,2367339
15,522	530,7	531,2	97,71	96,58	0,176	0,178	436	0,236305
15,479	530,7	531,2	96,57	96,53	0,176	0,178	437	0,2356598
15,521	530,7	531,2	95,96	96,38	0,174	0,178	438	0,2363055
15,450	530,7	531,2	96,62	96,83	0,174	0,178	439	0,2352295
15,449	530,7	531,2	96,62	96,90	0,174	0,178	440	0,2352297
15,306	530,7	531,2	99,15	97,74	0,176	0,178	441	0,2330626
15,519	530,7	531,1	96,33	96,81	0,176	0,178	442	0,2363053
15,420	530,7	531,1	99,15	97,29	0,176	0,178	443	0,2347972
15,559	530,7	531,1	95,98	95,82	0,176	0,178	444	0,2367339
15,430	530,7	531,2	97,61	97,01	0,175	0,177	445	0,2347975
15,430	530,8	531,2	98,73	97,13	0,177	0,178	446	0,2347976
15,428	530,8	531,2	98,73	97,27	0,178	0,178	447	0,2347973
15,457	530,8	531,2	96,54	96,83	0,176	0,178	448	0,2352301
15,484	530,7	531,2	98,41	96,66	0,176	0,178	449	0,2356599
15,426	530,7	531,2	98,35	97,34	0,177	0,178	450	0,2347974
15,482	530,7	531,2	98,60	96,79	0,178	0,178	451	0,2356601
15,451	530,7	531,2	96,55	96,83	0,176	0,178	452	0,2352292
15,451	530,7	531,2	97,64	96,74	0,175	0,178	453	0,2352295
15,479	530,7	531,2	98,47	97,40	0,177	0,178	454	0,23566
15,478	530,7	531,1	98,29	96,64	0,178	0,178	455	0,2356596
15,450	530,7	531,1	97,37	97,27	0,177	0,178	456	0,2352295
15,458	530,7	531,1	97,94	97,26	0,176	0,179	457	0,23537
15,519	530,7	531,1	96,23	96,43	0,176	0,178	458	0,2363052
15,447	530,6	531,1	98,57	96,82	0,176	0,178	459	0,2352291
15,448	530,6	531,1	98,54	97,57	0,178	0,179	460	0,235229
15,304	530,6	531,1	97,80	97,36	0,176	0,178	461	0,2330629
15,418	530,6	531,1	97,65	97,50	0,175	0,178	462	0,2347967
15,446	530,6	531,1	98,82	97,28	0,177	0,179	463	0,2352293
15,447	530,6	531,1	96,87	97,16	0,176	0,179	464	0,235229
15,482	530,6	531,1	98,69	96,81	0,176	0,178	465	0,235659
15,215	530,6	531,1	98,68	97,89	0,177	0,177	466	0,2315339
15,287	530,7	531,1	97,53	97,86	0,174	0,177	467	0,2326271
15,486	530,7	531,1	98,27	96,79	0,176	0,178	468	0,2356594
15,242	530,7	531,1	97,97	98,05	0,176	0,178	469	0,231971
15,482	530,7	531,1	98,91	96,83	0,176	0,178	470	0,235633
15,314	530,7	531,1	97,17	97,88	0,176	0,178	471	0,2330616
15,482	530,7	531,1	96,79	96,94	0,174	0,178	472	0,2356597
15,480	530,7	531,1	96,36	96,52	0,174	0,178	473	0,2356599
15,467	530,7	531,1	97,59	97,56	0,175	0,178	474	0,2354692
15,422	530,7	531,1	98,68	97,26	0,177	0,179	475	0,2347966
15,422	530,7	531,2	98,52	97,07	0,177	0,178	476	0,2347976
15,478	530,7	531,2	98,58	97,16	0,178	0,178	477	0,2356598
15,520	530,7	531,2	96,19	96,18	0,176	0,178	478	0,2363049
15,420	530,7	531,2	98,35	96,54	0,176	0,177	479	0,2347971
15,377	530,7	531,2	96,69	97,52	0,175	0,178	480	0,2341486
15,419	530,6	531,1	98,06	96,68	0,175	0,178	481	0,234797
15,517	530,6	531,1	96,10	96,52	0,175	0,178	482	0,2363051

15,545	530,6	531,1	95,88	96,15	0,174	0,178	483	0,2367334
15,475	530,6	531,1	96,34	96,94	0,174	0,178	484	0,2356596
15,446	530,6	531,1	97,54	96,43	0,175	0,178	485	0,2352449
15,445	530,6	531,1	98,39	97,13	0,177	0,178	486	0,235229
15,532	530,6	531,1	96,20	96,53	0,176	0,178	487	0,236305
15,217	530,6	531,1	99,14	99,00	0,175	0,178	488	0,2315342
15,557	530,7	531,1	95,95	96,22	0,175	0,178	489	0,2367329
15,555	530,7	531,2	96,14	96,34	0,174	0,178	490	0,2367334
15,456	530,7	531,2	97,62	97,40	0,175	0,178	491	0,2352292
15,527	530,8	531,2	96,05	96,47	0,175	0,178	492	0,2363051
15,427	530,8	531,2	98,85	97,06	0,176	0,178	493	0,2347968
15,530	530,8	531,2	97,26	96,28	0,177	0,178	494	0,2363834
15,551	530,7	531,2	97,18	96,47	0,176	0,178	495	0,2367334
15,552	530,7	531,2	95,91	96,12	0,175	0,178	496	0,2367333
15,381	530,7	531,2	97,99	97,08	0,175	0,178	497	0,2341486
15,380	530,7	531,2	99,28	97,36	0,177	0,178	498	0,2341482
15,479	530,7	531,2	96,53	96,76	0,176	0,178	499	0,2356603
15,478	530,7	531,1	96,18	97,06	0,174	0,178	500	0,2356597



Average	Average	Average						Average
14,63	Inlet +	Inlet +						0,221
	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	99,80	99,02	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	<b>Proportional Rates</b>		Vol.Std.	Vol.Std.		Delta-P
			<b>PR1</b>	<b>PR2</b>			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
14,719	535,5	535,8			0,176	0,176	0	0,217997
14,814	535,3	535,7	103,10	100,51	0,176	0,176	1	0,2203102
14,717	535,1	535,6	102,20	99,44	0,177	0,176	2	0,2207719
14,726	534,8	535,5	102,19	99,56	0,177	0,176	3	0,2207709
14,742	534,6	535,4	102,58	99,78	0,177	0,176	4	0,2207712
14,736	534,5	535,3	102,39	99,75	0,177	0,176	5	0,2203119
14,523	534,5	535,3	104,96	102,26	0,176	0,176	6	0,216364
14,845	534,5	535,3	103,63	100,64	0,177	0,176	7	0,2203119
14,819	534,6	535,3	103,97	101,06	0,177	0,176	8	0,2196196
14,663	534,5	535,3	105,06	101,63	0,177	0,175	9	0,2175323
14,737	534,5	535,3	102,48	102,44	0,175	0,176	10	0,2179972
14,724	534,4	535,2	105,07	102,48	0,175	0,176	11	0,2175322
14,741	534,4	535,2	102,83	101,79	0,175	0,176	12	0,2184626
14,708	534,3	535,2	102,23	101,68	0,174	0,176	13	0,2184611
14,835	534,4	535,3	101,89	100,84	0,174	0,176	14	0,2202412
14,733	534,5	535,3	104,12	101,24	0,175	0,176	15	0,2184629
14,681	534,5	535,3	105,34	102,82	0,176	0,176	16	0,2168314
14,702	534,6	535,3	103,41	103,74	0,174	0,176	17	0,2163636
14,661	534,5	535,3	103,13	103,57	0,172	0,177	18	0,2163636
14,577	534,5	535,3	103,77	102,54	0,173	0,176	19	0,2161615
14,749	534,4	535,2	101,06	101,14	0,173	0,176	20	0,2196195
14,731	534,4	535,3	102,09	100,49	0,174	0,176	21	0,2196194
14,669	534,6	535,4	100,85	100,74	0,174	0,176	22	0,2191572
14,737	534,7	535,4	100,87	100,21	0,173	0,176	23	0,2203114
14,812	534,7	535,4	101,30	99,13	0,175	0,176	24	0,2217087
14,702	534,6	535,4	99,87	99,97	0,174	0,176	25	0,2203119
14,563	534,6	535,4	100,46	101,46	0,172	0,177	26	0,2184625
14,702	534,5	535,3	99,80	99,60	0,172	0,177	27	0,2207712
14,654	534,5	535,3	101,59	99,08	0,174	0,176	28	0,2203119
14,769	534,5	535,3	99,00	99,24	0,174	0,176	29	0,2219175
14,592	534,6	535,4	102,39	100,11	0,174	0,176	30	0,2191578
14,707	534,6	535,4	100,65	99,64	0,175	0,176	31	0,2207709
14,716	534,6	535,4	100,77	99,25	0,174	0,176	32	0,220771
14,810	534,6	535,4	101,19	98,95	0,175	0,176	33	0,2219163
14,750	534,5	535,3	99,25	99,92	0,174	0,176	34	0,2207716
14,695	534,5	535,3	102,14	100,48	0,173	0,176	35	0,21962
14,618	534,5	535,3	102,96	100,46	0,175	0,176	36	0,2183062
14,622	534,6	535,3	102,94	101,22	0,175	0,175	37	0,217998
14,692	534,7	535,4	103,18	101,54	0,175	0,176	38	0,2184629
14,756	534,7	535,4	103,08	100,67	0,175	0,176	39	0,2191583
14,611	534,7	535,4	102,57	102,23	0,174	0,175	40	0,216832
14,736	534,6	535,4	102,77	101,95	0,173	0,176	41	0,2184632
14,696	534,6	535,3	104,03	102,61	0,174	0,176	42	0,2175323
14,626	534,6	535,3	102,02	102,89	0,173	0,177	43	0,2168316
14,736	534,6	535,4	104,16	102,08	0,173	0,176	44	0,217998
14,628	534,8	535,5	104,80	102,51	0,175	0,176	45	0,2163645
14,714	534,8	535,5	102,55	102,36	0,174	0,176	46	0,2175326
14,708	534,9	535,6	102,37	102,24	0,172	0,176	47	0,2175326
14,705	534,8	535,6	102,07	102,49	0,172	0,176	48	0,2175329
14,705	534,8	535,5	103,82	102,46	0,173	0,176	49	0,2175326
14,574	534,8	535,5	102,95	103,70	0,173	0,176	50	0,2156605
14,685	534,8	535,5	102,26	102,88	0,172	0,177	51	0,2175332
14,837	534,9	535,6	102,07	101,02	0,173	0,176	52	0,2196197
14,649	535,0	535,7	104,16	103,02	0,174	0,176	53	0,216832

14,655	535,0	535,7	104,07	103,18	0,174	0,177	54	0,2168318
14,701	535,0	535,7	103,39	102,84	0,174	0,177	55	0,2175329
14,654	535,0	535,7	104,49	102,77	0,174	0,176	56	0,2168322
14,736	535,0	535,7	104,24	102,28	0,175	0,176	57	0,2179982
14,633	534,9	535,7	102,82	103,05	0,174	0,176	58	0,2163645
14,705	535,0	535,7	102,39	101,99	0,172	0,176	59	0,2175327
14,672	535,1	535,8	103,92	103,61	0,173	0,176	60	0,216832
14,695	535,2	535,9	102,97	103,45	0,173	0,177	61	0,2168311
14,626	535,2	535,9	103,44	103,91	0,172	0,177	62	0,2156604
14,596	535,2	535,9	106,04	104,18	0,174	0,177	63	0,2152002
14,763	535,1	535,9	103,92	102,42	0,175	0,176	64	0,2175329
14,718	535,1	535,9	102,90	103,25	0,173	0,176	65	0,2168317
14,640	535,1	535,8	105,61	103,56	0,173	0,176	66	0,2156599
14,755	535,1	535,9	104,29	103,39	0,175	0,176	67	0,2175331
14,634	535,2	536,0	105,75	103,88	0,175	0,177	68	0,2156601
14,774	535,3	536,0	102,82	103,19	0,174	0,176	69	0,2175333
14,693	535,3	536,1	103,20	103,49	0,172	0,176	70	0,2163647
14,801	535,4	536,1	104,42	102,73	0,173	0,176	71	0,217998
14,769	535,3	536,1	104,88	102,83	0,175	0,176	72	0,2175329
14,717	535,3	536,0	104,68	103,78	0,175	0,177	73	0,2168315
14,702	535,3	536,0	103,12	103,18	0,173	0,177	74	0,2166706
14,740	535,2	536,0	104,71	102,97	0,174	0,176	75	0,217533
14,773	535,4	536,1	102,36	102,67	0,174	0,176	76	0,2179984
14,711	535,4	536,2	104,30	103,69	0,173	0,177	77	0,2168321
14,711	535,5	536,2	102,55	103,20	0,173	0,177	78	0,216832
14,672	535,5	536,2	105,32	103,44	0,173	0,176	79	0,216365
14,667	535,4	536,2	102,83	102,68	0,173	0,176	80	0,2163649
14,581	535,4	536,1	103,87	103,31	0,172	0,175	81	0,215189
14,690	535,4	536,1	104,82	103,09	0,174	0,176	82	0,2168321
14,739	535,4	536,1	103,98	102,25	0,175	0,176	83	0,2179988
14,790	535,4	536,2	103,52	102,70	0,175	0,177	84	0,2184636
14,571	535,5	536,2	104,20	103,44	0,174	0,176	85	0,2151888
14,789	535,5	536,3	103,46	102,41	0,174	0,176	86	0,2184636
14,750	535,5	536,3	102,14	101,84	0,173	0,176	87	0,2179985
14,746	535,5	536,3	103,92	102,66	0,173	0,176	88	0,2179985
14,662	535,5	536,2	104,74	103,23	0,175	0,177	89	0,2168325
14,662	535,4	536,2	103,32	103,09	0,174	0,177	90	0,2168488
14,722	535,4	536,2	101,92	102,07	0,172	0,176	91	0,2179985
14,747	535,5	536,2	103,63	102,50	0,173	0,176	92	0,2179985
14,482	535,6	536,3	106,45	104,70	0,175	0,177	93	0,2140093
14,753	535,6	536,3	102,02	101,86	0,174	0,176	94	0,2179988
14,720	535,6	536,4	103,87	102,75	0,173	0,176	95	0,2175333
14,669	535,6	536,3	104,32	102,95	0,175	0,176	96	0,2168321
14,710	535,6	536,3	103,69	102,51	0,174	0,176	97	0,2175333
14,659	535,5	536,3	103,82	102,69	0,174	0,176	98	0,2168319
14,750	535,5	536,3	101,74	101,77	0,173	0,176	99	0,2184633
14,709	535,5	536,3	101,59	101,80	0,172	0,176	100	0,2179982
14,606	535,7	536,4	104,25	103,18	0,173	0,176	101	0,2163649
14,747	535,7	536,4	103,57	101,89	0,175	0,176	102	0,2184637
14,699	535,7	536,4	102,31	102,03	0,174	0,176	103	0,2179983
14,702	535,7	536,4	103,91	102,26	0,174	0,176	104	0,2179984
14,803	535,6	536,4	102,63	101,41	0,175	0,177	105	0,2196205
14,649	535,6	536,3	104,10	102,45	0,175	0,177	106	0,217533
14,754	535,5	536,3	102,84	101,41	0,175	0,177	107	0,219159
14,810	535,5	536,3	100,23	100,40	0,173	0,176	108	0,2203125
14,633	535,6	536,3	103,44	102,07	0,173	0,176	109	0,2175334
14,669	535,6	536,4	103,36	101,96	0,175	0,176	110	0,2179985
14,695	535,6	536,4	101,73	101,36	0,174	0,176	111	0,2184637
14,768	535,6	536,4	100,58	100,56	0,172	0,176	112	0,2196204
14,686	535,6	536,3	102,82	101,74	0,173	0,176	113	0,2184638
14,647	535,5	536,3	101,20	101,47	0,173	0,176	114	0,2179983

14,671	535,5	536,3	102,45	101,39	0,173	0,176	115	0,2184635
14,644	535,4	536,2	103,18	101,27	0,175	0,176	116	0,2184638
14,806	535,5	536,3	100,10	99,72	0,174	0,176	117	0,2207718
14,589	535,6	536,3	101,62	101,62	0,172	0,176	118	0,2175334
14,766	535,6	536,4	99,99	99,81	0,172	0,176	119	0,2203125
14,598	535,6	536,4	103,11	101,47	0,173	0,176	120	0,2179988
14,670	535,6	536,3	101,53	101,03	0,174	0,177	121	0,2191588
14,581	535,5	536,3	101,69	101,36	0,173	0,177	122	0,2179987
14,600	535,5	536,3	100,83	100,64	0,173	0,176	123	0,218464
14,591	535,4	536,2	100,45	100,41	0,172	0,176	124	0,2184637
14,624	535,5	536,2	100,14	100,00	0,172	0,175	125	0,2191597
14,731	535,6	536,3	101,15	99,78	0,173	0,176	126	0,2207724
14,739	535,6	536,3	101,88	99,77	0,175	0,176	127	0,2207718
14,689	535,6	536,3	100,49	99,70	0,175	0,176	128	0,2203131
14,566	535,6	536,3	100,18	100,54	0,172	0,176	129	0,2184636
14,674	535,5	536,3	101,13	99,98	0,173	0,176	130	0,2202859
14,704	535,5	536,2	99,29	99,42	0,173	0,176	131	0,2207728
14,687	535,4	536,1	99,19	99,42	0,172	0,176	132	0,2207726
14,413	535,3	536,1	100,88	100,72	0,172	0,176	133	0,2168324
14,789	535,4	536,1	98,46	98,72	0,172	0,176	134	0,2223746
14,679	535,4	536,2	101,05	99,56	0,174	0,176	135	0,2207724
14,591	535,4	536,2	99,47	99,41	0,173	0,176	136	0,2196204
14,583	535,4	536,2	101,26	100,16	0,173	0,176	137	0,219621
14,653	535,4	536,1	99,12	99,14	0,174	0,177	138	0,2207673
14,725	535,3	536,1	100,24	99,24	0,174	0,177	139	0,2219182
14,641	535,2	536,0	98,59	99,01	0,173	0,177	140	0,2207725
14,713	535,2	536,0	98,11	98,87	0,171	0,176	141	0,2219186
14,743	535,2	536,0	97,82	97,93	0,171	0,176	142	0,2223741
14,637	535,3	536,1	100,66	99,20	0,173	0,176	143	0,2207787
14,711	535,3	536,1	98,12	98,33	0,173	0,176	144	0,2219176
14,741	535,3	536,1	97,97	98,10	0,172	0,176	145	0,222374
14,628	535,3	536,0	100,89	99,20	0,174	0,176	146	0,2207721
14,773	535,2	536,0	99,49	97,63	0,175	0,176	147	0,2230577
14,692	535,2	535,9	98,87	99,08	0,174	0,177	148	0,2219181
14,713	535,1	535,9	97,77	98,03	0,172	0,177	149	0,2223746
14,707	535,1	535,8	97,73	98,09	0,172	0,176	150	0,2223742
14,603	535,2	535,9	99,95	98,68	0,173	0,176	151	0,2207721
14,751	535,2	535,9	98,01	97,40	0,173	0,176	152	0,2230576
14,564	535,2	536,0	98,66	98,94	0,172	0,176	153	0,2203135
14,741	535,2	535,9	97,54	98,01	0,172	0,176	154	0,2230575
14,583	535,1	535,9	100,71	98,64	0,174	0,176	155	0,2207721
14,687	535,1	535,8	97,55	97,77	0,174	0,176	156	0,2223744
14,682	535,0	535,7	99,55	97,90	0,173	0,176	157	0,2223742
14,721	534,9	535,7	98,44	98,05	0,174	0,177	158	0,2230578
14,469	535,0	535,7	99,46	99,24	0,173	0,176	159	0,2191596
14,648	535,1	535,8	100,09	98,11	0,174	0,176	160	0,2219179
14,750	535,1	535,8	98,72	97,62	0,175	0,176	161	0,2235115
14,671	535,1	535,8	97,70	97,76	0,173	0,176	162	0,2223742
14,484	535,0	535,8	101,13	99,09	0,174	0,176	163	0,219619
14,631	535,0	535,7	99,93	98,02	0,176	0,176	164	0,2219181
14,626	534,9	535,7	97,72	97,85	0,174	0,176	165	0,2219181
14,546	534,9	535,7	100,37	98,49	0,174	0,176	166	0,2207722
14,809	534,8	535,6	98,62	96,62	0,176	0,176	167	0,224643
14,660	534,9	535,7	97,61	97,75	0,174	0,176	168	0,2223743
14,629	534,9	535,7	97,75	97,96	0,172	0,176	169	0,2219181
14,626	534,9	535,7	99,68	97,89	0,174	0,176	170	0,221919
14,650	534,9	535,6	98,03	98,22	0,174	0,177	171	0,2223743
14,512	534,8	535,6	100,28	98,18	0,174	0,176	172	0,2203127
14,684	534,8	535,6	97,24	97,16	0,174	0,176	173	0,2230575
14,605	534,8	535,5	98,53	98,30	0,173	0,176	174	0,2219179
14,502	534,8	535,5	99,89	98,81	0,174	0,177	175	0,2203124

14,650	534,9	535,6	97,35	97,87	0,173	0,177	176	0,2223744
14,693	534,9	535,6	99,10	97,15	0,173	0,176	177	0,2230574
14,753	535,0	535,7	96,55	97,16	0,173	0,176	178	0,2239652
14,641	535,0	535,7	97,75	97,53	0,172	0,176	179	0,2223741
14,610	535,0	535,7	97,73	98,04	0,172	0,176	180	0,2219174
14,712	535,0	535,7	96,85	97,51	0,172	0,177	181	0,2235109
14,527	535,0	535,7	100,24	98,05	0,174	0,176	182	0,2207722
14,730	535,0	535,7	98,73	96,87	0,176	0,176	183	0,2239651
14,710	535,0	535,7	98,86	97,08	0,175	0,176	184	0,2235114
14,504	535,1	535,7	99,17	98,80	0,174	0,176	185	0,2203127
14,608	535,2	535,8	99,46	97,77	0,174	0,176	186	0,2219201
14,783	535,2	535,8	96,06	97,09	0,173	0,177	187	0,2246424
14,706	535,1	535,8	98,94	96,70	0,173	0,176	188	0,2235187
14,521	535,1	535,8	98,03	98,64	0,174	0,176	189	0,2207719
14,486	535,1	535,8	100,48	98,40	0,174	0,176	190	0,2203126
14,619	535,1	535,7	97,89	97,26	0,174	0,176	191	0,2223738
14,661	535,0	535,7	98,75	96,83	0,174	0,176	192	0,223058
14,780	535,1	535,7	96,62	96,82	0,174	0,176	193	0,2246435
14,495	535,2	535,8	100,48	98,34	0,174	0,176	194	0,2203127
14,735	535,2	535,9	98,95	96,52	0,176	0,176	195	0,2239654
14,672	535,3	535,9	99,11	96,75	0,176	0,175	196	0,2230576
14,623	535,2	535,9	96,94	98,02	0,173	0,176	197	0,2223748
14,693	535,2	535,9	97,17	97,23	0,172	0,177	198	0,2235113
14,661	535,2	535,8	97,15	97,46	0,172	0,177	199	0,2230568
14,659	535,2	535,8	97,45	97,52	0,172	0,177	200	0,2230579
14,762	535,2	535,8	98,42	96,37	0,174	0,176	201	0,224644
14,772	535,2	535,8	97,96	96,45	0,175	0,176	202	0,2246435
14,774	535,3	535,9	96,73	96,87	0,174	0,176	203	0,2246434
14,595	535,3	536,0	99,63	97,33	0,174	0,176	204	0,2219185
14,487	535,3	536,0	98,42	98,59	0,174	0,176	205	0,2203137
14,724	535,4	536,0	96,56	96,78	0,172	0,176	206	0,2239658
14,661	535,3	536,0	96,73	97,53	0,172	0,176	207	0,2230578
14,657	535,3	535,9	96,69	97,40	0,171	0,177	208	0,2230578
14,610	535,3	535,9	99,14	97,26	0,173	0,176	209	0,2223753
14,651	535,2	535,9	98,73	97,09	0,175	0,176	210	0,2230578
14,690	535,3	535,9	96,44	97,35	0,173	0,176	211	0,2235121
14,590	535,3	536,0	97,41	98,16	0,171	0,177	212	0,2219162
14,697	535,4	536,0	96,62	97,21	0,172	0,177	213	0,2235123
14,666	535,4	536,1	99,16	96,70	0,174	0,176	214	0,2230586
14,661	535,5	536,1	97,66	97,19	0,174	0,176	215	0,2230561
14,613	535,5	536,1	96,65	97,93	0,172	0,177	216	0,2223748
14,684	535,4	536,0	98,50	96,71	0,173	0,176	217	0,2235122
14,651	535,4	536,0	97,70	97,04	0,174	0,176	218	0,2230579
14,587	535,4	536,0	98,09	97,52	0,173	0,176	219	0,2221254
14,681	535,4	536,0	98,56	96,89	0,174	0,176	220	0,2235126
14,722	535,4	536,0	96,25	97,01	0,173	0,176	221	0,2239664
14,482	535,5	536,1	99,99	98,05	0,173	0,176	222	0,220314
14,617	535,5	536,1	98,82	97,37	0,175	0,176	223	0,2223754
14,584	535,5	536,1	97,22	97,70	0,173	0,176	224	0,2219194
14,683	535,5	536,1	98,29	96,46	0,173	0,176	225	0,2235126
14,756	535,5	536,1	96,05	96,60	0,173	0,176	226	0,2246444
14,574	535,5	536,1	96,83	97,89	0,171	0,177	227	0,2219194
14,704	535,4	536,1	96,75	96,76	0,172	0,177	228	0,2239667
14,672	535,4	536,1	96,86	96,71	0,172	0,176	229	0,2235129
14,678	535,4	536,1	98,37	96,62	0,174	0,176	230	0,2235128
14,616	535,5	536,1	98,87	97,51	0,175	0,176	231	0,2223851
14,507	535,5	536,1	97,59	98,32	0,173	0,176	232	0,2207738
14,658	535,6	536,2	98,51	96,86	0,173	0,176	233	0,2230592
14,653	535,6	536,2	99,07	97,10	0,175	0,176	234	0,223059
14,606	535,6	536,2	99,28	97,16	0,176	0,176	235	0,2223754
14,570	535,6	536,2	99,15	97,89	0,175	0,176	236	0,2219191

14,494	535,6	536,2	99,94	97,76	0,175	0,176	237	0,2207731
14,491	535,5	536,2	99,88	97,71	0,175	0,176	238	0,2207736
14,640	535,5	536,1	98,31	97,25	0,175	0,176	239	0,2230593
14,715	535,5	536,1	96,86	96,73	0,173	0,176	240	0,2239667
14,684	535,6	536,2	98,79	96,87	0,174	0,176	241	0,2235127
14,505	535,6	536,2	99,86	98,00	0,175	0,176	242	0,220773
14,580	535,7	536,3	97,67	98,17	0,174	0,177	243	0,2219197
14,755	535,7	536,3	97,79	96,52	0,173	0,177	244	0,2246449
14,678	535,7	536,3	96,61	96,80	0,173	0,176	245	0,2235129
14,600	535,7	536,3	98,90	97,09	0,173	0,176	246	0,2223752
14,699	535,7	536,3	98,43	96,46	0,175	0,176	247	0,2239665
14,667	535,7	536,3	98,52	96,64	0,175	0,176	248	0,2235132
14,637	535,6	536,3	98,06	96,54	0,175	0,176	249	0,2230592
14,711	535,7	536,3	98,40	96,65	0,175	0,176	250	0,2239671
14,432	535,8	536,4	98,42	98,64	0,174	0,176	251	0,2196249
14,654	535,9	536,4	96,75	97,20	0,172	0,176	252	0,2230594
14,716	535,9	536,5	97,61	97,12	0,173	0,177	253	0,2239692
14,574	535,9	536,5	97,24	97,64	0,173	0,177	254	0,2219196
14,493	535,9	536,5	99,87	97,78	0,174	0,176	255	0,2207743
14,493	535,9	536,5	99,44	98,29	0,175	0,176	256	0,2207735
14,670	535,9	536,5	98,17	97,14	0,175	0,177	257	0,2235139
14,635	535,9	536,5	96,88	97,35	0,173	0,177	258	0,2230599
14,587	535,9	536,5	98,04	97,05	0,173	0,176	259	0,2223766
14,693	535,8	536,4	95,92	96,69	0,172	0,176	260	0,2239674
14,269	535,8	536,4	101,65	99,65	0,173	0,176	261	0,2172605
14,573	535,9	536,5	97,28	97,78	0,174	0,176	262	0,2219203
14,603	536,0	536,5	97,53	96,75	0,172	0,176	263	0,2223766
14,707	536,0	536,6	96,55	96,94	0,172	0,176	264	0,2239674
14,598	536,0	536,6	98,81	97,41	0,173	0,176	265	0,2223769
14,595	536,0	536,6	97,30	96,90	0,174	0,176	266	0,2223769
14,592	536,0	536,6	98,24	96,92	0,173	0,175	267	0,222377
14,634	536,0	536,6	98,60	97,09	0,174	0,176	268	0,2230598
14,550	536,0	536,6	98,99	97,37	0,175	0,176	269	0,2218142
14,735	536,0	536,6	95,82	96,30	0,173	0,176	270	0,224646
14,691	536,0	536,6	96,33	96,80	0,172	0,176	271	0,2239676
14,496	536,0	536,6	98,66	98,34	0,173	0,177	272	0,2207746
14,600	536,1	536,7	98,36	97,90	0,174	0,177	273	0,2223766
14,675	536,1	536,7	96,35	96,96	0,173	0,177	274	0,2235138
14,643	536,2	536,7	97,25	97,22	0,172	0,176	275	0,2230597
14,640	536,2	536,7	97,39	96,83	0,173	0,176	276	0,2230602
14,591	536,2	536,7	98,77	97,49	0,174	0,176	277	0,2223765
14,664	536,1	536,7	98,23	96,79	0,175	0,176	278	0,2235138
14,451	536,1	536,7	99,75	98,14	0,175	0,176	279	0,2203149
14,328	536,1	536,7	99,57	99,33	0,174	0,176	280	0,2184657
14,553	536,1	536,7	98,28	97,19	0,173	0,176	281	0,2219202
14,550	536,0	536,6	98,73	97,32	0,174	0,176	282	0,2219203
14,579	536,0	536,6	96,78	97,43	0,173	0,176	283	0,2223766
14,622	536,0	536,6	96,20	96,74	0,171	0,176	284	0,2230596
14,578	536,0	536,6	98,92	97,31	0,173	0,176	285	0,2223767
14,470	535,9	536,5	97,41	97,81	0,173	0,176	286	0,2207749
14,620	535,9	536,5	96,24	96,73	0,171	0,176	287	0,2230598
14,544	535,9	536,5	96,80	97,46	0,171	0,176	288	0,2219203
14,392	535,9	536,5	99,41	98,62	0,173	0,176	289	0,2196227
14,572	535,9	536,5	98,43	97,42	0,174	0,177	290	0,2223767
14,572	535,9	536,5	98,68	97,05	0,175	0,176	291	0,2223763
14,466	535,9	536,5	98,98	98,19	0,175	0,176	292	0,2207743
14,645	535,9	536,4	96,57	96,61	0,173	0,176	293	0,2235137
14,614	535,8	536,4	96,67	97,03	0,172	0,176	294	0,2230599
14,644	535,8	536,4	96,37	96,57	0,172	0,176	295	0,2235136
14,643	535,8	536,4	96,44	96,44	0,172	0,176	296	0,2235135
14,358	535,8	536,4	98,25	98,21	0,172	0,176	297	0,219161



14,613	535,8	536,4	96,80	96,35	0,172	0,175	298	0,2230599
14,431	535,8	536,4	99,88	98,57	0,174	0,176	299	0,2203148
14,462	535,8	536,4	99,35	97,65	0,175	0,176	300	0,2207746
14,566	535,8	536,4	99,26	97,67	0,175	0,176	301	0,2223762
14,610	535,8	536,3	98,73	96,87	0,176	0,177	302	0,2230602
14,566	535,8	536,3	96,80	96,89	0,174	0,176	303	0,2223764
14,638	535,8	536,3	96,40	96,41	0,172	0,176	304	0,2235132
14,430	535,8	536,3	97,72	97,79	0,172	0,176	305	0,2203153
14,564	535,8	536,3	98,98	97,63	0,174	0,176	306	0,2223769
14,498	535,7	536,3	96,92	97,34	0,173	0,176	307	0,2213675
14,564	535,7	536,3	97,90	97,21	0,172	0,176	308	0,2223762
14,563	535,8	536,3	98,75	97,66	0,174	0,177	309	0,2223769
14,533	535,7	536,3	97,96	97,25	0,174	0,177	310	0,2219204
14,532	535,7	536,3	98,75	97,49	0,174	0,176	311	0,2219202
14,572	535,7	536,2	99,08	97,63	0,175	0,177	312	0,2225253
14,562	535,7	536,2	98,72	97,34	0,175	0,177	313	0,2223765
14,606	535,7	536,2	96,63	96,64	0,174	0,176	314	0,2230599
14,561	535,7	536,2	98,57	97,17	0,173	0,176	315	0,2223761
14,456	535,7	536,2	98,15	97,66	0,174	0,176	316	0,2207743
14,348	535,7	536,2	100,19	98,74	0,174	0,176	317	0,219162
14,581	535,7	536,2	96,26	96,58	0,173	0,176	318	0,2227409
14,559	535,7	536,2	99,01	97,37	0,173	0,176	319	0,2223764
14,600	535,6	536,2	98,30	96,98	0,175	0,177	320	0,2230596
14,451	535,6	536,1	97,62	97,62	0,173	0,176	321	0,220774
14,660	535,6	536,1	95,90	96,31	0,172	0,176	322	0,2239672
14,599	535,5	536,1	98,36	96,99	0,173	0,176	323	0,2230595
14,525	535,5	536,0	99,03	97,54	0,175	0,177	324	0,2219198
14,524	535,5	536,0	96,54	97,17	0,173	0,176	325	0,2219203
14,448	535,5	536,0	99,25	98,20	0,173	0,176	326	0,2207739
14,343	535,5	536,0	98,37	98,51	0,173	0,177	327	0,2191603
14,417	535,5	536,0	99,77	98,56	0,174	0,177	328	0,2203139
14,524	535,4	535,9	97,68	97,17	0,174	0,177	329	0,2219398
14,551	535,4	535,9	98,59	97,07	0,174	0,176	330	0,2223737
14,626	535,4	535,9	96,37	96,03	0,173	0,176	331	0,2235131
14,626	535,4	535,9	98,02	96,88	0,173	0,176	332	0,2235133
14,417	535,4	535,9	99,39	98,19	0,175	0,177	333	0,2203141
14,371	535,4	535,9	97,87	98,13	0,173	0,176	334	0,2196216
14,521	535,4	535,8	97,73	97,17	0,172	0,176	335	0,2219191
14,653	535,3	535,9	97,76	96,67	0,174	0,176	336	0,2239668
14,595	535,4	535,9	98,46	97,01	0,175	0,177	337	0,2230588
14,551	535,4	535,8	97,01	96,92	0,174	0,176	338	0,2223758
14,625	535,3	535,8	98,18	96,41	0,174	0,176	339	0,2235129
14,414	535,3	535,8	98,80	97,89	0,174	0,176	340	0,2203134
14,414	535,4	535,8	97,51	97,89	0,173	0,176	341	0,2203138
14,699	535,4	535,9	95,79	95,77	0,172	0,176	342	0,2246431
14,548	535,4	535,8	98,61	97,26	0,173	0,176	343	0,2223754
14,548	535,3	535,8	99,04	97,45	0,175	0,177	344	0,2223756
14,623	535,3	535,8	98,27	96,74	0,176	0,177	345	0,2235127
14,696	535,3	535,8	98,18	96,27	0,176	0,177	346	0,224645
14,623	535,3	535,8	98,73	96,95	0,176	0,177	347	0,2235128
14,368	535,3	535,8	100,02	98,84	0,176	0,177	348	0,219622
14,292	535,3	535,8	98,35	98,82	0,173	0,177	349	0,2184649
14,518	535,3	535,7	99,20	97,49	0,174	0,176	350	0,2219187
14,520	535,2	535,7	96,84	97,07	0,174	0,176	351	0,2219193
14,652	535,3	535,7	96,41	95,81	0,172	0,176	352	0,2239666
14,444	535,2	535,7	97,66	97,89	0,172	0,176	353	0,2207731
14,517	535,2	535,7	96,76	97,21	0,172	0,176	354	0,2219131
14,622	535,2	535,7	97,86	96,39	0,173	0,176	355	0,2235122
14,651	535,2	535,7	97,81	96,49	0,175	0,176	356	0,2239664
14,592	535,2	535,7	96,20	96,64	0,173	0,176	357	0,2230585
14,695	535,2	535,7	96,97	96,28	0,173	0,176	358	0,2246443

14,517	535,2	535,7	99,32	97,78	0,175	0,177	359	0,2219192
14,548	535,2	535,6	98,69	97,09	0,176	0,177	360	0,2223751
14,607	535,2	535,7	96,34	96,64	0,173	0,176	361	0,2233013
14,650	535,2	535,7	95,75	96,26	0,172	0,176	362	0,2239665
14,366	535,2	535,6	97,81	98,34	0,171	0,176	363	0,2196217
14,442	535,2	535,7	99,18	98,16	0,173	0,177	364	0,220773
14,516	535,2	535,7	96,94	97,01	0,173	0,176	365	0,2219188
14,412	535,2	535,6	98,96	98,38	0,173	0,176	366	0,2203132
14,546	535,2	535,6	99,36	97,09	0,175	0,177	367	0,2223751
14,365	535,2	535,6	99,87	98,74	0,176	0,177	368	0,2196216
14,543	535,2	535,6	96,67	96,76	0,173	0,176	369	0,2223749
14,545	535,2	535,6	96,50	97,17	0,172	0,176	370	0,2223751
14,545	535,2	535,6	96,65	96,97	0,171	0,176	371	0,2223747
14,410	535,2	535,6	98,22	98,28	0,172	0,176	372	0,2203137
14,547	535,2	535,6	98,30	96,74	0,174	0,176	373	0,2223749
14,620	535,2	535,6	97,12	96,07	0,174	0,176	374	0,2235125

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	101,80	101,54	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
15,293	534,0	534,3			0,172	0,175	0	0,2235003
15,100	534,0	534,3	102,74	102,59	0,172	0,175	1	0,2223719
15,103	533,9	534,3	101,40	102,61	0,170	0,174	2	0,2221764
15,124	533,9	534,3	104,57	103,06	0,171	0,174	3	0,2219159
15,176	533,9	534,3	104,01	103,77	0,173	0,174	4	0,2219161
15,152	533,9	534,3	104,61	104,44	0,172	0,175	5	0,22077
15,193	533,9	534,3	106,26	104,57	0,173	0,174	6	0,2207703
15,216	533,9	534,3	106,84	104,53	0,174	0,174	7	0,2207696
15,089	533,9	534,3	106,25	106,21	0,173	0,174	8	0,218462
15,206	533,9	534,3	105,86	105,30	0,172	0,174	9	0,2203109
15,122	533,9	534,3	107,14	105,39	0,173	0,174	10	0,2196186
15,121	534,0	534,3	105,61	104,38	0,173	0,174	11	0,2203105
15,038	534,0	534,3	106,91	104,92	0,174	0,174	12	0,2196184
15,022	534,0	534,3	106,28	104,91	0,174	0,175	13	0,2196185
15,055	534,0	534,4	105,07	104,39	0,173	0,175	14	0,2203106
14,993	534,1	534,4	105,17	104,41	0,173	0,174	15	0,2196203
14,987	534,1	534,4	104,56	104,06	0,172	0,174	16	0,2196501
15,172	534,1	534,4	102,88	102,92	0,171	0,174	17	0,2223716
15,136	534,1	534,4	104,88	102,53	0,172	0,174	18	0,2219158
15,161	534,1	534,4	102,47	102,88	0,172	0,174	19	0,2223719
14,973	534,1	534,4	103,63	104,26	0,170	0,174	20	0,2196188
15,057	534,1	534,4	103,26	103,56	0,170	0,174	21	0,2207703
15,063	534,2	534,5	104,98	103,63	0,172	0,174	22	0,22077
15,036	534,2	534,5	105,45	104,07	0,173	0,174	23	0,220311
15,240	534,1	534,5	102,03	102,57	0,172	0,174	24	0,2230559
15,085	534,1	534,5	103,52	104,82	0,170	0,174	25	0,220311
15,168	534,1	534,6	104,56	104,61	0,170	0,175	26	0,2207704
15,125	534,2	534,6	105,51	105,66	0,171	0,175	27	0,2196187
15,178	534,2	534,6	105,56	105,06	0,172	0,175	28	0,2203112
15,196	534,2	534,6	106,57	104,40	0,173	0,174	29	0,2207704
15,069	534,2	534,6	105,22	105,52	0,173	0,174	30	0,2191572
15,168	534,2	534,7	104,16	104,76	0,171	0,175	31	0,2207707
15,082	534,2	534,7	105,39	105,17	0,171	0,175	32	0,2196195
15,071	534,3	534,7	105,53	104,88	0,172	0,174	33	0,2196191
15,061	534,3	534,7	106,64	104,53	0,173	0,174	34	0,2196195
15,100	534,4	534,8	105,38	104,27	0,173	0,174	35	0,2203108
15,092	534,4	534,8	106,55	103,65	0,174	0,173	36	0,2203115
15,194	534,4	534,8	105,20	103,45	0,174	0,173	37	0,2219168
15,198	534,4	534,8	104,47	103,57	0,173	0,174	38	0,2219171
15,014	534,5	534,9	105,69	104,71	0,172	0,174	39	0,2191576
15,088	534,5	534,9	104,56	104,15	0,172	0,174	40	0,2203114
15,124	534,5	534,9	103,98	104,18	0,171	0,174	41	0,2207557
15,122	534,6	534,9	105,78	103,82	0,172	0,174	42	0,2207712
15,020	534,6	534,9	104,43	105,39	0,172	0,174	43	0,2191574
15,123	534,6	535,0	103,49	104,53	0,170	0,175	44	0,2207712
15,241	534,7	535,0	102,92	103,65	0,170	0,175	45	0,2223732
15,210	534,7	535,0	104,80	103,21	0,172	0,174	46	0,2219177
15,133	534,8	535,1	105,57	103,69	0,173	0,173	47	0,2207714
15,141	534,8	535,1	103,35	104,63	0,171	0,174	48	0,2207715
15,140	534,8	535,2	103,32	104,57	0,170	0,175	49	0,2207712
15,061	534,9	535,2	104,78	104,63	0,170	0,174	50	0,2196198
15,036	534,9	535,2	104,03	105,27	0,170	0,174	51	0,2191589
15,223	534,9	535,2	104,45	103,76	0,171	0,174	52	0,2219175
15,070	535,0	535,3	105,93	104,71	0,172	0,174	53	0,2196202
15,118	535,0	535,3	104,46	104,28	0,172	0,174	54	0,2203124
15,121	535,1	535,4	106,17	104,07	0,172	0,174	55	0,2203122
15,123	535,1	535,4	105,55	104,05	0,173	0,173	56	0,2203122
15,058	535,2	535,4	106,24	105,34	0,173	0,174	57	0,2191523
15,169	535,2	535,5	105,60	104,40	0,173	0,174	58	0,2207716
15,092	535,3	535,5	106,78	104,51	0,173	0,174	59	0,21962
15,097	535,3	535,6	104,82	104,71	0,172	0,173	60	0,2196202
15,063	535,3	535,6	104,91	105,26	0,171	0,174	61	0,2191585
14,897	535,3	535,6	106,26	106,12	0,171	0,174	62	0,216832

15,088	535,3	535,6	105,84	105,08	0,172	0,174	63	0,2196199
14,981	535,3	535,7	106,85	105,14	0,173	0,174	64	0,2179983
15,010	535,4	535,7	104,60	105,57	0,171	0,174	65	0,2184635
15,058	535,4	535,7	103,86	105,26	0,169	0,174	66	0,2191588
15,053	535,4	535,7	106,30	104,72	0,171	0,174	67	0,2191588
15,057	535,4	535,7	104,67	104,92	0,172	0,174	68	0,2191588
15,086	535,4	535,7	106,13	104,25	0,172	0,173	69	0,2196205
15,136	535,5	535,8	105,86	103,90	0,173	0,173	70	0,2203132
15,129	535,4	535,8	105,94	104,30	0,173	0,173	71	0,2203131
15,083	535,4	535,7	105,90	105,03	0,173	0,174	72	0,2196207
15,152	535,4	535,8	103,10	104,38	0,171	0,174	73	0,2207721
15,077	535,4	535,8	104,15	104,47	0,169	0,174	74	0,2196208
15,043	535,4	535,8	104,42	105,47	0,170	0,174	75	0,2191592
15,078	535,5	535,8	105,20	104,42	0,171	0,174	76	0,2196206
15,075	535,5	535,8	106,07	104,70	0,172	0,174	77	0,2196208
15,122	535,5	535,9	105,45	103,92	0,173	0,173	78	0,2203132
15,114	535,5	535,9	105,58	104,02	0,173	0,173	79	0,2203132
15,143	535,5	535,9	103,80	104,37	0,172	0,174	80	0,2207723
15,067	535,5	535,9	105,03	103,99	0,171	0,174	81	0,219621
15,146	535,5	535,9	105,23	103,60	0,172	0,173	82	0,2207722
15,145	535,6	535,9	103,38	104,22	0,171	0,174	83	0,2207727
15,104	535,6	535,9	104,45	103,61	0,170	0,173	84	0,2203125
15,057	535,6	535,9	105,95	104,75	0,172	0,173	85	0,2196207
15,027	535,6	535,9	104,28	104,82	0,171	0,174	86	0,2191595
15,108	535,6	535,9	103,06	104,25	0,169	0,174	87	0,2203132
15,105	535,5	535,9	105,73	104,04	0,171	0,174	88	0,220313
15,105	535,6	535,9	105,57	104,18	0,173	0,174	89	0,2203132
14,931	535,5	535,9	106,21	105,60	0,173	0,174	90	0,2178898
15,096	535,6	536,0	103,26	104,16	0,171	0,174	91	0,220313
15,097	535,6	536,0	103,52	104,49	0,169	0,174	92	0,2203134
15,098	535,6	536,0	105,33	103,89	0,171	0,174	93	0,220313
15,096	535,6	536,0	105,03	103,56	0,172	0,173	94	0,2203128
15,207	535,6	536,0	102,60	103,55	0,171	0,173	95	0,2219185
15,094	535,6	536,0	105,27	103,92	0,171	0,174	96	0,2203126
14,973	535,6	536,0	103,47	104,97	0,170	0,174	97	0,2186346
15,092	535,6	536,0	102,82	103,89	0,168	0,174	98	0,2203128
14,897	535,7	536,1	104,32	105,23	0,169	0,173	99	0,2175361
15,035	535,7	536,1	105,07	104,05	0,170	0,173	100	0,2196205
15,191	535,7	536,1	102,46	103,51	0,171	0,174	101	0,2219186
15,113	535,7	536,1	102,81	103,90	0,169	0,174	102	0,2207572
14,947	535,7	536,1	105,82	105,58	0,171	0,174	103	0,218464
14,994	535,7	536,1	105,89	104,50	0,173	0,174	104	0,2191591
15,100	535,7	536,1	103,37	103,31	0,171	0,173	105	0,2207722
15,070	535,7	536,2	104,44	103,49	0,171	0,173	106	0,2203126
15,094	535,7	536,2	103,02	103,13	0,170	0,173	107	0,220772
15,003	535,7	536,2	104,30	103,91	0,170	0,173	108	0,2196209
15,005	535,7	536,2	105,44	103,92	0,172	0,173	109	0,2196205
15,042	535,7	536,2	105,24	103,82	0,173	0,174	110	0,2203129
15,031	535,7	536,1	103,51	103,39	0,172	0,174	111	0,2203127
15,032	535,7	536,1	103,13	103,54	0,170	0,173	112	0,2203124
15,055	535,7	536,2	103,42	103,09	0,170	0,173	113	0,2207723
15,161	535,7	536,2	102,92	102,55	0,171	0,173	114	0,2223741
15,128	535,8	536,2	104,61	102,92	0,172	0,174	115	0,2219179
15,057	535,8	536,2	104,67	102,85	0,173	0,173	116	0,220953
15,039	535,8	536,2	104,87	103,17	0,173	0,173	117	0,2207722
14,999	535,8	536,2	103,01	103,09	0,172	0,173	118	0,2203125
14,993	535,8	536,2	104,17	104,14	0,171	0,174	119	0,2203125
14,938	535,8	536,2	102,78	103,48	0,171	0,174	120	0,2196203
15,012	535,8	536,2	104,54	103,58	0,171	0,174	121	0,2207717
15,006	535,8	536,2	104,18	103,60	0,173	0,175	122	0,2207717
14,999	535,8	536,2	102,71	102,86	0,171	0,174	123	0,2207718
14,991	535,8	536,2	104,09	102,65	0,171	0,173	124	0,2207718
14,903	535,7	536,2	104,77	103,21	0,173	0,173	125	0,2196208
14,947	535,7	536,2	104,39	103,05	0,173	0,173	126	0,2203127
15,048	535,7	536,2	103,80	102,57	0,173	0,174	127	0,2219178
14,930	535,7	536,2	102,42	102,79	0,171	0,174	128	0,2202911
15,035	535,7	536,2	103,40	102,03	0,171	0,173	129	0,2219184
15,026	535,7	536,2	101,47	102,25	0,171	0,174	130	0,2219184
15,099	535,7	536,1	100,58	101,54	0,169	0,174	131	0,2230581

14,937	535,7	536,1	104,07	102,88	0,171	0,174	132	0,2207721
15,041	535,7	536,2	103,44	102,25	0,173	0,174	133	0,2223744
14,931	535,7	536,1	102,97	102,59	0,172	0,174	134	0,220772
15,003	535,7	536,1	103,46	102,00	0,172	0,174	135	0,2219177
15,075	535,7	536,1	100,32	101,34	0,171	0,174	136	0,2230577
15,102	535,7	536,1	102,39	101,26	0,171	0,174	137	0,2235112
14,992	535,7	536,2	102,13	102,08	0,172	0,174	138	0,2219181
15,095	535,7	536,2	100,20	100,83	0,170	0,174	139	0,2235116
15,013	535,7	536,2	101,05	101,77	0,169	0,174	140	0,2223741
14,978	535,7	536,2	103,12	102,52	0,171	0,174	141	0,2219178
14,973	535,7	536,2	103,07	102,56	0,173	0,175	142	0,2219181
15,076	535,7	536,1	100,43	100,75	0,171	0,174	143	0,2235115
15,037	535,7	536,1	101,56	101,46	0,170	0,174	144	0,2230579
14,990	535,6	536,1	102,36	101,76	0,172	0,174	145	0,222375
15,061	535,7	536,1	100,20	100,88	0,171	0,174	146	0,2235157
15,028	535,7	536,1	100,37	101,18	0,169	0,174	147	0,2230578
15,024	535,6	536,1	101,45	100,82	0,170	0,174	148	0,2230578
15,129	535,6	536,1	99,67	100,25	0,170	0,173	149	0,2246439
15,019	535,6	536,1	102,44	101,76	0,171	0,174	150	0,2230569
15,042	535,6	536,1	101,78	101,28	0,173	0,175	151	0,2235106
14,705	535,5	536,0	101,96	102,62	0,170	0,174	152	0,218464
15,070	535,5	536,0	99,62	100,05	0,169	0,173	153	0,2239652
15,033	535,5	536,0	100,24	100,51	0,169	0,173	154	0,2234416
15,063	535,5	536,0	101,91	100,94	0,171	0,174	155	0,2239653
15,002	535,5	536,0	101,82	101,30	0,173	0,174	156	0,2230577
14,999	535,5	536,0	100,00	100,52	0,171	0,174	157	0,2230568
14,998	535,5	536,0	99,88	100,32	0,169	0,173	158	0,2230576
15,054	535,5	535,9	99,23	100,14	0,169	0,173	159	0,2239653
14,946	535,4	535,9	100,24	100,80	0,169	0,173	160	0,2223742
14,991	535,4	535,9	100,09	100,56	0,169	0,173	161	0,2230574
14,912	535,4	535,9	102,79	101,79	0,171	0,174	162	0,2219176
14,909	535,4	535,9	100,26	101,04	0,171	0,174	163	0,2219179
14,984	535,4	535,9	100,03	100,78	0,169	0,173	164	0,2230573
14,981	535,4	535,9	102,55	101,08	0,171	0,174	165	0,223057
15,039	535,4	535,9	99,53	100,08	0,171	0,174	166	0,2239646
14,975	535,4	535,9	101,97	101,03	0,171	0,174	167	0,2230572
15,006	535,4	535,9	101,65	100,80	0,173	0,174	168	0,223511
15,079	535,4	535,9	101,08	100,35	0,172	0,174	169	0,2246429
14,892	535,3	535,8	101,36	101,18	0,172	0,174	170	0,2219175
15,000	535,3	535,8	100,48	100,34	0,171	0,174	171	0,2235113
15,001	535,3	535,8	101,69	100,77	0,172	0,174	172	0,223511
14,922	535,3	535,8	102,37	101,44	0,173	0,174	173	0,2223737
15,149	535,3	535,8	99,77	99,95	0,172	0,174	174	0,2257689
15,024	535,3	535,8	99,68	99,70	0,170	0,174	175	0,2239713
14,992	535,3	535,8	100,39	100,67	0,170	0,173	176	0,2235111
15,023	535,3	535,7	101,59	100,50	0,172	0,174	177	0,2239653
14,914	535,3	535,8	102,09	101,32	0,173	0,174	178	0,2223742
15,014	535,3	535,7	101,79	100,49	0,173	0,174	179	0,2239655
14,911	535,2	535,7	102,33	101,48	0,173	0,174	180	0,2223737
15,016	535,2	535,7	101,35	100,33	0,173	0,174	181	0,2239643
15,060	535,2	535,7	101,20	99,96	0,173	0,174	182	0,2246434
15,055	535,2	535,7	99,33	99,92	0,171	0,174	183	0,2246429
14,979	535,2	535,7	100,46	100,60	0,170	0,174	184	0,2235113
14,927	535,3	535,7	101,53	100,76	0,171	0,174	185	0,2227293
14,981	535,2	535,7	100,90	100,78	0,172	0,174	186	0,2235111
15,056	535,2	535,7	99,39	99,84	0,171	0,174	187	0,2246433
14,979	535,2	535,7	99,77	100,26	0,170	0,174	188	0,2235127
14,901	535,2	535,7	101,81	100,86	0,171	0,174	189	0,223745
14,974	535,2	535,7	99,80	100,19	0,171	0,174	190	0,2235111
14,943	535,2	535,7	102,02	101,15	0,171	0,174	191	0,2230576
15,006	535,2	535,7	99,55	99,82	0,171	0,174	192	0,2239649
14,866	535,2	535,6	100,18	101,11	0,169	0,173	193	0,2219175
14,969	535,2	535,6	101,68	100,94	0,171	0,174	194	0,2235105
15,043	535,2	535,6	101,41	100,14	0,173	0,175	195	0,2246428
14,938	535,2	535,6	100,80	101,06	0,172	0,174	196	0,2230571
14,890	535,1	535,6	101,87	100,74	0,172	0,174	197	0,2223735
14,998	535,1	535,6	99,65	99,62	0,171	0,173	198	0,2239646
14,934	535,1	535,6	101,45	100,66	0,171	0,173	199	0,2230569
14,934	535,1	535,6	101,39	101,33	0,172	0,175	200	0,2230569



15,064	535,1	535,6	100,46	99,45	0,172	0,174	201	0,2250935
14,990	535,1	535,6	99,86	100,18	0,171	0,174	202	0,2239644
14,928	535,1	535,6	100,46	99,98	0,170	0,173	203	0,2230568
14,993	535,1	535,6	99,62	100,16	0,170	0,173	204	0,2239646
14,961	535,2	535,6	99,68	99,77	0,170	0,173	205	0,2235109
15,063	535,2	535,6	100,82	99,90	0,171	0,174	206	0,2250936
14,927	535,1	535,6	100,38	100,82	0,172	0,174	207	0,2230573
14,989	535,1	535,6	101,28	100,10	0,172	0,174	208	0,2239645
14,882	535,1	535,6	102,12	100,95	0,173	0,174	209	0,2223736
14,985	535,1	535,6	100,94	100,56	0,173	0,174	210	0,2239645
14,987	535,1	535,6	99,23	99,99	0,171	0,174	211	0,2239645
15,027	535,1	535,6	100,95	100,06	0,171	0,174	212	0,2246427
15,059	535,1	535,6	98,91	99,25	0,171	0,174	213	0,2250932
14,924	535,1	535,6	99,97	99,98	0,170	0,173	214	0,223057
15,102	535,1	535,6	99,80	98,87	0,171	0,173	215	0,2257668
14,948	535,1	535,6	101,12	100,77	0,172	0,174	216	0,2235107
14,947	535,1	535,6	101,74	100,49	0,173	0,175	217	0,2235106
14,981	535,1	535,6	99,72	100,42	0,172	0,174	218	0,2239643
15,056	535,1	535,6	99,25	99,84	0,170	0,174	219	0,225093
14,978	535,1	535,5	99,09	100,13	0,170	0,174	220	0,2239648
15,054	535,1	535,6	99,06	100,14	0,170	0,174	221	0,2250938
14,978	535,1	535,6	101,68	100,10	0,172	0,174	222	0,2239648
14,871	535,2	535,6	100,88	100,25	0,172	0,173	223	0,2223736
15,079	535,2	535,6	98,68	99,54	0,170	0,174	224	0,2255245
14,944	535,2	535,6	99,61	100,03	0,170	0,174	225	0,223511
14,946	535,2	535,6	99,25	99,89	0,169	0,173	226	0,2235206
14,976	535,2	535,6	99,11	99,92	0,169	0,173	227	0,2239651
14,976	535,2	535,6	100,09	100,69	0,170	0,174	228	0,2239652
14,947	535,2	535,6	99,61	100,61	0,170	0,175	229	0,2235145
15,047	535,2	535,6	100,23	99,21	0,171	0,174	230	0,2250938
14,836	535,2	535,6	101,68	100,43	0,172	0,173	231	0,2219175
14,945	535,2	535,6	101,83	100,30	0,173	0,173	232	0,2235112
15,018	535,2	535,6	98,90	99,93	0,171	0,174	233	0,224643
14,972	535,2	535,6	100,96	100,32	0,171	0,174	234	0,2239651
15,048	535,2	535,6	100,83	99,80	0,173	0,174	235	0,225094
14,941	535,2	535,6	99,68	100,72	0,171	0,175	236	0,2235111
15,043	535,2	535,6	98,44	99,45	0,169	0,174	237	0,2250944
14,969	535,2	535,6	99,15	100,33	0,169	0,174	238	0,2239655
14,937	535,2	535,6	99,00	100,38	0,169	0,174	239	0,2235118
15,014	535,2	535,6	98,87	99,97	0,169	0,174	240	0,224644
15,044	535,2	535,6	100,25	99,22	0,171	0,174	241	0,2250939
14,938	535,2	535,7	99,23	100,47	0,171	0,174	242	0,2235107
14,932	535,2	535,7	101,26	100,53	0,171	0,174	243	0,2234162
14,861	535,2	535,7	100,14	101,34	0,171	0,175	244	0,2223741
15,042	535,2	535,7	100,69	99,65	0,171	0,175	245	0,2250938
14,935	535,2	535,7	99,53	100,11	0,171	0,174	246	0,2235113
15,010	535,3	535,7	100,73	99,96	0,171	0,174	247	0,2246434
14,934	535,2	535,7	99,61	100,64	0,171	0,175	248	0,2235116
14,828	535,3	535,7	101,97	100,46	0,171	0,174	249	0,2219179
14,934	535,3	535,7	99,09	100,27	0,171	0,174	250	0,2235116
14,859	535,3	535,7	101,76	100,11	0,171	0,173	251	0,2223738
15,008	535,2	535,7	101,12	99,55	0,173	0,173	252	0,2246429
14,901	535,2	535,7	100,56	100,34	0,172	0,174	253	0,2230574
14,903	535,2	535,7	102,01	100,39	0,172	0,174	254	0,2230578
14,962	535,3	535,7	100,98	99,48	0,173	0,173	255	0,2239651
14,964	535,3	535,7	99,74	100,14	0,171	0,174	256	0,2239834
14,931	535,3	535,7	98,96	100,66	0,170	0,174	257	0,2235116
15,034	535,3	535,7	100,80	99,00	0,171	0,174	258	0,2250942
14,933	535,3	535,7	99,74	100,65	0,172	0,174	259	0,2235112
14,930	535,3	535,7	101,18	99,68	0,171	0,174	260	0,2235112
15,005	535,3	535,7	99,93	99,26	0,172	0,173	261	0,2246432
14,958	535,3	535,7	100,88	99,98	0,172	0,174	262	0,2239652
14,929	535,3	535,7	100,80	99,76	0,172	0,174	263	0,2235111
14,929	535,3	535,7	98,93	100,37	0,170	0,174	264	0,223511
14,745	535,3	535,7	100,16	101,96	0,169	0,175	265	0,2207719
14,960	535,3	535,7	99,05	100,42	0,169	0,175	266	0,2239653
14,959	535,3	535,7	101,40	99,49	0,171	0,174	267	0,2239654
14,959	535,3	535,7	101,61	99,61	0,173	0,173	268	0,2239653
14,959	535,3	535,7	99,40	100,17	0,172	0,174	269	0,223965

15,046	535,3	535,7	98,45	99,88	0,170	0,175	270	0,2252874
15,006	535,3	535,7	98,90	99,69	0,169	0,174	271	0,2246434
15,007	535,3	535,7	98,93	100,03	0,170	0,174	272	0,2246436
15,004	535,3	535,7	98,66	100,02	0,169	0,175	273	0,2246435
14,929	535,3	535,7	101,62	99,87	0,171	0,174	274	0,2235113
14,960	535,3	535,7	101,42	99,56	0,173	0,173	275	0,2239652
15,035	535,3	535,8	100,96	98,95	0,173	0,173	276	0,2250944
14,960	535,3	535,7	101,01	99,83	0,173	0,173	277	0,2239659
15,116	535,3	535,7	100,46	98,32	0,173	0,173	278	0,2262177
14,962	535,3	535,7	99,06	100,08	0,171	0,173	279	0,2239565
15,085	535,3	535,7	99,38	98,95	0,170	0,174	280	0,2257696
14,934	535,3	535,8	99,59	100,53	0,170	0,174	281	0,2235115
15,009	535,3	535,8	99,15	99,88	0,170	0,174	282	0,2246436
14,858	535,3	535,8	100,52	100,77	0,170	0,174	283	0,2223742
15,010	535,3	535,8	98,83	99,72	0,170	0,174	284	0,2246434
14,931	535,3	535,8	100,88	99,94	0,171	0,174	285	0,2235113
15,010	535,3	535,8	99,68	99,98	0,171	0,174	286	0,2246434
14,932	535,4	535,8	101,72	99,66	0,172	0,174	287	0,223512
14,935	535,4	535,8	100,40	100,26	0,172	0,174	288	0,2235119
15,025	535,4	535,8	98,53	99,74	0,170	0,174	289	0,224901
14,960	535,4	535,8	99,40	100,05	0,169	0,174	290	0,2239654
15,038	535,4	535,8	100,68	99,01	0,171	0,174	291	0,2250942
14,961	535,4	535,8	101,23	99,75	0,173	0,173	292	0,2239657
14,826	535,4	535,8	100,42	101,00	0,171	0,174	293	0,2219195
14,951	535,5	535,8	101,34	99,39	0,172	0,173	294	0,2237984
14,934	535,5	535,9	100,06	100,27	0,172	0,173	295	0,2235122
14,962	535,5	535,9	98,92	100,54	0,170	0,174	296	0,2239658
14,900	535,5	535,9	100,40	100,23	0,170	0,174	297	0,2230591
14,934	535,5	535,9	101,79	99,75	0,172	0,173	298	0,2235119
15,011	535,5	535,9	99,88	99,42	0,172	0,173	299	0,2246441
15,041	535,5	535,9	98,59	99,84	0,170	0,174	300	0,2250948
14,966	535,5	535,9	98,80	100,15	0,169	0,174	301	0,2239654
15,008	535,6	536,0	100,14	99,54	0,170	0,174	302	0,2246441
14,904	535,6	536,0	101,39	100,14	0,172	0,174	303	0,2230587
14,964	535,6	536,0	98,71	100,43	0,171	0,174	304	0,2239656
14,934	535,6	536,0	99,57	100,23	0,169	0,174	305	0,2235126
15,014	535,6	536,0	101,00	99,46	0,171	0,174	306	0,224719
14,934	535,6	536,0	99,35	100,42	0,171	0,174	307	0,2235125
14,933	535,6	536,0	98,89	100,35	0,169	0,174	308	0,2235124
14,903	535,6	536,0	99,82	100,71	0,169	0,174	309	0,2230587
15,040	535,6	536,0	98,85	99,32	0,170	0,174	310	0,2250948
15,009	535,6	536,1	99,46	99,42	0,170	0,174	311	0,2246442
14,963	535,7	536,1	99,77	99,74	0,170	0,173	312	0,2239659
15,036	535,6	536,1	99,14	99,37	0,170	0,174	313	0,2250946
15,040	535,7	536,1	100,96	99,47	0,172	0,174	314	0,2250945
15,009	535,7	536,1	99,00	99,97	0,171	0,174	315	0,2246446
15,036	535,7	536,1	100,33	98,83	0,171	0,174	316	0,225095
15,008	535,7	536,1	100,93	99,68	0,173	0,173	317	0,2246445
15,006	535,7	536,1	99,28	99,33	0,172	0,174	318	0,2246449
14,931	535,7	536,1	101,68	99,68	0,172	0,173	319	0,2235124
14,931	535,7	536,2	99,27	100,31	0,171	0,174	320	0,2235122
14,856	535,8	536,2	101,72	100,93	0,171	0,174	321	0,2223749
14,961	535,8	536,2	101,12	99,71	0,173	0,174	322	0,223966
14,930	535,8	536,2	99,36	100,00	0,171	0,174	323	0,2235124
14,899	535,8	536,2	100,31	100,13	0,170	0,174	324	0,2230585
15,078	535,8	536,2	100,20	98,64	0,172	0,173	325	0,2257702
15,082	535,8	536,2	99,66	98,86	0,172	0,173	326	0,2257705
15,082	535,8	536,2	97,93	99,35	0,170	0,174	327	0,2257702
14,930	535,8	536,2	101,18	99,76	0,171	0,174	328	0,2235125
15,006	535,8	536,2	99,04	100,12	0,171	0,174	329	0,224644
14,932	535,9	536,3	101,40	99,94	0,171	0,174	330	0,223511
15,036	535,9	536,3	98,07	99,29	0,171	0,174	331	0,2250949
14,902	535,9	536,3	100,91	100,37	0,170	0,174	332	0,2230676
14,962	535,9	536,3	99,83	100,28	0,171	0,174	333	0,2239666
15,081	535,9	536,3	97,92	99,28	0,170	0,174	334	0,2257703
14,898	536,0	536,4	99,39	100,72	0,169	0,174	335	0,2230588
14,960	535,9	536,4	99,98	99,34	0,170	0,174	336	0,2239665
15,004	535,9	536,4	100,87	99,57	0,172	0,173	337	0,2246443
15,004	535,9	536,4	100,12	99,93	0,172	0,174	338	0,2246442

14,959	536,0	536,4	100,92	99,63	0,172	0,174	339	0,2239662
14,928	536,0	536,4	99,16	100,25	0,171	0,174	340	0,2235122
14,914	536,0	536,4	101,72	100,02	0,171	0,174	341	0,2232873
14,958	536,0	536,4	101,00	99,88	0,173	0,174	342	0,2239663
15,003	536,0	536,4	100,50	99,75	0,172	0,174	343	0,2246443
14,957	536,0	536,4	99,04	99,70	0,171	0,174	344	0,2239664
14,743	536,0	536,4	102,22	100,92	0,171	0,173	345	0,2207734
14,849	536,1	536,5	99,82	100,65	0,171	0,174	346	0,2223751
14,850	536,1	536,5	99,69	100,81	0,169	0,174	347	0,222375
15,076	536,1	536,5	97,85	99,22	0,169	0,174	348	0,2257704
15,077	536,1	536,5	98,06	99,31	0,169	0,174	349	0,225771
14,954	536,1	536,5	99,27	99,47	0,169	0,174	350	0,2239664
14,998	536,1	536,5	98,88	99,23	0,170	0,173	351	0,2246446
14,951	536,1	536,5	98,89	99,70	0,169	0,173	352	0,2239669
14,892	536,1	536,5	101,58	100,24	0,171	0,174	353	0,2230589
14,998	536,1	536,5	98,36	99,25	0,171	0,174	354	0,2246443
14,998	536,1	536,5	98,56	99,33	0,169	0,173	355	0,2246443
14,921	536,1	536,5	100,98	99,78	0,171	0,173	356	0,2235123
14,844	536,1	536,5	99,28	100,71	0,170	0,174	357	0,2223751
14,950	536,1	536,6	100,15	100,09	0,170	0,174	358	0,2239664
14,920	536,1	536,6	101,03	100,21	0,172	0,174	359	0,2235124
14,951	536,1	536,5	98,58	99,91	0,170	0,174	360	0,2239663
14,841	536,1	536,6	101,59	100,33	0,171	0,174	361	0,223727
14,919	536,1	536,5	101,23	99,88	0,173	0,173	362	0,2235125
14,919	536,1	536,6	100,98	99,70	0,173	0,173	363	0,2235125
15,022	536,2	536,6	98,85	98,85	0,171	0,173	364	0,2250947
14,947	536,2	536,6	99,16	99,26	0,170	0,173	365	0,2239663
14,885	536,2	536,6	101,49	100,44	0,171	0,174	366	0,2230414
14,991	536,2	536,6	100,82	100,14	0,173	0,175	367	0,2246444
14,992	536,2	536,6	100,36	99,96	0,173	0,175	368	0,2246445
14,991	536,2	536,6	99,01	99,33	0,171	0,174	369	0,2246445
14,840	536,2	536,6	101,65	100,85	0,171	0,174	370	0,2223751
14,915	536,2	536,6	98,80	99,81	0,171	0,174	371	0,2235124
15,020	536,2	536,6	98,62	98,72	0,169	0,173	372	0,2250946
14,945	536,2	536,6	100,44	99,95	0,171	0,173	373	0,2239663
14,914	536,2	536,6	98,87	99,73	0,170	0,174	374	0,2235123
14,884	536,2	536,6	99,37	99,63	0,169	0,173	375	0,2230585
14,885	536,2	536,6	99,58	99,64	0,169	0,173	376	0,2230591
14,731	536,2	536,6	101,46	101,47	0,170	0,174	377	0,2207731
15,093	536,2	536,6	100,14	98,89	0,172	0,174	378	0,2262193
14,913	536,2	536,6	98,84	99,61	0,171	0,174	379	0,2235129
14,913	536,2	536,6	100,72	99,57	0,170	0,173	380	0,2235137
14,913	536,2	536,6	98,90	99,28	0,170	0,173	381	0,2235127
15,016	536,2	536,6	100,26	99,45	0,171	0,173	382	0,2250953
15,061	536,2	536,6	97,69	98,64	0,170	0,174	383	0,2257704

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	100,76	100,27	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
14,952	533,0	533,3			0,177	0,183	0	0,2135288
14,723	532,9	533,3	104,50	102,10	0,176	0,179	1	0,2156554
14,718	532,9	533,3	102,69	102,01	0,175	0,176	2	0,2162279
14,720	532,9	533,4	103,65	101,28	0,175	0,176	3	0,2163595
14,734	532,9	533,4	103,46	101,48	0,176	0,175	4	0,2163594
14,871	532,9	533,4	103,81	100,92	0,176	0,175	5	0,217991
14,813	532,9	533,4	102,86	102,51	0,175	0,176	6	0,2163596
14,843	532,8	533,4	104,99	102,23	0,175	0,176	7	0,2163927
14,860	532,9	533,4	104,80	102,38	0,177	0,175	8	0,2163598
14,875	532,9	533,4	103,22	102,32	0,175	0,176	9	0,2168271
14,900	532,9	533,4	104,47	102,17	0,175	0,176	10	0,2168272
14,670	532,9	533,4	106,15	103,58	0,176	0,175	11	0,2135289
14,803	532,9	533,4	104,42	102,67	0,176	0,175	12	0,2156551
14,830	532,9	533,5	104,22	102,12	0,175	0,175	13	0,2163601
14,919	532,9	533,5	101,50	101,81	0,174	0,176	14	0,2179933
14,864	532,9	533,5	104,19	101,05	0,175	0,176	15	0,2175286
14,795	532,9	533,5	104,02	101,45	0,177	0,175	16	0,2168273
14,753	533,0	533,5	101,97	102,15	0,175	0,176	17	0,2163597
14,752	533,0	533,5	101,72	102,26	0,173	0,176	18	0,2163596
14,799	533,0	533,5	101,63	102,25	0,172	0,177	19	0,2168271
14,811	533,0	533,5	103,81	101,54	0,174	0,176	20	0,2168275
14,789	533,0	533,5	101,76	102,20	0,174	0,176	21	0,2163601
14,745	533,0	533,5	102,02	102,63	0,172	0,176	22	0,2156557
14,790	533,1	533,6	103,34	102,18	0,173	0,176	23	0,2163597
14,745	533,1	533,5	104,53	101,83	0,175	0,175	24	0,2156562
14,637	533,1	533,6	103,26	103,44	0,174	0,175	25	0,2140035
14,887	533,1	533,6	101,33	101,88	0,172	0,176	26	0,2175284
14,821	533,1	533,6	102,33	102,28	0,172	0,176	27	0,2163602
14,846	533,2	533,6	101,79	102,65	0,172	0,176	28	0,2164067
14,880	533,2	533,6	101,75	102,14	0,171	0,176	29	0,2168272
14,885	533,2	533,7	102,23	102,51	0,172	0,176	30	0,2168276
14,883	533,3	533,7	101,71	102,24	0,172	0,176	31	0,2168248
14,893	533,3	533,7	103,55	102,56	0,173	0,176	32	0,2168274
14,817	533,3	533,8	102,41	103,45	0,173	0,176	33	0,2156564
14,780	533,4	533,8	104,74	102,54	0,173	0,176	34	0,2151605
14,786	533,4	533,8	102,86	103,55	0,174	0,176	35	0,2151845
14,871	533,4	533,8	104,06	101,86	0,174	0,175	36	0,2165239
14,672	533,4	533,8	103,58	104,09	0,173	0,175	37	0,2135303
14,944	533,5	533,9	102,62	102,29	0,173	0,176	38	0,2175286
14,782	533,5	533,9	104,00	102,62	0,174	0,175	39	0,2151844
14,817	533,5	533,9	102,20	102,86	0,173	0,175	40	0,2156558
14,820	533,5	533,9	103,50	102,39	0,172	0,175	41	0,2156562
14,810	533,5	533,9	104,94	102,39	0,175	0,175	42	0,2156562
14,941	533,5	533,9	103,79	101,80	0,176	0,175	43	0,2175283
14,896	533,6	533,9	104,07	102,40	0,175	0,176	44	0,2168278
14,904	533,6	534,0	101,73	102,51	0,173	0,176	45	0,2168275
14,904	533,6	534,0	103,60	102,40	0,173	0,176	46	0,2168281
14,827	533,7	534,0	104,71	102,54	0,175	0,175	47	0,2156563
14,679	533,7	534,1	103,34	103,98	0,173	0,175	48	0,21353
14,827	533,8	534,1	102,16	102,94	0,171	0,176	49	0,2156563
14,828	533,8	534,1	102,32	103,12	0,171	0,176	50	0,215656
14,913	533,8	534,2	104,27	102,54	0,173	0,176	51	0,2168283
14,991	533,9	534,2	101,65	101,48	0,174	0,175	52	0,2179941
14,961	533,8	534,2	103,75	101,83	0,174	0,175	53	0,2175292
14,910	533,8	534,2	103,57	102,37	0,175	0,175	54	0,2168285
14,957	533,8	534,2	101,65	102,05	0,173	0,176	55	0,2175293
14,830	533,8	534,2	104,37	102,80	0,173	0,175	56	0,2156566
14,828	533,8	534,2	102,62	102,29	0,173	0,175	57	0,2156562
14,876	533,9	534,3	102,65	102,77	0,172	0,175	58	0,2163611
14,829	533,9	534,3	101,92	102,80	0,172	0,176	59	0,2156571
14,715	533,9	534,3	104,33	103,16	0,172	0,175	60	0,2140049
14,835	533,9	534,3	104,68	103,12	0,174	0,175	61	0,2156569
14,833	533,9	534,3	102,22	103,05	0,173	0,176	62	0,2156571

14,911	533,9	534,3	101,65	102,26	0,171	0,176	63	0,2168285
14,678	533,9	534,3	103,37	103,89	0,171	0,175	64	0,213531
14,948	533,9	534,3	103,76	102,09	0,173	0,176	65	0,2175294
14,785	533,9	534,3	104,63	103,06	0,175	0,176	66	0,2151857
14,897	534,0	534,3	103,25	102,56	0,174	0,176	67	0,2168288
14,811	534,0	534,4	102,28	102,85	0,173	0,176	68	0,2156571
14,779	534,0	534,4	102,52	102,38	0,171	0,175	69	0,2151855
14,898	534,0	534,4	101,39	102,16	0,171	0,175	70	0,2168281
14,862	534,0	534,4	102,90	102,60	0,172	0,176	71	0,2163609
14,704	534,0	534,4	103,07	103,75	0,172	0,176	72	0,2140047
14,864	534,0	534,4	103,67	103,04	0,173	0,176	73	0,2163607
14,897	534,0	534,4	102,45	101,77	0,173	0,176	74	0,2168286
14,818	534,0	534,4	102,02	102,61	0,172	0,175	75	0,2156565
14,817	534,0	534,4	104,18	102,53	0,173	0,175	76	0,2156564
14,707	534,0	534,4	102,82	103,63	0,173	0,175	77	0,2140038
14,781	534,0	534,4	102,29	102,65	0,171	0,175	78	0,2151852
14,674	534,0	534,4	105,43	103,69	0,173	0,175	79	0,2135353
14,788	534,0	534,4	104,47	103,24	0,175	0,176	80	0,215185
14,787	534,0	534,4	102,63	103,35	0,173	0,176	81	0,2151857
14,867	534,0	534,4	104,13	103,03	0,173	0,176	82	0,2163608
14,896	534,0	534,4	102,61	102,14	0,174	0,176	83	0,2168282
14,814	534,0	534,4	101,80	102,53	0,172	0,175	84	0,2156565
14,811	534,0	534,4	104,24	102,80	0,173	0,175	85	0,2156566
14,775	534,0	534,4	102,04	102,37	0,173	0,175	86	0,2151856
14,855	533,9	534,4	102,60	102,28	0,172	0,175	87	0,2163609
14,655	534,0	534,4	103,96	103,51	0,173	0,175	88	0,2135305
14,687	534,0	534,4	104,71	103,15	0,173	0,175	89	0,2140046
14,961	534,0	534,4	102,80	101,24	0,174	0,175	90	0,2179943
14,840	533,9	534,4	102,60	102,34	0,174	0,175	91	0,2163606
14,785	533,9	534,4	104,02	102,70	0,174	0,176	92	0,2156575
14,871	534,0	534,4	102,81	101,66	0,174	0,175	93	0,2168279
14,832	534,0	534,5	101,71	102,19	0,172	0,175	94	0,216361
14,841	534,0	534,5	101,98	101,85	0,172	0,175	95	0,2163609
14,798	534,0	534,5	102,41	102,39	0,172	0,175	96	0,2156561
14,687	534,1	534,5	102,99	103,48	0,172	0,175	97	0,2140039
14,693	534,1	534,5	104,59	103,62	0,173	0,176	98	0,2140037
14,887	534,1	534,5	103,58	102,10	0,174	0,175	99	0,2168276
14,938	534,1	534,5	101,56	101,51	0,173	0,175	100	0,2175288
14,856	534,1	534,5	101,67	102,11	0,171	0,175	101	0,2163611
14,769	534,1	534,6	104,44	102,97	0,173	0,175	102	0,2151851
14,842	534,1	534,5	103,80	102,65	0,175	0,176	103	0,2163609
14,752	534,1	534,6	104,17	102,99	0,175	0,176	104	0,2151853
14,847	534,1	534,6	101,31	101,95	0,173	0,175	105	0,2164723
14,783	534,1	534,6	102,03	102,41	0,171	0,175	106	0,215656
14,775	534,1	534,6	103,52	102,69	0,173	0,175	107	0,2156563
14,820	534,1	534,6	102,61	102,08	0,174	0,176	108	0,2164168
14,890	534,1	534,6	103,02	101,43	0,174	0,175	109	0,2175289
14,800	534,1	534,6	102,35	101,87	0,174	0,175	110	0,2163607
14,797	534,1	534,6	101,75	101,81	0,172	0,175	111	0,2163699
14,786	534,1	534,6	103,18	102,08	0,173	0,175	112	0,2163608
14,863	534,1	534,6	100,58	101,26	0,173	0,176	113	0,2175288
14,919	534,1	534,6	102,04	101,14	0,173	0,176	114	0,2184597
14,848	534,2	534,6	100,56	101,11	0,173	0,176	115	0,2175295
14,842	534,2	534,6	102,62	101,65	0,173	0,176	116	0,217529
14,788	534,2	534,6	102,09	101,46	0,174	0,176	117	0,2168288
14,676	534,2	534,7	103,62	102,38	0,174	0,176	118	0,2152484
14,827	534,2	534,6	102,80	101,19	0,175	0,176	119	0,2175297
14,819	534,2	534,7	102,46	101,25	0,175	0,176	120	0,2175296
14,766	534,2	534,7	100,53	100,83	0,173	0,175	121	0,2168287
14,807	534,2	534,6	102,39	101,21	0,173	0,175	122	0,2175297
14,830	534,2	534,7	99,81	100,42	0,173	0,175	123	0,2179946
14,711	534,2	534,7	102,58	101,40	0,172	0,175	124	0,216361
14,780	534,2	534,7	102,07	101,09	0,174	0,176	125	0,2175298
14,722	534,2	534,6	100,23	100,87	0,173	0,176	126	0,2168285
14,788	534,2	534,7	101,74	100,81	0,173	0,176	127	0,2179946
14,779	534,2	534,7	100,99	100,31	0,174	0,176	128	0,2179944
14,805	534,2	534,7	99,61	100,23	0,172	0,176	129	0,2184603
14,764	534,2	534,6	101,56	100,20	0,173	0,176	130	0,2179542
14,789	534,1	534,6	101,50	100,42	0,175	0,176	131	0,2184602



14,783	534,1	534,6	101,54	100,05	0,175	0,176	132	0,2184604
14,558	534,1	534,6	102,65	101,35	0,175	0,175	133	0,2151863
14,817	534,1	534,6	101,30	99,60	0,175	0,175	134	0,2191551
14,750	534,1	534,6	99,20	99,08	0,173	0,175	135	0,2182635
14,804	534,1	534,6	99,62	99,38	0,172	0,175	136	0,2191554
14,730	534,1	534,6	101,76	100,01	0,174	0,176	137	0,2181199
14,792	534,1	534,6	98,69	99,14	0,173	0,175	138	0,2191553
14,859	534,1	534,6	98,27	98,17	0,171	0,175	139	0,2203092
14,781	534,1	534,6	100,99	99,54	0,173	0,175	140	0,2191553
14,777	534,1	534,6	100,79	99,54	0,175	0,176	141	0,2191556
14,850	534,1	534,6	98,36	98,85	0,173	0,176	142	0,220309
14,803	534,1	534,6	98,25	99,03	0,171	0,176	143	0,2196167
14,794	534,1	534,6	99,36	99,35	0,172	0,176	144	0,2196171
14,714	534,1	534,6	98,66	99,55	0,172	0,176	145	0,2184608
14,682	534,1	534,6	98,95	99,47	0,171	0,175	146	0,2179955
14,752	534,2	534,6	100,65	98,92	0,173	0,175	147	0,2191558
14,750	534,1	534,6	98,13	98,56	0,173	0,175	148	0,2191558
14,744	534,1	534,6	100,70	99,32	0,173	0,175	149	0,2191561
14,660	534,1	534,6	100,92	99,46	0,175	0,176	150	0,2179431
14,659	534,1	534,6	100,27	99,09	0,174	0,175	151	0,2179947
14,762	534,1	534,6	100,15	98,82	0,174	0,175	152	0,2196141
14,649	534,1	534,6	99,10	99,33	0,173	0,175	153	0,2179956
14,647	534,1	534,6	98,82	99,34	0,171	0,175	154	0,2179953
14,646	534,1	534,6	101,12	99,37	0,173	0,175	155	0,2179956
14,642	534,1	534,6	100,44	99,09	0,175	0,175	156	0,2179954
14,637	534,1	534,6	98,89	99,43	0,173	0,175	157	0,2179951
14,743	534,1	534,6	99,70	98,95	0,173	0,176	158	0,2196174
14,631	534,1	534,6	101,13	99,55	0,175	0,176	159	0,2179949
14,817	534,1	534,6	98,97	97,69	0,175	0,175	160	0,2207691
14,736	534,1	534,6	100,24	98,42	0,174	0,175	161	0,2196178
14,732	534,1	534,6	97,74	98,43	0,173	0,175	162	0,219617
14,624	534,1	534,6	100,96	99,23	0,173	0,175	163	0,2179956
14,698	534,2	534,6	97,79	98,50	0,173	0,175	164	0,219156
14,773	534,1	534,6	97,84	98,38	0,171	0,175	165	0,2203097
14,726	534,2	534,6	97,59	98,27	0,171	0,175	166	0,219618
14,645	534,1	534,6	100,36	99,04	0,173	0,175	167	0,2184613
14,768	534,1	534,6	97,11	98,10	0,172	0,175	168	0,2203099
14,578	534,1	534,6	100,79	99,13	0,173	0,175	169	0,2175313
14,717	534,1	534,6	99,96	98,05	0,175	0,175	170	0,2196176
14,574	534,1	534,6	100,30	98,87	0,174	0,175	171	0,2175309
14,576	534,1	534,6	100,55	98,80	0,174	0,174	172	0,2175305
14,762	534,1	534,6	99,23	97,74	0,174	0,175	173	0,2203099
14,758	534,1	534,6	97,67	97,70	0,173	0,175	174	0,2203098
14,602	534,1	534,6	98,90	99,14	0,172	0,175	175	0,2179956
14,451	534,1	534,6	100,08	100,35	0,172	0,176	176	0,2158035
14,441	534,1	534,6	101,04	99,69	0,173	0,175	177	0,2156584
14,628	534,1	534,6	98,01	99,01	0,172	0,175	178	0,2184611
14,680	534,1	534,6	98,04	99,00	0,171	0,176	179	0,2192852
14,512	534,1	534,6	100,22	99,30	0,172	0,176	180	0,21683
14,588	534,1	534,6	98,31	99,02	0,172	0,175	181	0,2179955
14,588	534,1	534,6	97,93	99,04	0,171	0,175	182	0,2179957
14,614	534,1	534,6	97,95	99,11	0,171	0,176	183	0,2184615
14,614	534,1	534,6	99,65	98,48	0,172	0,175	184	0,2184611
14,586	534,1	534,6	98,40	99,56	0,172	0,176	185	0,2179957
14,658	534,2	534,6	99,94	98,48	0,173	0,176	186	0,2191561
14,660	534,2	534,6	97,66	98,55	0,173	0,176	187	0,2191567
14,839	534,2	534,6	96,72	97,17	0,171	0,175	188	0,221871
14,690	534,2	534,6	98,20	98,31	0,172	0,175	189	0,2196186
14,654	534,2	534,7	97,82	98,64	0,172	0,176	190	0,2191564
14,729	534,2	534,7	98,37	97,72	0,172	0,175	191	0,2203089
14,498	534,2	534,7	98,71	99,80	0,172	0,176	192	0,2168299
14,655	534,2	534,7	97,80	98,70	0,171	0,176	193	0,2191561
14,684	534,2	534,7	97,79	98,26	0,171	0,176	194	0,2196181
14,728	534,2	534,7	98,88	97,89	0,173	0,175	195	0,2203105
14,649	534,2	534,7	97,95	98,43	0,173	0,175	196	0,2191563
14,679	534,2	534,7	99,44	98,20	0,173	0,175	197	0,2196185
14,678	534,2	534,6	97,56	98,37	0,173	0,176	198	0,2196178
14,569	534,2	534,7	100,45	98,37	0,173	0,175	199	0,2179958
14,675	534,2	534,7	97,64	98,16	0,173	0,175	200	0,219618

14,642	534,2	534,7	98,10	98,27	0,172	0,175	201	0,2191562
14,641	534,2	534,7	98,92	97,93	0,172	0,175	202	0,2191566
14,531	534,2	534,7	98,53	99,14	0,172	0,175	203	0,2175304
14,640	534,2	534,7	99,29	98,27	0,173	0,175	204	0,2191563
14,717	534,2	534,7	97,34	98,01	0,173	0,176	205	0,2203099
14,640	534,2	534,7	98,59	98,12	0,172	0,175	206	0,2191564
14,670	534,2	534,7	97,48	98,14	0,172	0,175	207	0,2196179
14,564	534,2	534,7	98,54	98,90	0,171	0,175	208	0,2179957
14,668	534,2	534,7	97,72	98,27	0,172	0,176	209	0,2196183
14,562	534,2	534,7	98,51	98,92	0,172	0,176	210	0,2179964
14,717	534,2	534,7	98,83	97,62	0,173	0,175	211	0,2203102
14,404	534,2	534,7	98,87	99,98	0,172	0,175	212	0,2156582
14,663	534,2	534,7	98,49	98,13	0,172	0,176	213	0,2196179
14,822	534,2	534,7	97,03	97,31	0,173	0,176	214	0,2219157
14,553	534,2	534,7	100,14	98,50	0,173	0,175	215	0,2179963
14,666	534,2	534,7	97,91	98,05	0,173	0,175	216	0,219618
14,666	534,2	534,7	96,89	98,40	0,171	0,176	217	0,2196178
14,740	534,2	534,7	96,99	97,53	0,171	0,176	218	0,22077
14,664	534,2	534,7	99,36	97,84	0,173	0,175	219	0,219618
14,634	534,2	534,7	98,34	98,17	0,173	0,175	220	0,2191566
14,477	534,2	534,7	100,37	99,29	0,173	0,175	221	0,216831
14,586	534,2	534,7	97,95	98,74	0,173	0,176	222	0,2184616
14,741	534,2	534,7	98,74	97,23	0,173	0,175	223	0,2207698
14,589	534,2	534,7	98,43	98,49	0,173	0,175	224	0,2184618
14,665	534,2	534,7	97,83	98,15	0,172	0,175	225	0,2196175
14,527	534,2	534,7	100,06	98,91	0,173	0,175	226	0,2175308
14,633	534,2	534,7	98,55	98,18	0,173	0,175	227	0,2191564
14,664	534,2	534,7	98,11	97,98	0,172	0,175	228	0,2196175
14,709	534,1	534,6	97,25	97,96	0,172	0,176	229	0,2203105
14,585	534,1	534,7	98,01	98,68	0,171	0,176	230	0,2184611
14,552	534,2	534,7	98,10	98,99	0,171	0,176	231	0,2179952
14,709	534,2	534,7	97,20	97,79	0,171	0,176	232	0,2203101
14,631	534,2	534,7	99,53	98,10	0,173	0,175	233	0,2191572
14,524	534,2	534,7	100,35	98,77	0,174	0,175	234	0,2175309
14,633	534,2	534,7	97,92	98,31	0,173	0,175	235	0,2191565
14,662	534,2	534,7	97,31	98,37	0,171	0,176	236	0,2196178
14,662	534,2	534,7	97,40	98,30	0,171	0,176	237	0,2196179
14,633	534,2	534,7	100,07	98,04	0,173	0,175	238	0,2191561
14,633	534,2	534,7	97,17	98,33	0,173	0,175	239	0,2191565
14,630	534,2	534,7	99,09	98,16	0,172	0,175	240	0,219156
14,519	534,2	534,7	99,90	98,75	0,174	0,175	241	0,2175308
14,582	534,2	534,7	99,93	98,56	0,174	0,175	242	0,2184608
14,662	534,2	534,7	99,64	97,84	0,175	0,175	243	0,2196181
14,627	534,2	534,7	98,85	98,29	0,174	0,175	244	0,2191568
14,704	534,2	534,7	99,32	97,36	0,174	0,175	245	0,2203102
14,581	534,2	534,7	100,15	98,37	0,175	0,175	246	0,2184613
14,705	534,2	534,7	99,24	97,51	0,175	0,175	247	0,2203101
14,655	534,2	534,7	98,56	97,50	0,174	0,175	248	0,2196174
14,656	534,2	534,7	97,42	98,18	0,172	0,175	249	0,2196176
14,653	534,2	534,7	97,24	98,12	0,171	0,176	250	0,219617
14,622	534,2	534,7	99,58	97,69	0,173	0,175	251	0,2191556
14,701	534,2	534,7	99,37	97,27	0,175	0,175	252	0,2203101
14,703	534,2	534,7	97,02	97,98	0,173	0,175	253	0,2203098
14,730	534,2	534,7	99,01	97,35	0,173	0,176	254	0,2207693
14,625	534,2	534,7	97,73	98,14	0,173	0,175	255	0,2191562
14,551	534,2	534,7	99,88	98,98	0,173	0,176	256	0,2180941
14,702	534,2	534,7	97,02	97,54	0,173	0,176	257	0,22031
14,579	534,2	534,7	98,24	98,27	0,171	0,175	258	0,2184608
14,732	534,2	534,7	96,94	97,43	0,171	0,175	259	0,2207697
14,579	534,2	534,7	100,09	98,21	0,173	0,175	260	0,2184609
14,515	534,2	534,7	98,53	99,04	0,173	0,175	261	0,2175308
14,655	534,2	534,7	98,49	98,34	0,172	0,176	262	0,2196183
14,577	534,2	534,7	99,86	98,23	0,174	0,175	263	0,2184614
14,576	534,2	534,7	100,00	98,37	0,175	0,175	264	0,2184611
14,576	534,2	534,7	99,74	98,45	0,175	0,175	265	0,2184612
14,701	534,2	534,7	97,80	98,20	0,173	0,176	266	0,2203099
14,516	534,2	534,7	99,69	99,42	0,173	0,176	267	0,2175308
14,622	534,2	534,7	98,96	98,39	0,173	0,176	268	0,2191561
14,703	534,3	534,7	98,25	97,08	0,173	0,175	269	0,2203106

14,623	534,3	534,7	99,10	97,59	0,173	0,174	270	0,2191565
14,653	534,3	534,8	97,99	97,64	0,173	0,175	271	0,219618
14,699	534,3	534,8	96,84	97,84	0,171	0,175	272	0,2203098
14,655	534,3	534,8	98,98	98,09	0,172	0,176	273	0,2196184
14,542	534,3	534,8	99,85	98,32	0,174	0,175	274	0,2179962
14,620	534,3	534,7	97,56	98,30	0,173	0,175	275	0,2191565
14,651	534,3	534,7	99,25	97,85	0,173	0,175	276	0,2196179
14,695	534,3	534,8	96,93	97,41	0,173	0,175	277	0,2203107
14,619	534,3	534,8	97,55	98,49	0,171	0,175	278	0,2191564
14,649	534,3	534,8	99,72	98,17	0,173	0,176	279	0,2196179
14,649	534,3	534,8	97,55	98,20	0,173	0,176	280	0,2196179

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	100,55	100,52	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
14,508	535,8	536,2			0,172	0,175	0	0,2123428
14,660	535,9	536,3	101,34	99,08	0,174	0,175	1	0,2163652
14,630	535,8	536,3	99,12	98,73	0,174	0,175	2	0,2167648
14,701	535,8	536,3	98,90	97,79	0,172	0,174	3	0,2175335
14,682	535,7	536,3	100,95	98,28	0,174	0,174	4	0,2169782
14,426	535,7	536,3	102,02	99,89	0,175	0,174	5	0,2135345
14,632	535,7	536,3	101,66	98,40	0,175	0,174	6	0,2163653
14,562	535,7	536,3	101,90	98,98	0,176	0,174	7	0,2151901
14,664	535,7	536,3	101,28	98,56	0,175	0,174	8	0,2163653
14,489	535,7	536,4	100,96	100,77	0,174	0,174	9	0,2135346
14,497	535,7	536,3	102,80	100,46	0,174	0,175	10	0,2135345
14,635	535,7	536,3	100,25	99,44	0,174	0,174	11	0,215661
14,588	535,7	536,4	101,00	99,67	0,173	0,175	12	0,2151896
14,610	535,8	536,4	101,46	99,37	0,174	0,175	13	0,215661
14,644	535,8	536,4	98,90	99,25	0,173	0,175	14	0,2163652
14,670	535,9	536,5	100,67	98,45	0,173	0,175	15	0,2168327
14,674	535,9	536,5	100,17	98,40	0,174	0,174	16	0,2168328
14,568	535,9	536,5	99,29	99,86	0,172	0,175	17	0,2151896
14,682	535,9	536,5	98,38	99,08	0,171	0,175	18	0,2168339
14,665	536,0	536,6	99,17	98,59	0,171	0,175	19	0,2165822
14,680	536,0	536,6	100,12	98,42	0,173	0,174	20	0,2168331
14,680	536,1	536,7	98,20	98,85	0,172	0,174	21	0,2168335
14,752	536,1	536,7	97,71	98,18	0,170	0,175	22	0,2179992
14,672	536,2	536,7	98,49	98,44	0,171	0,174	23	0,2168335
14,719	536,2	536,8	100,18	98,23	0,173	0,174	24	0,2175348
14,725	536,2	536,8	100,15	98,17	0,174	0,174	25	0,2175344
14,503	536,3	536,8	100,07	100,11	0,173	0,174	26	0,2140092
14,603	536,3	536,9	100,79	99,70	0,172	0,175	27	0,2151883
14,706	536,4	536,9	98,52	99,42	0,171	0,175	28	0,2163664
14,694	536,4	537,0	101,57	99,58	0,172	0,174	29	0,2156621
14,688	536,5	537,0	101,28	99,65	0,174	0,174	30	0,2151909
14,433	536,5	537,0	101,98	102,22	0,172	0,174	31	0,2111471
14,641	536,6	537,1	102,44	100,25	0,172	0,174	32	0,2140092
14,635	536,6	537,1	101,08	101,36	0,172	0,174	33	0,2135358
14,644	536,7	537,2	102,56	101,65	0,172	0,175	34	0,2135356
14,617	536,7	537,2	102,76	101,43	0,173	0,174	35	0,2128224
14,545	536,8	537,3	102,94	102,80	0,172	0,174	36	0,2116279
14,608	536,8	537,3	103,81	102,22	0,173	0,174	37	0,2123447
14,620	536,9	537,4	103,17	102,07	0,173	0,174	38	0,2123449
14,551	536,9	537,4	104,36	102,90	0,173	0,174	39	0,2111475
14,639	537,0	537,5	104,08	102,56	0,173	0,174	40	0,2123448
14,580	537,0	537,5	104,19	102,79	0,173	0,174	41	0,2113602
14,653	537,1	537,6	101,83	103,01	0,171	0,174	42	0,2123452
14,619	537,2	537,6	104,18	103,33	0,171	0,175	43	0,2116283
14,468	537,2	537,7	104,33	103,56	0,172	0,174	44	0,2094604
14,679	537,3	537,7	101,70	103,18	0,170	0,174	45	0,2123453
14,693	537,3	537,8	103,93	103,11	0,171	0,175	46	0,2123457
14,647	537,4	537,9	102,70	103,59	0,171	0,175	47	0,2116286
14,705	537,5	537,9	103,80	103,31	0,171	0,175	48	0,2123457
14,632	537,6	538,0	102,64	104,04	0,171	0,175	49	0,2111488
14,653	537,7	538,1	102,67	103,69	0,169	0,175	50	0,211411
14,636	537,7	538,2	104,45	103,10	0,171	0,174	51	0,2111484
14,674	537,8	538,2	102,55	102,80	0,171	0,173	52	0,2116284
14,614	537,9	538,3	103,55	103,40	0,170	0,173	53	0,2106779
14,655	537,9	538,3	102,54	103,78	0,170	0,174	54	0,2111489
14,661	538,0	538,4	104,67	103,63	0,171	0,174	55	0,2111489

14,548	538,0	538,4	105,54	104,66	0,172	0,174	56	0,2094625
14,676	538,1	538,5	104,74	104,28	0,172	0,175	57	0,2111488
14,681	538,1	538,6	102,76	104,00	0,171	0,175	58	0,2111493
14,687	538,2	538,6	103,01	104,14	0,169	0,174	59	0,2111494
14,654	538,2	538,7	103,06	104,02	0,169	0,174	60	0,2106692
14,658	538,3	538,7	103,12	104,14	0,169	0,174	61	0,2106656
14,672	538,3	538,8	103,00	104,22	0,169	0,174	62	0,2106697
14,717	538,4	538,8	104,98	103,87	0,170	0,174	63	0,2111494
14,687	538,4	538,9	103,43	104,40	0,171	0,174	64	0,2106627
14,687	538,5	539,0	103,21	104,31	0,169	0,174	65	0,2106698
14,689	538,5	539,0	105,21	104,62	0,171	0,174	66	0,2106696
14,701	538,5	539,1	103,69	104,67	0,171	0,174	67	0,2106693
14,737	538,6	539,1	105,50	104,36	0,171	0,174	68	0,2111498
14,765	538,6	539,1	102,52	103,72	0,171	0,174	69	0,2116301
14,726	538,6	539,2	103,69	104,23	0,169	0,174	70	0,2111498
14,559	538,6	539,2	104,09	105,29	0,169	0,174	71	0,2087358
14,730	538,7	539,2	102,55	104,02	0,168	0,174	72	0,2111498
14,729	538,7	539,3	102,93	104,18	0,168	0,174	73	0,21115
14,698	538,8	539,4	103,35	104,29	0,169	0,174	74	0,2106781
14,725	538,8	539,4	102,66	103,83	0,169	0,174	75	0,2111505
14,762	538,8	539,4	105,06	104,12	0,170	0,174	76	0,2115256
14,609	538,9	539,5	105,92	105,57	0,172	0,175	77	0,2094634
14,809	538,9	539,5	104,27	103,59	0,172	0,175	78	0,2123473
14,688	538,9	539,5	103,29	104,46	0,170	0,174	79	0,2106703
14,809	539,0	539,6	104,73	103,76	0,171	0,174	80	0,212348
14,750	539,0	539,6	104,79	104,41	0,173	0,175	81	0,211631
14,890	539,0	539,6	104,35	103,25	0,173	0,175	82	0,2135383
14,802	539,0	539,7	104,03	103,60	0,172	0,174	83	0,2122714
14,753	539,1	539,7	102,53	103,79	0,170	0,174	84	0,2116313
14,922	539,1	539,7	104,06	102,87	0,171	0,174	85	0,214013
14,752	539,2	539,8	103,91	104,21	0,172	0,174	86	0,2116307
14,799	539,2	539,8	104,36	103,35	0,172	0,174	87	0,2123477
14,824	539,2	539,8	101,77	102,80	0,170	0,174	88	0,2128259
14,738	539,2	539,8	102,80	103,50	0,169	0,174	89	0,2116313
14,873	539,2	539,9	101,83	102,60	0,169	0,174	90	0,2135394
14,863	539,3	539,9	103,56	102,83	0,171	0,174	91	0,213539
14,862	539,3	539,9	101,57	102,64	0,170	0,174	92	0,2135386
14,887	539,3	540,0	103,12	102,75	0,170	0,174	93	0,2140131
14,846	539,3	540,0	101,40	102,52	0,170	0,174	94	0,2135391
14,875	539,3	540,0	103,11	102,90	0,170	0,174	95	0,2140133
14,872	539,4	540,0	103,26	102,65	0,172	0,175	96	0,2140129
14,830	539,4	540,0	103,85	103,04	0,173	0,175	97	0,2135394
14,939	539,4	540,0	100,79	101,35	0,171	0,174	98	0,2151943
14,840	539,4	540,1	100,52	101,58	0,169	0,173	99	0,2140132
14,665	539,5	540,1	101,98	103,26	0,168	0,174	100	0,2116315
14,938	539,5	540,1	101,60	101,43	0,170	0,174	101	0,2156658
14,786	539,5	540,1	100,91	102,10	0,170	0,174	102	0,2135394
14,926	539,5	540,2	99,69	100,67	0,168	0,173	103	0,2156661
14,921	539,5	540,2	101,96	101,42	0,170	0,174	104	0,215666
14,881	539,5	540,2	102,41	101,58	0,172	0,175	105	0,2151947
14,909	539,5	540,2	101,67	101,18	0,172	0,174	106	0,2156658
14,698	539,5	540,2	101,44	102,05	0,170	0,174	107	0,2127531
14,862	539,5	540,2	101,46	101,19	0,170	0,174	108	0,2151939
14,857	539,5	540,2	102,30	101,24	0,172	0,174	109	0,2151945
14,967	539,5	540,2	100,71	100,51	0,172	0,174	110	0,2168379
14,731	539,5	540,2	100,76	101,63	0,170	0,174	111	0,2135398
14,821	539,5	540,3	102,22	101,74	0,171	0,174	112	0,2148795
14,937	539,6	540,3	100,91	100,36	0,172	0,175	113	0,2168381
14,859	539,6	540,3	101,46	101,42	0,172	0,175	114	0,2156659
14,821	539,6	540,3	101,62	101,11	0,172	0,175	115	0,2151947
14,812	539,6	540,3	99,74	100,58	0,170	0,174	116	0,2151953



14,836	539,6	540,3	99,40	100,25	0,169	0,174	117	0,2156661
14,880	539,6	540,3	98,97	100,07	0,169	0,174	118	0,2163706
14,869	539,6	540,3	99,04	99,61	0,169	0,173	119	0,2163707
14,665	539,6	540,3	102,55	101,50	0,171	0,174	120	0,2135399
14,814	539,6	540,3	98,93	100,19	0,170	0,174	121	0,2156659
14,774	539,6	540,3	101,60	100,73	0,170	0,174	122	0,2151947
14,878	539,6	540,3	100,95	99,89	0,173	0,174	123	0,2168377
14,793	539,6	540,4	99,71	100,27	0,171	0,174	124	0,2156664
14,597	539,6	540,3	100,69	101,26	0,170	0,174	125	0,2128263
14,865	539,6	540,4	98,61	99,33	0,169	0,173	126	0,2168385
14,767	539,6	540,3	100,56	100,22	0,170	0,174	127	0,2156662
14,822	539,6	540,3	99,13	100,10	0,171	0,174	128	0,2163704
14,861	539,6	540,4	100,43	100,18	0,171	0,175	129	0,2170365
14,810	539,6	540,4	99,70	99,72	0,172	0,175	130	0,2163701
14,885	539,6	540,4	98,24	98,80	0,170	0,174	131	0,2175391
14,721	539,6	540,4	99,18	100,23	0,169	0,174	132	0,2151949
14,871	539,6	540,4	97,79	99,03	0,169	0,174	133	0,2175386
14,825	539,6	540,4	97,94	99,10	0,168	0,174	134	0,2168366
14,628	539,6	540,4	101,59	100,67	0,170	0,174	135	0,2140142
14,815	539,6	540,4	100,22	99,40	0,172	0,174	136	0,2168383
14,619	539,6	540,4	101,54	101,02	0,172	0,174	137	0,2140144
14,892	539,7	540,5	97,73	98,65	0,171	0,174	138	0,2180043
14,777	539,7	540,5	100,40	99,64	0,171	0,174	139	0,2163707
14,698	539,7	540,5	100,08	99,71	0,172	0,174	140	0,2151952
14,697	539,7	540,5	99,71	99,87	0,170	0,174	141	0,2151948
14,809	539,7	540,5	98,30	98,83	0,170	0,173	142	0,2168381
14,723	539,7	540,5	100,72	100,01	0,171	0,174	143	0,2156667
14,771	539,8	540,6	98,69	99,69	0,171	0,174	144	0,2163708
14,686	539,8	540,6	99,06	99,96	0,169	0,174	145	0,2151948
14,765	539,8	540,6	100,36	99,73	0,171	0,174	146	0,2163713
14,841	539,8	540,6	98,04	98,46	0,171	0,174	147	0,2175392
14,792	539,8	540,6	98,37	99,42	0,169	0,174	148	0,2168381
14,789	539,9	540,6	97,72	99,14	0,169	0,174	149	0,2167972
14,866	539,9	540,7	98,22	98,91	0,169	0,174	150	0,2180042
14,863	539,8	540,7	99,47	98,93	0,171	0,175	151	0,2180044
14,781	539,9	540,7	97,91	99,00	0,170	0,174	152	0,2168385
14,863	539,9	540,7	97,67	98,78	0,169	0,174	153	0,2180047
14,830	539,9	540,7	98,17	99,23	0,169	0,175	154	0,2175393
14,741	539,9	540,7	98,26	99,16	0,169	0,174	155	0,2163706
14,854	539,9	540,7	97,65	98,47	0,169	0,174	156	0,2180043
14,746	539,9	540,7	100,51	99,37	0,171	0,174	157	0,2163714
14,842	539,8	540,7	97,18	98,65	0,171	0,174	158	0,2180044
14,873	539,8	540,7	97,25	98,73	0,169	0,175	159	0,2184699
14,771	539,8	540,7	97,89	99,32	0,169	0,175	160	0,2168384
14,813	539,8	540,7	97,37	98,91	0,169	0,174	161	0,2175395
14,812	539,8	540,7	99,24	98,35	0,170	0,174	162	0,2175398
14,761	539,8	540,7	99,60	98,58	0,172	0,173	163	0,2168395
14,871	539,8	540,7	99,08	98,12	0,172	0,174	164	0,2184698
14,728	539,8	540,7	99,08	98,99	0,171	0,174	165	0,2163714
14,798	539,8	540,6	97,40	98,72	0,170	0,174	166	0,2175389
14,836	539,8	540,6	97,10	98,65	0,169	0,174	167	0,2180047
14,800	539,8	540,6	98,91	98,98	0,170	0,174	168	0,2174294
14,794	539,8	540,7	98,41	98,55	0,171	0,174	169	0,2175392
14,665	539,8	540,7	100,38	99,63	0,171	0,174	170	0,2156663
14,829	539,8	540,7	98,14	98,74	0,171	0,175	171	0,2180057
14,802	539,9	540,7	98,57	98,65	0,171	0,174	172	0,2175393
14,752	539,9	540,7	99,98	98,70	0,172	0,174	173	0,2168382
14,856	539,9	540,7	96,76	98,45	0,170	0,174	174	0,2184695
14,802	539,9	540,7	99,41	98,92	0,170	0,175	175	0,2176026
14,780	539,9	540,7	99,44	98,32	0,172	0,174	176	0,2175393
14,891	539,8	540,7	98,14	97,45	0,172	0,174	177	0,2191654

14,903	539,8	540,7	98,31	97,55	0,172	0,174	178	0,2191651
14,827	539,8	540,7	99,26	98,79	0,172	0,174	179	0,2180048
14,710	539,8	540,7	97,83	99,61	0,170	0,175	180	0,2163714
14,904	539,8	540,7	98,44	98,08	0,170	0,175	181	0,2191655
14,855	539,8	540,7	99,08	98,26	0,172	0,174	182	0,2184703
14,767	539,8	540,7	99,50	98,80	0,172	0,174	183	0,2172908
14,817	539,8	540,7	97,81	98,48	0,171	0,174	184	0,2180045
14,848	539,9	540,7	98,43	98,01	0,171	0,174	185	0,2184298
14,774	539,9	540,7	99,19	97,94	0,172	0,174	186	0,2175391
14,822	539,9	540,7	97,36	99,01	0,171	0,174	187	0,2180044
14,823	539,9	540,7	97,09	98,59	0,169	0,175	188	0,2180048
14,786	539,9	540,7	99,54	98,56	0,171	0,174	189	0,2175393
14,856	539,9	540,7	96,60	98,83	0,170	0,175	190	0,2184696
14,819	539,9	540,7	99,18	98,45	0,170	0,175	191	0,2180042
14,849	539,9	540,7	98,93	98,10	0,172	0,174	192	0,2184624
14,849	539,9	540,7	97,13	98,41	0,171	0,174	193	0,2184701
14,682	539,9	540,7	99,89	99,07	0,171	0,174	194	0,2160475
14,820	539,9	540,7	96,91	99,02	0,170	0,175	195	0,2180044
14,737	539,9	540,8	99,49	98,87	0,170	0,175	196	0,2168388
14,816	539,9	540,8	99,31	98,19	0,172	0,174	197	0,218005
14,190	539,9	540,8	103,50	102,59	0,172	0,174	198	0,2087376
14,814	539,9	540,8	97,14	98,75	0,170	0,174	199	0,2180046
14,887	539,9	540,8	97,24	97,83	0,169	0,175	200	0,2191649
14,835	540,0	540,8	98,22	97,94	0,171	0,174	201	0,2184701
14,890	540,0	540,8	98,77	97,57	0,172	0,174	202	0,219165
14,657	540,0	540,8	99,67	99,34	0,172	0,174	203	0,2156666
14,783	540,0	540,8	97,14	98,85	0,170	0,174	204	0,2175398
14,841	540,0	540,8	97,52	98,45	0,169	0,175	205	0,2184702
14,836	540,0	540,8	98,14	98,12	0,170	0,175	206	0,2184702
14,729	540,0	540,8	99,41	98,73	0,171	0,174	207	0,2168385
14,724	540,0	540,8	97,21	99,31	0,170	0,175	208	0,2168389
14,725	540,0	540,9	99,64	98,66	0,170	0,174	209	0,2168393
14,723	540,0	540,9	97,09	99,40	0,170	0,175	210	0,2168389
14,808	540,1	540,9	99,12	97,83	0,170	0,174	211	0,2180051
14,831	540,1	540,9	98,74	97,67	0,172	0,173	212	0,2184704
14,801	540,1	540,9	96,85	98,89	0,170	0,174	213	0,2180062
14,804	540,1	540,9	99,26	97,92	0,171	0,174	214	0,2180051
14,805	540,1	540,9	98,92	97,92	0,172	0,174	215	0,2180047
14,830	540,1	540,9	96,60	98,67	0,170	0,174	216	0,2184708
14,797	540,1	540,9	97,11	98,77	0,169	0,175	217	0,2180053
14,828	540,1	540,9	98,46	98,16	0,170	0,175	218	0,2184706
14,721	540,1	540,9	97,53	98,95	0,170	0,175	219	0,2169048
14,760	540,1	540,9	98,10	98,68	0,170	0,175	220	0,2175418
14,766	540,1	540,9	97,09	98,75	0,170	0,175	221	0,2176751
14,791	540,1	540,9	99,16	97,71	0,171	0,174	222	0,2180055
14,898	540,1	540,9	97,46	97,38	0,172	0,174	223	0,2196277
14,812	540,1	540,9	96,97	98,43	0,170	0,175	224	0,218471
14,780	540,1	540,9	99,09	97,84	0,171	0,174	225	0,2180057

## APPENDIX 3: Calibration data

CLIENT	Foyer Supreme	PROJECT NUMBER	PI-20164
PRODUCT	Wood fireplace	SAMPLE ID#	QI_20237
MODEL	TBD		
STANDARDS	EPA method 28R; ASTME2780; ASTME2515		

### TEST EQUIPMENT

ITEM	EQUIPMENT TYPE	MANUFACTURER	EQUIPMENT #	CALIBRATION DUE DATE	COMPLIES WITH STANDARD REQUIREMENTS
1	Calibration block	Delmhorst	EM-191	2018-12-23	Y
2	Digital Manometer	Dwyer	EM-006	2019 March	Y
3	Digital Manometer	Dwyer	EM-007	2019 March	Y
4	Data aquisition System	Keithley	EM-012	2019-03-05	Y
5	analytical scale 200gr.	Ohaus	EM-232	2018-may	Y
6	Weight 2kg	na	EM-090	2018 nov.	Y
7	Barometer	Control company	EM-266	2018-may	Y
8	Scale 0-1000lbs Rough Deck	Rice lake	EM-114	Sept 2018	Y
9	Gas analyzer	Siemen's	EM-118	Verification before use	Y
10	Vacuum gauge	Dwyer	EM-126	2019 March	Y
11	Vacuum gauge	Dwyer	EM-127	2019 March	Y
12	Calibration weight 100mg	Troemer	EM-128	2018 nov	y
13	Calibration weight 200g	Troemer	EM-129	2018 nov.	Y
14	Reference Dry gas meter	American meter	EM-130	2018 Sept	Y
15	Temperature humidity meter	Fluke	EM-136	2019 March	Y
16	Digital weight indicator	Rice lake	EM-020	Sept 2018	Y
17	Vane anemometer	Omega	EM-153	2018 august	Y
18	Measuring tape	Stanley	EM-224	2018-August	Y
19	Chronometer	Extech	EM-175	2018-dec.	Y
20	Dry gas meter	Shinagwa corporation	EM-178	2018 March	Y
21	Dry gas meter	Shinagwa corporation	EM-179	2018-March	Y
22	Calibrabration gas	Praxair	EM-183	2021 oct	Y
23	Calibrabration gas	Praxair	EM-201	2021 oct	Y
24	Thermometer	Fluke	EM-001	2019 March	Y
25	20 channel card	Keithley	EM-015	2019 Sept	Y
26	20 channel card	Keithley	EM-154	2019 Sept	Y
27	Filter holder	Pall	EG-086	na	Y

## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-001 06/03/18

CLIENT		SPÉCIFICATION DE CALIBRATION	
<b>Compagnie:</b>	Services Polytests Inc	<b>Procédure de service:</b>	4IN9101
<b>Adresse:</b>	695 B rue Gaudette	<b>Précision requise:</b>	+/- 2.0°C
	St-Jean-sur-Richelieu, Québec, J3B 7S7	<b>Fréquence d'étalonnage: (jours)</b>	365

SPÉCIFICATION DE L'INSTRUMENT			
<b>Type d'instrument:</b>	Enregistreur	<b>Type d'entrée:</b>	Temp
<b>Manufacturier:</b>	Fluke	<b>Type de sortie:</b>	Digitale
<b>No. Model:</b>	52-II	<b>Type de mesure:</b>	Température
<b>No. Série:</b>	90630037	<b>Gamme:</b>	Divers
<b>Emplacement:</b>	N.A.	<b>No. Machine:</b>	N.A.

SPÉCIFICATION DE L'ÉTALON			
<b>Étalon Utilisé:</b>	Fluke 744	<b>No. du certificat d'étalonnage:</b>	2017004079
<b>No. Série:</b>	7798010	<b>Dernière date d'étalonnage:</b>	5-Jul-17
<b>Certificat fait par:</b>	Alpha Controls	<b>Prochaine date d'étalonnage:</b>	5-Jul-18
<b>Commentaire:</b>			

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage	Incertitude Élargie	Commentaire
0.0 °C	0.0 °C	-0.1 °C	-0.1 °C	-0.1 °C	1.0 °C	T1 typeJ
125.0 °C	125.0 °C	125.0 °C	0.0 °C	125.0 °C	1.0 °C	T1 typeJ
250.0 °C	250.0 °C	250.0 °C	0.0 °C	250.0 °C	1.0 °C	T1 typeJ
375.0 °C	375.0 °C	374.9 °C	-0.1 °C	374.9 °C	1.0 °C	T1 typeJ
500.0 °C	500.0 °C	499.9 °C	-0.1 °C	499.9 °C	1.0 °C	T1 typeJ
0.0 °C	0.0 °C	0.0 °C	0.0 °C	0.0 °C	1.0 °C	T2 typeJ
125.0 °C	125.0 °C	125.0 °C	0.0 °C	125.0 °C	1.0 °C	T2 typeJ
250.0 °C	250.0 °C	250.0 °C	0.0 °C	250.0 °C	1.0 °C	T2 typeJ
375.0 °C	375.0 °C	374.9 °C	-0.1 °C	374.9 °C	1.0 °C	T2 typeJ
500.0 °C	500.0 °C	500.0 °C	0.0 °C	500.0 °C	1.0 °C	T2 typeJ
0.0 °C	0.0 °C	0.0 °C	0.0 °C	0.0 °C	1.0 °C	T1 typeK
125.0 °C	125.0 °C	125.0 °C	0.0 °C	125.0 °C	1.0 °C	T1 typeK
250.0 °C	250.0 °C	250.0 °C	0.0 °C	250.0 °C	1.0 °C	T1 typeK
375.0 °C	375.0 °C	375.0 °C	0.0 °C	375.0 °C	1.0 °C	T1 typeK
500.0 °C	500.0 °C	500.0 °C	0.0 °C	500.0 °C	1.0 °C	T1 typeK
0.0 °C	0.0 °C	0.0 °C	0.0 °C	0.0 °C	1.0 °C	T2 typeK
125.0 °C	125.0 °C	125.0 °C	0.0 °C	125.0 °C	1.0 °C	T2 typeK
250.0 °C	250.0 °C	250.0 °C	0.0 °C	250.0 °C	1.0 °C	T2 typeK
375.0 °C	375.0 °C	375.0 °C	0.0 °C	375.0 °C	1.0 °C	T2 typeK
500.0 °C	500.0 °C	500.0 °C	0.0 °C	500.0 °C	1.0 °C	T2 typeK
<b>Conditions Environnementales:</b> Température: 20 °C      Humidité: 33 %RH						
<b>Type d'Étalonnage:</b>						

## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-001 06/03/18

CLIENT	
<b>Compagnie:</b>	Services Polytests Inc
<b>Adresse:</b>	695 B rue Gaudette St-Jean-sur-Richelieu, Québec, J3B 7S7

SPÉCIFICATION DE CALIBRATION	
<b>Procédure de service:</b>	4IN9101
<b>Précision requise:</b>	+/- 2.0°C
<b>Fréquence d'étalonnage: (jours)</b>	365

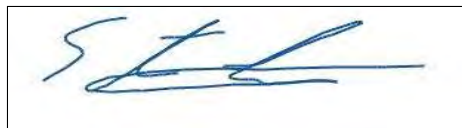
SPÉCIFICATION DE L'INSTRUMENT			
<b>Type d'instrument:</b>	Enregistreur	<b>Type d'entrée:</b>	Temp
<b>Manufacturier:</b>	Fluke	<b>Type de sortie:</b>	Digitale
<b>No. Model:</b>	52-II	<b>Type de mesure:</b>	Température
<b>No. Série:</b>	90630037	<b>Gamme:</b>	Divers
<b>Emplacement:</b>	N.A.	<b>No. Machine:</b>	N.A.

Instrumentation St-Laurent Inc. Certifie que l'instrument ci-haut, rencontre ou excède les spécifications établies par le fabricant. Le système qualité de l'entreprise est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour effectuer l'étalonnage est retraçable au CNRC et/ou au NIST. Le degré d'incertitude est basé sur un niveau de confiance=95%, K=2.

DATE D'ÉTALONNAGE / ÉMISSION DU CERTIFICAT	
<b>Date d'Étalonnage:</b>	6 Mars 2018
<b>Date du prochain Étalonnage:</b>	6 Mars 2019
<b>Date d'émission du certificat:</b>	6 Mars 2018

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
<b>Conforme:</b>	X	X
<b>Non Conforme:</b>		

Le Service d'évaluation des laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et certifié la capacité d'étalonnage du laboratoire et la traçabilité au Système international d'unités (SI) ou à des étalons acceptables selon le CLAS. Le présent certificat d'étalonnage est délivré conformément aux conditions de certification du CLAS et aux conditions d'accréditation du Conseil canadien des normes (CCN). Numéro d'accréditation du CCN: # 669. Le CLAS et le CCN ne garantissent pas l'exactitude des étalonnages individuels effectués par les laboratoires accrédités.



Stéphane - Technicien



## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-006 07/03/18

CLIENT		SPÉCIFICATION DE CALIBRATION	
Compagnie:	Services Polytests Inc	Procédure de service:	4IN9106
Adresse:	695 B rue Gaudette	Précision requise:	+/-0.25"H2O
	St-Jean-sur-Richelieu, Québec, J3B 7S7	Fréquence d'étalonnage: (jours)	365

SPÉCIFICATION DE L'INSTRUMENT			
Type d'instrument:	Indicateur	Type d'entrée:	Pression
Manufacturier:	Dwyer	Type de sortie:	Digitale
No. Model:	MS-321-LCD	Type de mesure:	Pression
No. Série:	E47U020014	Gamme:	0-0.5"H2O
Emplacement:	N.A.	No. Machine:	N.A.

SPÉCIFICATION DE L'ÉTALON			
Étalon Utilisé:	Fluke 744	No. du certificat d'étalonnage:	<a href="#">2017004079</a>
No. Série:	7798010	Dernière date d'étalonnage:	5-Jul-17
Certificat fait par:	Alpha Controls	Prochaine date d'étalonnage:	5-Jul-18
Commentaire:			

SPÉCIFICATION DE L'ÉTALON			
Étalon Utilisé:	Setra	No. du certificat d'étalonnage:	<a href="#">2018001018</a>
No. Série:	2784759	Dernière date d'étalonnage:	21-Feb-18
Certificat fait par:	Alpha Controls	Prochaine date d'étalonnage:	21-Feb-19
Commentaire:			

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage	Incertitude Élargie	Commentaire
0.0000 "H2O	0.000 "H2O	0.000 "H2O	0.000 "H2O	0.000 "H2O	0.25 "H2O	Vérification indicateur
0.2500 "H2O	0.250 "H2O	0.249 "H2O	-0.001 "H2O	0.249 "H2O	0.25 "H2O	Vérification indicateur
0.5000 "H2O	0.500 "H2O	0.505 "H2O	0.005 "H2O	0.505 "H2O	0.25 "H2O	Vérification indicateur
0.7500 "H2O	0.750 "H2O	0.754 "H2O	0.004 "H2O	0.754 "H2O	0.25 "H2O	Vérification indicateur
1.0000 "H2O	1.000 "H2O	1.001 "H2O	0.001 "H2O	1.001 "H2O	0.25 "H2O	Vérification indicateur
0.0000 "H2O	0.0000 V.DC.	0.0003 V.DC.	+0.0003 V.DC.	0.0003 V.DC.	0.00 V.DC.	Vérification sortie analogique
0.2500 "H2O	2.5000 V.DC.	2.4811 V.DC.	-0.0189 V.DC.	2.4811 V.DC.	0.00 V.DC.	Vérification sortie analogique
0.5000 "H2O	5.0000 V.DC.	5.0389 V.DC.	0.0389 V.DC.	5.0389 V.DC.	0.00 V.DC.	Vérification sortie analogique
0.7500 "H2O	7.5000 V.DC.	7.5582 V.DC.	0.0582 V.DC.	7.5582 V.DC.	0.00 V.DC.	Vérification sortie analogique
1.0000 "H2O	10.0000 V.DC.	10.0285 V.DC.	0.0285 V.DC.	10.0285 V.DC.	0.00 V.DC.	Vérification sortie analogique
Conditions Environnementales:			Température: 20 °C	Humidité: 33 %RH		
Type d'Étalonnage:						

## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-006 07/03/18

CLIENT	
<b>Compagnie:</b>	Services Polytests Inc
<b>Adresse:</b>	695 B rue Gaudette St-Jean-sur-Richelieu, Québec, J3B 7S7

SPÉCIFICATION DE CALIBRATION	
<b>Procédure de service:</b>	4IN9106
<b>Précision requise:</b>	+/-0.25"H2O
<b>Fréquence d'étalonnage: (jours)</b>	365


SPÉCIFICATION DE L'INSTRUMENT			
<b>Type d'instrument:</b>	Indicateur	<b>Type d'entrée:</b>	Pression
<b>Manufacturier:</b>	Dwyer	<b>Type de sortie:</b>	Digitale
<b>No. Model:</b>	MS-321-LCD	<b>Type de mesure:</b>	Pression
<b>No. Série:</b>	E47U020014	<b>Gamme:</b>	0-0.5"H2O
<b>Emplacement:</b>	N.A.	<b>No. Machine:</b>	N.A.

Instrumentation St-Laurent Inc. Certifie que l'instrument ci-haut, rencontre ou excède les spécifications établies par le fabricant. Le système qualité de l'entreprise est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour effectuer l'étalonnage est retraçable au CNRC et/ou au NIST. Le degré d'incertitude est basé sur un niveau de confiance=95%, K=2.

DATE D'ÉTALONNAGE / ÉMISSION DU CERTIFICAT	
<b>Date d'Étalonnage:</b>	7 Mars 2018
<b>Date du prochain Étalonnage:</b>	7 Mars 2019
<b>Date d'émission du certificat:</b>	7 Mars 2018

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
<b>Conforme:</b>	X	X
<b>Non Conforme:</b>		

Le Service d'évaluation des laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et certifié la capacité d'étalonnage du laboratoire et la traçabilité au Système international d'unités (SI) ou à des étalons acceptables selon le CLAS. Le présent certificat d'étalonnage est délivré conformément aux conditions de certification du CLAS et aux conditions d'accréditation du Conseil canadien des normes (CCN). Numéro d'accréditation du CCN: # 669. Le CLAS et le CCN ne garantissent pas l'exactitude des étalonnages individuels effectués par les laboratoires accrédités.



Martin Langlais - Technicien

## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-007 07/03/18

CLIENT		SPÉCIFICATION DE CALIBRATION	
<b>Compagnie:</b>	Services Polytests Inc	<b>Procédure de service:</b>	4IN9106
<b>Adresse:</b>	695 B rue Gaudette	<b>Précision requise:</b>	+/- 0.25"H2O
	St-Jean-sur-Richelieu, Québec, J3B 7S7	<b>Fréquence d'étalonnage: (jours)</b>	365

SPÉCIFICATION DE L'INSTRUMENT			
<b>Type d'instrument:</b>	Indicateur	<b>Type d'entrée:</b>	Pression
<b>Manufacturier:</b>	Dwyer	<b>Type de sortie:</b>	Digitale
<b>No. Model:</b>	MS-321-LCD	<b>Type de mesure:</b>	Pression
<b>No. Série:</b>	E23S020111/12	<b>Gamme:</b>	0-0.5"H2O
<b>Emplacement:</b>	N.A.	<b>No. Machine:</b>	N.A.

SPÉCIFICATION DE L'ÉTALON			
<b>Étalon Utilisé:</b>	Fluke 744	<b>No. du certificat d'étalonnage:</b>	2017004079
<b>No. Série:</b>	7798010	<b>Dernière date d'étalonnage:</b>	5-Jul-17
<b>Certificat fait par:</b>	Alpha Controls	<b>Prochaine date d'étalonnage:</b>	5-Jul-18
<b>Commentaire:</b>			

SPÉCIFICATION DE L'ÉTALON			
<b>Étalon Utilisé:</b>	Setra	<b>No. du certificat d'étalonnage:</b>	2018001018
<b>No. Série:</b>	2784759	<b>Dernière date d'étalonnage:</b>	21-Feb-18
<b>Certificat fait par:</b>	Alpha Controls	<b>Prochaine date d'étalonnage:</b>	21-Feb-19
<b>Commentaire:</b>			

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage	Incertitude Élargie	Commentaire
0.0000 "H2O	0.0000 "H2O	0.0000 "H2O	0.0000 "H2O	0.0000 "H2O	0.25 "H2O	Vérification indicateur
0.0250 "H2O	0.0250 "H2O	0.0249 "H2O	-0.0001 "H2O	0.0249 "H2O	0.25 "H2O	Vérification indicateur
0.0500 "H2O	0.0500 "H2O	0.0498 "H2O	-0.0002 "H2O	0.0498 "H2O	0.25 "H2O	Vérification indicateur
0.0750 "H2O	0.0750 "H2O	0.0747 "H2O	-0.0003 "H2O	0.0747 "H2O	0.25 "H2O	Vérification indicateur
0.1000 "H2O	0.1000 "H2O	0.0996 "H2O	-0.0004 "H2O	0.0996 "H2O	0.25 "H2O	Vérification indicateur
0.0000 "H2O	0.0000 V.DC.	0.0015 V.DC.	+0.0015 V.DC.	0.0015 V.DC.	0.01 V.DC.	Vérification sortie analogique
0.0250 "H2O	2.5000 V.DC.	2.5020 V.DC.	0.0020 V.DC.	2.5020 V.DC.	0.01 V.DC.	Vérification sortie analogique
0.0500 "H2O	5.0000 V.DC.	4.9842 V.DC.	-0.0158 V.DC.	4.9842 V.DC.	0.01 V.DC.	Vérification sortie analogique
0.0750 "H2O	7.5000 V.DC.	7.4924 V.DC.	-0.0076 V.DC.	7.4924 V.DC.	0.01 V.DC.	Vérification sortie analogique
0.1000 "H2O	10.0000 V.DC.	9.9524 V.DC.	-0.0476 V.DC.	9.9524 V.DC.	0.01 V.DC.	Vérification sortie analogique
<b>Conditions Environnementales:</b>			Température: 20 °C	Humidité: 33 %RH		
<b>Type d'Étalonnage:</b>						

## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-007 07/03/18

CLIENT	
<b>Compagnie:</b>	Services Polytests Inc
<b>Adresse:</b>	695 B rue Gaudette St-Jean-sur-Richelieu, Québec, J3B 7S7

SPÉCIFICATION DE CALIBRATION	
<b>Procédure de service:</b>	4IN9106
<b>Précision requise:</b>	+/- 0.25"H2O
<b>Fréquence d'étalonnage: (jours)</b>	365

SPÉCIFICATION DE L'INSTRUMENT			
<b>Type d'instrument:</b>	Indicateur	<b>Type d'entrée:</b>	Pression
<b>Manufacturier:</b>	Dwyer	<b>Type de sortie:</b>	Digitale
<b>No. Model:</b>	MS-321-LCD	<b>Type de mesure:</b>	Pression
<b>No. Série:</b>	E23S020111/12	<b>Gamme:</b>	0-0.5"H2O
<b>Emplacement:</b>	N.A.	<b>No. Machine:</b>	N.A.

Instrumentation St-Laurent Inc. Certifie que l'instrument ci-haut, rencontre ou excède les spécifications établies par le fabricant. Le système qualité de l'entreprise est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour effectuer l'étalonnage est retraçable au CNRC et/ou au NIST. Le degré d'incertitude est basé sur un niveau de confiance=95%, K=2.

DATE D'ÉTALONNAGE / ÉMISSION DU CERTIFICAT	
<b>Date d'Étalonnage:</b>	7 Mars 2018
<b>Date du prochain Étalonnage:</b>	7 Mars 2019
<b>Date d'émission du certificat:</b>	7 Mars 2018

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
<b>Conforme:</b>	X	X
<b>Non Conforme:</b>		

Le Service d'évaluation des laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et certifié la capacité d'étalonnage du laboratoire et la traçabilité au Système international d'unités (SI) ou à des étalons acceptables selon le CLAS. Le présent certificat d'étalonnage est délivré conformément aux conditions de certification du CLAS et aux conditions d'accréditation du Conseil canadien des normes (CCN). Numéro d'accréditation du CCN: # 669. Le CLAS et le CCN ne garantissent pas l'exactitude des étalonnages individuels effectués par les laboratoires accrédités.



Martin Langlais - Technicien

## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-012 05/03/18

CLIENT		SPÉCIFICATION DE CALIBRATION	
<b>Compagnie:</b>	Services Polytests Inc	<b>Procédure de service:</b>	4IN9101
<b>Adresse:</b>	695 B rue Gaudette	<b>Précision requise:</b>	+/- 2°C
	St-Jean-sur-Richelieu, Québec, J3B 7S7	<b>Fréquence d'étalonnage: (jours)</b>	365

SPÉCIFICATION DE L'INSTRUMENT			
<b>Type d'instrument:</b>	Enregistreur	<b>Type d'entrée:</b>	Divers
<b>Manufacturier:</b>	Keithley	<b>Type de sortie:</b>	Digitale
<b>No. Model:</b>	2750	<b>Type de mesure:</b>	Température
<b>No. Série:</b>	977470	<b>Gamme:</b>	Divers
<b>Emplacement:</b>	N.A.	<b>No. Machine:</b>	N.A.

SPÉCIFICATION DE L'ÉTALON			
<b>Étalon Utilisé:</b>	Fluke 744	<b>No. du certificat d'étalonnage:</b>	2017004079
<b>No. Série:</b>	7798010	<b>Dernière date d'étalonnage:</b>	5-Jul-17
<b>Certificat fait par:</b>	Alpha Controls	<b>Prochaine date d'étalonnage:</b>	5-Jul-18
<b>Commentaire:</b>			

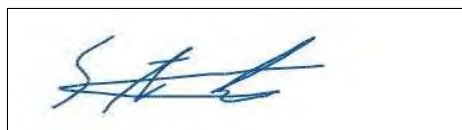
RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage	Incertitude Élargie	Commentaire
Voir Commentaire						
<b>Conditions Environnementales:</b>			Température: 21 °C	Humidité: 31 %RH		
<b>Type d'Étalonnage:</b> Data Acquisition system Conforme Cartes: EM-014, EM-154 Utilisé un maximum de 2 cartes d'entrées sinon les valeurs ne sont plus précises.						

Instrumentation St-Laurent Inc. Certifie que l'instrument ci-haut, rencontre ou excède les spécifications établies par le fabricant. Le système qualité de l'entreprise est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour effectuer l'étalonnage est retraçable au CNRC et/ou au NIST. Le degré d'incertitude est basé sur un niveau de confiance=95%, K=2.

DATE D'ÉTALONNAGE / ÉMISSION DU CERTIFICAT	
<b>Date d'Étalonnage:</b>	5 Mars 2018
<b>Date du prochain Étalonnage:</b>	5 Mars 2019
<b>Date d'émission du certificat:</b>	5 Mars 2018

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
<b>Conforme:</b>	X	X
<b>Non Conforme:</b>		

Le Service d'évaluation des laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et certifié la capacité d'étalonnage du laboratoire et la traçabilité au Système international d'unités (SI) ou à des étalons acceptables selon le CLAS. Le présent certificat d'étalonnage est délivré conformément aux conditions de certification du CLAS et aux conditions d'accréditation du Conseil canadien des normes (CCN). Numéro d'accréditation du CCN: # 669. Le CLAS et le CCN ne garantissent pas l'exactitude des étalonnages individuels effectués par les laboratoires accrédités.



Stéphane - Technicien




## CERTIFICAT D'ÉTALONNAGE

9900 Chemin de la Côte-de-Liesse, Lachine, QC H8T 1A1  
www.dispersion.ca 1.866.390.5066

<b>Client :</b>	Polytests	<b>No. du Certificat :</b>	<b>142-492011-171-1649</b>
<b>Adresse :</b>	695 B rue Gaudette St-Jean-sur-Richelieu, QC J3B7S7	<b>Date d'étalonnage :</b>	13-11-2017

**Technicien:**  
Gatto, Angelo



David Llorens, Responsable Qualité

## DESCRIPTION DU SERVICE:

<b>Modèle de Balance :</b>	AR2140	<b>Méthode :</b>	ISO 17025
<b>Manufacturier :</b>	Ohaus	<b>Date d'approbation :</b>	13-11-2017
<b>Numéro de Série :</b>	M3658329010091	<b>Date prochain étalonnage :</b>	13-11-2018
<b>Numéro d'identification :</b>	EM-051	<b>accréditation CCN n. :</b>	668
<b>Capacité :</b>	210g	<b>Certification CLAS n. :</b>	2010-01
<b>Résolution:</b>	0.0001g		

<b>Condition d'essai :</b>	Temp °C:	77	Pression kPa:	102.6	Humidité %:	91.7
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Note: Les conditions environnementales ne sont pas utilisées dans le calcul de l'incertitude.

## CETTE BALANCE RENCONTRE LES SPÉCIFICATIONS SUIVANTES:

Type de test :	Manufacturier
Excentricité:	<input checked="" type="checkbox"/> Oui <input type="checkbox"/> Non
Linéarité:	<input checked="" type="checkbox"/> Oui <input type="checkbox"/> Non
Sensibilité:	<input checked="" type="checkbox"/> Oui <input type="checkbox"/> Non
Répétabilité:	<input checked="" type="checkbox"/> Oui <input type="checkbox"/> Non

## NOTES:

Cette balance a été certifiée selon la procédure de travail PDL-09-MG-010 (certification de balance analytique et à plateau) et la et la procédure PDL-09-MG-012 (détermination des incertitudes de pesées). Nos étalons sont certifiés à chaque année. Le droit d'auteur du présent certificat appartient au laboratoire délivreur et doit être reproduit intégralement, à moins d'une autorisation écrite du laboratoire délivreur.





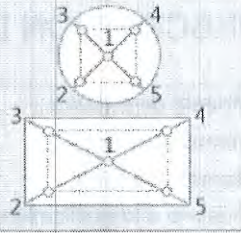
## CERTIFICAT D'ÉTALONNAGE

9900 Chemin de la Côte-de-Liesse, Lachine, QC H8T 1A1  
www.dispersion.ca 1.866.390.5066

<b>Client :</b>	Polytests	<b>No. du Certificat :</b>	142-492011-171-1649
<b>Adresse :</b>	695 B rue Gaudette St-Jean-sur-Richelieu, QC J3B7S7	<b>Accréditation CCN n. :</b>	668
<b>Méthode :</b>	ISO 17025	<b>Certification CLAS n. :</b>	2010-01
		<b>Modèle de Balance :</b>	AR2140
		<b>Date d'étalonnage :</b>	13-11-2017
		<b>Date du prochain étalonnage :</b>	13-11-2018

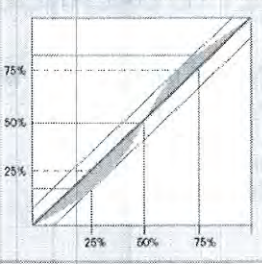
### TEST D'EXCENTRICITÉ:

Poids Test: 100 g Tolérance 0.0004 g  
(Note: Le Poids Test est taré au centre du plateau de pesée)

Position	Avant Ajustement	Après Ajustement	
1: Centre:	0.0000 g	---	
2: Avant Gauche:	0.0000 g	---	
3: Arrière Gauche:	0.0000 g	---	
4: Arrière Droit:	0.0000 g	---	
5: Avant Droit:	0.0000 g	---	
<b>Résultats</b>	<b>0.0000 g</b>	<b>---</b>	
<b>STATUT</b>	<b>CONFORME</b>	<b>N/A</b>	

### TEST DE LINÉARITÉ:

Méthode: Substitution Plage: 210 g Poids Test: 50 g Tolérance: 0.0002 g

Pré-Charge	Avant Ajustement	Après Ajustement	
0.0000 g	49.9997 g	---	
50.0000 g	49.9997 g	---	
100.0000 g	49.9998 g	---	
150.0000 g	49.9997 g	---	
---	---	---	
---	---	---	
<b>Résultats</b>	<b>0.00005 g</b>	<b>---</b>	
<b>STATUT</b>	<b>CONFORME</b>	<b>N/A</b>	

### TEST DE SENSIBILITÉ:

Valeur de masse conventionnelle: 200.0003 g Tolérance: 0.0004 g Résultats: 0.00% < 0.10%

	Avant Ajustement	Après Ajustement	
Lecture:	200.0000 g	---	$S = \frac{\Delta W}{\Delta m}$
Résultats:	0.0003 g	---	
<b>STATUT</b>	<b>CONFORME</b>	<b>N/A</b>	

## CERTIFICAT D'ÉTALONNAGE

9900 Chemin de la Côte-de-Liesse, Lachine, QC H8T 1A1  
www.dispersion.ca 1.866.390.5066

<b>Client :</b>	Polytests	<b>No. du Certificat :</b>	142-492011-171-1649
<b>Adresse :</b>	695 B rue Gaudette St-Jean-sur-Richelieu, QC J3B7S7	<b>Accréditation CCN n. :</b>	668
		<b>Certification CLAS n. :</b>	2010-01
		<b>Modèle de Balance :</b>	AR2140
		<b>Date d'étalonnage :</b>	13-11-2017
<b>Méthode :</b>	ISO 17025	<b>Date du prochain étalonnage :</b>	13-11-2018

### TEST DE RÉPÉTABILITÉ:

#### AVANT AJUSTEMENT:

Charge Utilisée:  
100.0000 gTolérance:  
0.00010 gRésolution d'affichage:  
0.0001 gMoyenne:  
99.99979 gÉcart-type:  
0.00003 g

#	Vide	Chargé	Différence
1	0.0000 g	99.9998 g	99.9998 g
2	0.0000 g	99.9998 g	99.9998 g
3	0.0000 g	99.9998 g	99.9998 g
4	0.0000 g	99.9997 g	99.9997 g
5	0.0000 g	99.9998 g	99.9998 g
6	0.0000 g	99.9998 g	99.9998 g
7	0.0000 g	99.9998 g	99.9998 g
8	0.0000 g	99.9998 g	99.9998 g
9	0.0000 g	99.9998 g	99.9998 g
10	0.0000 g	99.9998 g	99.9998 g

**Statut : CONFORME**

#### APRÈS AJUSTEMENT:

Charge Utilisée:  
---Tolérance:  
0.00010 gRésolution d'affichage:  
0.0001 gMoyenne:  
---Écart-type:  
---

#	Vide	Chargé	Différence
1	---	---	---
2	---	---	---
3	---	---	---
4	---	---	---
5	---	---	---
6	---	---	---
7	---	---	---
8	---	---	---
9	---	---	---
10	---	---	---

**Statut : N/A**



## CERTIFICAT D'ÉTALONNAGE

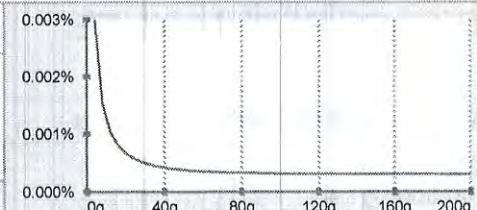
9900 Chemin de la Côte-de-Liesse, Lachine, QC H8T 1A1  
www.dispersion.ca 1.866.390.5066

### INCERTITUDE AVANT AJUSTEMENT :

$$Uc = \sqrt{(u_{(cr)})^2 + s_p^2 + u_{(l)}^2 + u_{(dr)}^2 + u_{(s)}^2}$$

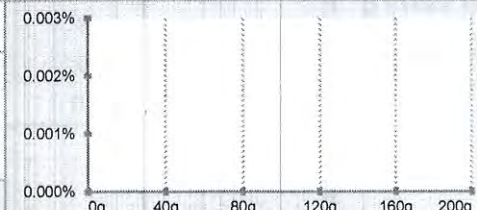
- $u_{(cr)}$  = Incertitude reliée à l'étalon utilisé
- $s_p$  = Incertitude de l'écart-type
- $u_{(l)}$  = Incertitude associée à la linéarité
- $u_{(dr)}$  = Incertitude associée à résolution si  $Sp = 0$
- $u_{(s)}$  = Incertitude liée à la sensibilité (span)

Valeur	Incertitude	Incertitude (%)
12.5000 g	0.00017 g	0.001321 %
25.0000 g	0.00018 g	0.000713 %
50.0000 g	0.00022 g	0.000446 %
100.0000 g	0.00035 g	0.000349 %
200.0000 g	0.00065 g	0.000324 %



### INCERTITUDE APRÈS AJUSTEMENT :

Valeur	Incertitude	Incertitude (%)
---	---	---
---	---	---
---	---	---
---	---	---



### NOTES :

De ces valeurs d'incertitudes, seule la valeur surlignée est calculée selon ISO17025:2005, les autres étant estimées jusqu'au résultat de l'incertitude minimale. Dans le calcul de cette l'incertitude, l'écart-type utilisé est de 0,577d (où d est la précision d'affichage de la balance) lorsque cet écart-type est plus inférieur à 0,577d.

## CERTIFICAT D'ÉTALONNAGE

9900 Chemin de la Côte-de-Liesse, Lachine, QC H8T 1A1  
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## RÉFÉRENCE

### ENSEMBLE DE RÉFÉRENCE:

Référence	No de série	Fabricant	Date d'étalonnage
1mg-5kg	DK000A175	Dispersion	29-09-2017

## INCERTITUDES:

Les incertitudes que nous retrouvons comprennent :

1. *L'incertitude associée à l'opération de pesage.*
2. *L'incertitude associée à l'écart-type.*
3. *L'incertitude associée à l'étalon utilisé.*
4. *L'incertitude associée à la résolution de l'appareil.*

L'incertitude de l'opération de pesage comprend la reproductibilité à long terme.

Les incertitudes précisées dans ce rapport sont des incertitudes élargies représentant un niveau de confiance d'approximativement 95 %, obtenu en multipliant ensemble l'incertitude-type composée par un facteur de couverture de  $k = 2$ . Pour de plus amples renseignements, veuillez consulter la publication GUM (Guide pour l'expression de l'incertitude de mesure, édition de 1995).

## TRAÇABILITÉ

Le Service d'évaluation de laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et a certifié des capacités d'étalonnage spécifiques de ce laboratoire et leur traçabilité à des étalons nationaux de mesure reconnus et au Système international d'unités (SI). Ce certificat d'étalonnage est émis conformément aux conditions de certification accordées par CLAS et aux conditions d'accréditation accordées par le Conseil canadien des normes (CCN). Le CLAS pas plus que le CCN ne peut garantir l'exactitude des étalonnages individuels effectués par des laboratoires accrédités.

## REMARQUES:

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## CERTIFICAT D'ÉTALONNAGE

9900 Chemin de la Côte-de-Liesse, Lachine, QC H8T 1A1  
www.dispersion.ca 1.866.390.5066

<b>Client :</b>	Polytests	<b>No. du Certificat :</b>	152-4BB901-181
<b>Adresse :</b>	695 B rue Gaudette St-Jean-sur-Richelieu, QC J3B7S7	<b>Date d'étalonnage :</b>	09-01-2018

**Technicien:**  
Simeonidis, Georgios



David Llorens, Responsable Qualité

## DESCRIPTION DU SERVICE:

<b>Description des masses :</b>	ASTM E617	<b>Date d'approbation :</b>	09-01-2018
<b>Classe de précision :</b>	ASTM 6	<b>Date prochain étalonnage :</b>	09-01-2023
<b>Densité :</b>	7.95g/cm <sup>3</sup>	<b>Accréditation CCN n. :</b>	668
<b>Identification (si unique) :</b>	EM-090	<b>Certification CLAS n. :</b>	2010-01

<b>Condition d'essai :</b>	<b>Temp °C:</b> 21.17	<b>Pression kPa:</b> 101.475	<b>Humidité:</b> 48.665
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## NOTES:

Pour l'étalonnage des masses, nous utilisons la procédure "Comparaison individuelle" PDL-09-MG-001 et la procédure "Détermination des incertitudes" PDL-09-MG-002. Le droit d'auteur du présent certificat appartient au laboratoire délivreur et doit être reproduit intégralement, à moins d'une autorisation écrite du laboratoire délivreur.

## REMARQUES:



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## CERTIFICAT D'ÉTALONNAGE

9900 Chemin de la Côte-de-Liesse, Lachine, QC H8T 1A1  
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### BALANCES UTILISÉES

Pour l'étalonnage manuel :

> 5 kg à 25 kg :	Mettler Toledo XP32003L, SNR 1123271214, max. 32100 g, d = 0.005 g
> 1 kg à 5 kg	Mettler Toledo PR5003, SNR 1115311634, max. 5100 g, d = 0.001 g
> 300 g à 2 kg :	Mettler Toledo XP2004S, SNR B131185222, max. 2100 g, d = 0.1 mg
> 100 g à 200 g :	Mettler Toledo AT201 SNR BA1115230146, max. 205 g, d = 0.01 mg
> 5 g à 100 g :	Mettler Toledo AX106 SNR 1127063924, max. 111 g, d = 1 µg
1 mg à 5 g :	Mettler UMX5, SNR 1121103055, max. 5.1 g, d = 0.1 µg

Pour l'étalonnage automatisé :

> 200 g à 1 kg :	Mettler Toledo AX1005 SNR 1127063210, max. 1109 g, d = 0.01 mg
> 5 g à 100 g :	Mettler Toledo AX106 SNR 1120143015, max. 111 g, d = 1 µg
1 mg à 5 g :	Mettler UMX5, SNR 1125140561, max. 5.1 g, d = 0.1 µg

Les balances sont vérifiées selon notre procédure de contrôle périodique PDL-11-MG-001.

### INCERTITUDES:

Les incertitudes que nous retrouvons comprennent :

1. L'incertitude associée à l'opération de pesage.
2. L'incertitude associée à la densité de l'air.
3. L'incertitude associée à l'étalon utilisé.
4. L'incertitude associée à la densité de la masse à être étalonnée.

L'incertitude de l'opération de pesage comprend la reproductibilité à long terme.

Les incertitudes précisées dans ce rapport sont des incertitudes élargies représentant un niveau de confiance d'approximativement 95 %, obtenu en multipliant ensemble l'incertitude-type composée par un facteur de couverture de  $k = 2$ . Pour de plus amples renseignements, veuillez consulter la publication GUM (Guide pour l'expression de l'incertitude de mesure, édition de 1995).

### TRAÇABILITÉ

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D.P.

## CERTIFICAT D'ÉTALONNAGE

9900 Chemin de la Côte-de-Liesse, Lachine, QC H8T 1A1  
www.dispersion.ca 1.866.390.5066

### RÉFÉRENCES UTILISÉES

Poids	No de série	Fabricant	Date d'étalonnage	Date due
20kg	69976	Troemner	30-05-2017	30-05-2018
5kg	129099	Mettler Toledo	02-09-2017	02-09-2018
5kg	96-0888-50-3	Denver Instrument Company	02-09-2017	02-09-2018
2kg	129098	Mettler Toledo	02-09-2017	02-09-2018
2kg	96-0888-50-3	Denver Instrument Company	02-09-2017	02-09-2018
300g	96-0888-50-2	Denver Instrument Company	02-09-2017	02-09-2018
1kg - 1mg	MT-01	Mettler Toledo	02-09-2017	02-09-2018

### ÉTALONS CERTIFIÉS PAR LE CNRC( Référence NRC MS-2016-0021)

Poids	No de série	Fabricant	Date d'étalonnage	Date due
100g	95170	Mettler Toledo	17-10-2016	17-10-2018
10kg	129100	Mettler Toledo	17-10-2016	17-10-2018
1kg	95171	Mettler Toledo	17-10-2016	17-10-2018

### RÉFÉRENCES DE LA STATION ROBOTISÉE

Poids	No de série	Fabricant	Date d'étalonnage	Date due
1kg - 1mg	DK000A132	Laboratoire Dispersion	01-08-2017	01-08-2018

DP



## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-126 06/03/18

CLIENT		SPÉCIFICATION DE CALIBRATION	
<b>Compagnie:</b>	Services Polytests Inc	<b>Procédure de service:</b>	4IN9106
<b>Adresse:</b>	695 B rue Gaudette	<b>Précision requise:</b>	+/- 1"Hg
	St-Jean-sur-Richelieu, Québec, J3B 7S7	<b>Fréquence d'étalonnage: (jours)</b>	365

SPÉCIFICATION DE L'INSTRUMENT			
<b>Type d'instrument:</b>	Manomètre	<b>Type d'entrée:</b>	Pression
<b>Manufacturier:</b>	Dwyer	<b>Type de sortie:</b>	Digitale
<b>No. Model:</b>	DPG200	<b>Type de mesure:</b>	Pression
<b>No. Série:</b>	N.A.	<b>Gamme:</b>	0-28"Hg
<b>Emplacement:</b>	N.A.	<b>No. Machine:</b>	N.A.

SPÉCIFICATION DE L'ÉTALON			
<b>Étalon Utilisé:</b>	Crystal XP2i	<b>No. du certificat d'étalonnage:</b>	2017004083
<b>No. Série:</b>	258139	<b>Dernière date d'étalonnage:</b>	4-Jul-17
<b>Certificat fait par:</b>	Alpha Controls	<b>Prochaine date d'étalonnage:</b>	4-Jul-18
<b>Commentaire:</b>			

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage	Incertitude Élargie	Commentaire
0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	1 "Hg	Vérification indicateur
-7.50 "Hg	-7.50 "Hg	-7.61 "Hg	-0.11 "Hg	-7.61 "Hg	1 "Hg	Vérification indicateur
-15.00 "Hg	-15.00 "Hg	-15.23 "Hg	-0.23 "Hg	-15.23 "Hg	1 "Hg	Vérification indicateur
-22.50 "Hg	-22.50 "Hg	-22.85 "Hg	-0.35 "Hg	-22.85 "Hg	1 "Hg	Vérification indicateur
-28.00 "Hg	-28.00 "Hg	-28.45 "Hg	-0.45 "Hg	-28.45 "Hg	1 "Hg	Vérification indicateur
0.00 "Hg	10.0000 V.DC.	10.0516 V.DC.	+0.0600 V.DC.	10.0600 V.DC.	0.5 V.DC.	Vérification sortie analogique
-7.50 "Hg	8.0000 V.DC.	8.0377 V.DC.	+0.0377 V.DC.	8.0377 V.DC.	0.5 V.DC.	Vérification sortie analogique
-15.00 "Hg	6.0000 V.DC.	6.0080 V.DC.	+0.0080 V.DC.	6.0080 V.DC.	0.5 V.DC.	Vérification sortie analogique
-22.50 "Hg	4.0000 V.DC.	3.9666 V.DC.	-0.0333 V.DC.	3.9666 V.DC.	0.5 V.DC.	Vérification sortie analogique
-28.00 "Hg	2.5333 V.DC.	2.4615 V.DC.	-0.0718 V.DC.	2.4615 V.DC.	0.5 V.DC.	Vérification sortie analogique
<b>Conditions Environnementales:</b>			Température: 20 °C	Humidité: 33 %RH		
<b>Type d'Étalonnage:</b>						

Instrumentation St-Laurent Inc. Certifie que l'instrument ci-haut, rencontre ou excède les spécifications établies par le fabricant. Le système qualité de l'entreprise est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour effectuer l'étalonnage est retraçable au CNRC et/ou au NIST. Le degré d'incertitude est basé sur un niveau de confiance=95%, K=2.

DATE D'ÉTALONNAGE / ÉMISSION DU CERTIFICAT	
<b>Date d'Étalonnage:</b>	6 Mars 2018
<b>Date du prochain Étalonnage:</b>	6 Mars 2019
<b>Date d'émission du certificat:</b>	6 Mars 2018

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
<b>Conforme:</b>	X	X
<b>Non Conforme:</b>		

Le Service d'évaluation des laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et certifié la capacité d'étalonnage du laboratoire et la traçabilité au Système international d'unités (SI) ou à des étalons acceptables selon le CLAS. Le présent certificat d'étalonnage est délivré conformément aux conditions de certification du CLAS et aux conditions d'accréditation du Conseil canadien des normes (CCN). Numéro d'accréditation du CCN: # 669. Le CLAS et le CCN ne garantissent pas l'exactitude des étalonnages individuels effectués par les laboratoires accrédités.



Stéphane - Technicien

## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-127 06/03/18

CLIENT		SPÉCIFICATION DE CALIBRATION	
<b>Compagnie:</b>	Services Polytests Inc	<b>Procédure de service:</b>	4IN9106
<b>Adresse:</b>	695 B rue Gaudette	<b>Précision requise:</b>	+/- 1"Hg
	St-Jean-sur-Richelieu, Québec, J3B 7S7	<b>Fréquence d'étalonnage: (jours)</b>	365

SPÉCIFICATION DE L'INSTRUMENT			
<b>Type d'instrument:</b>	Manomètre	<b>Type d'entrée:</b>	Pression
<b>Manufacturier:</b>	Dwyer	<b>Type de sortie:</b>	Digitale
<b>No. Model:</b>	DPG200	<b>Type de mesure:</b>	Pression
<b>No. Série:</b>	N.A.	<b>Gamme:</b>	0-28"Hg
<b>Emplacement:</b>	N.A.	<b>No. Machine:</b>	N.A.

SPÉCIFICATION DE L'ÉTALON			
<b>Étalon Utilisé:</b>	Crystal XP2i	<b>No. du certificat d'étalonnage:</b>	2017004083
<b>No. Série:</b>	258139	<b>Dernière date d'étalonnage:</b>	4-Jul-17
<b>Certificat fait par:</b>	Alpha Controls	<b>Prochaine date d'étalonnage:</b>	4-Jul-18
<b>Commentaire:</b>			

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage	Incertitude Élargie	Commentaire
0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	1 "Hg	Vérification indicateur
-7.50 "Hg	-7.50 "Hg	-7.52 "Hg	-0.03 "Hg	-7.52 "Hg	1 "Hg	Vérification indicateur
-15.00 "Hg	-15.00 "Hg	-15.05 "Hg	-0.05 "Hg	-15.05 "Hg	1 "Hg	Vérification indicateur
-22.50 "Hg	-22.50 "Hg	-22.60 "Hg	-0.10 "Hg	-22.60 "Hg	1 "Hg	Vérification indicateur
-28.00 "Hg	-28.00 "Hg	-28.11 "Hg	-0.11 "Hg	-28.11 "Hg	1 "Hg	Vérification indicateur
0.00 "Hg	10.0000 V.DC.	10.0048 V.DC.	+0.0048 V.DC.	10.0048 V.DC.	0.01 V.DC.	Vérification sortie analogique
-7.50 "Hg	8.0000 V.DC.	8.0156 V.DC.	+0.0156 V.DC.	8.0156 V.DC.	0.01 V.DC.	Vérification sortie analogique
-15.00 "Hg	6.0000 V.DC.	6.0141 V.DC.	+0.0141 V.DC.	6.0141 V.DC.	0.01 V.DC.	Vérification sortie analogique
-22.50 "Hg	4.0000 V.DC.	3.9973 V.DC.	-0.0027 V.DC.	3.9973 V.DC.	0.01 V.DC.	Vérification sortie analogique
-28.00 "Hg	2.5333 V.DC.	2.5129 V.DC.	-0.0204 V.DC.	2.5129 V.DC.	0.01 V.DC.	Vérification sortie analogique
<b>Conditions Environnementales:</b>			Température: 20 °C	Humidité: 33 %RH		
<b>Type d'Étalonnage:</b>						

Instrumentation St-Laurent Inc. Certifie que l'instrument ci-haut, rencontre ou excède les spécifications établies par le fabricant. Le système qualité de l'entreprise est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour effectuer l'étalonnage est retraçable au CNRC et/ou au NIST. Le degré d'incertitude est basé sur un niveau de confiance=95%, K=2.

DATE D'ÉTALONNAGE / ÉMISSION DU CERTIFICAT	
<b>Date d'Étalonnage:</b>	6 Mars 2018
<b>Date du prochain Étalonnage:</b>	6 Mars 2019
<b>Date d'émission du certificat:</b>	6 Mars 2018

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
<b>Conforme:</b>	X	X
<b>Non Conforme:</b>		

Le Service d'évaluation des laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et certifié la capacité d'étalonnage du laboratoire et la traçabilité au Système international d'unités (SI) ou à des étalons acceptables selon le CLAS. Le présent certificat d'étalonnage est délivré conformément aux conditions de certification du CLAS et aux conditions d'accréditation du Conseil canadien des normes (CCN). Numéro d'accréditation du CCN: # 669. Le CLAS et le CCN ne garantissent pas l'exactitude des étalonnages individuels effectués par les laboratoires accrédités.



Stéphane - Technicien



## CERTIFICAT D'ÉTALONNAGE

9900 Chemin de la Côte-de-Liesse, Lachine, QC H8T 1A1  
www.dispersion.ca 1.866.390.5066

<b>Client :</b>	Polytests	<b>No. du Certificat :</b>	152-4BB901-182
<b>Adresse :</b>	695 B rue Gaudette St-Jean-sur-Richelieu, QC J3B7S7	<b>Date d'étalonnage :</b>	09-01-2018

**Technicien:**  
Simeonidis, Georgios



David Llorens, Responsable Qualité


### DESCRIPTION DU SERVICE:

<b>Description des masses :</b>	ASTM E617	<b>Date d'approbation :</b>	09-01-2018
<b>Classe de précision :</b>	ASTM 1	<b>Date prochain étalonnage :</b>	09-01-2023
<b>Densité :</b>	7.95g/cm <sup>3</sup>	<b>Accréditation CCN n. :</b>	668
<b>Identification (si unique) :</b>	(items multiples)	<b>Certification CLAS n. :</b>	2010-01
<b>Condition d'essai :</b>	Temp °C: 21.265	Pression kPa: 101.565	Humidité: 49.58

### NOTES:

Pour l'étalonnage des masses, nous utilisons la procédure "Comparaison individuelle" PDL-09-MG-001 et la procédure "Détermination des incertitudes" PDL-09-MG-002. Le droit d'auteur du présent certificat appartient au laboratoire délivreur et doit être reproduit intégralement, à moins d'une autorisation écrite du laboratoire délivreur.

### REMARQUES:

  
11 JANV. 2018  
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## CERTIFICAT D'ÉTALONNAGE

9900 Chemin de la Côte-de-Liesse, Lachine, QC H8T 1A1  
www.dispersion.ca 1.866.390.5066

### BALANCES UTILISÉES

Pour l'étalonnage manuel :

> 5 kg à 25 kg :	Mettler Toledo XP32003L, SNR 1123271214, max. 32100 g, d = 0.005 g
> 1 kg à 5 kg	Mettler Toledo PR5003, SNR 1115311634, max. 5100 g, d = 0.001 g
> 300 g à 2 kg :	Mettler Toledo XP2004S, SNR B131185222, max. 2100 g, d = 0.1 mg
> 100 g à 200 g :	Mettler Toledo AT201 SNR BA1115230146, max. 205 g, d = 0.01 mg
> 5 g à 100 g :	Mettler Toledo AX106 SNR 1127063924, max. 111 g, d = 1 µg
1 mg à 5 g :	Mettler UMX5, SNR 1121103055, max. 5.1 g, d = 0.1 µg

Pour l'étalonnage automatisé :

> 200 g à 1 kg :	Mettler Toledo AX1005 SNR 1127063210, max. 1109 g, d = 0.01 mg
> 5 g à 100 g :	Mettler Toledo AX106 SNR 1120143015, max. 111 g, d = 1 µg
1 mg à 5 g :	Mettler UMX5, SNR 1125140561, max. 5.1 g, d = 0.1 µg

*Les balances sont vérifiées selon notre procédure de contrôle périodique PDL-11-MG-001.*

### INCERTITUDES:

Les incertitudes que nous retrouvons comprennent :

1. *L'incertitude associée à l'opération de pesage.*
2. *L'incertitude associée à la densité de l'air.*
3. *L'incertitude associée à l'étalon utilisé.*
4. *L'incertitude associée à la densité de la masse à être étalonnée.*

L'incertitude de l'opération de pesage comprend la reproductibilité à long terme.

Les incertitudes précisées dans ce rapport sont des incertitudes élargies représentant un niveau de confiance d'approximativement 95 %, obtenu en multipliant ensemble l'incertitude-type composée par un facteur de couverture de  $k = 2$ . Pour de plus amples renseignements, veuillez consulter la publication GUM (Guide pour l'expression de l'incertitude de mesure, édition de 1995).

### TRAÇABILITÉ

Le Service d'évaluation de laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et a certifié des capacités d'étalonnage spécifiques de ce laboratoire et leur traçabilité à des étalons nationaux de mesure reconnus et au Système international d'unités (SI). Ce certificat d'étalonnage est émis conformément aux conditions de certification accordées par CLAS et aux conditions d'accréditation accordées par le Conseil canadien des normes (CCN). Le CLAS pas plus que le CCN ne peut garantir l'exactitude des étalonnages individuels effectués par des laboratoires accrédités.



## CERTIFICAT D'ÉTALONNAGE

9900 Chemin de la Côte-de-Liesse, Lachine, QC H8T 1A1  
www.dispersion.ca 1.866.390.5066

### RÉFÉRENCES UTILISÉES

Poids	No de série	Fabricant	Date d'étalonnage	Date due
20kg	69976	Troemner	30-05-2017	30-05-2018
5kg	129099	Mettler Toledo	02-09-2017	02-09-2018
5kg	96-0888-50-3	Denver Instrument Company	02-09-2017	02-09-2018
2kg	129098	Mettler Toledo	02-09-2017	02-09-2018
2kg	96-0888-50-3	Denver Instrument Company	02-09-2017	02-09-2018
300g	96-0888-50-2	Denver Instrument Company	02-09-2017	02-09-2018
1kg - 1mg	MT-01	Mettler Toledo	02-09-2017	02-09-2018

### ÉTALONS CERTIFIÉS PAR LE CNRC( Référence NRC MS-2016-0021)

Poids	No de série	Fabricant	Date d'étalonnage	Date due
100g	95170	Mettler Toledo	17-10-2016	17-10-2018
10kg	129100	Mettler Toledo	17-10-2016	17-10-2018
1kg	95171	Mettler Toledo	17-10-2016	17-10-2018

### RÉFÉRENCES DE LA STATION ROBOTISÉE

Poids	No de série	Fabricant	Date d'étalonnage	Date due
1kg - 1mg	DK000A132	Laboratoire Dispersion	01-08-2017	01-08-2018





## Certificat d'Étalonnage / Certificate of Calibration

**CLIENT :**  
 SERVICES POLYTESTS INC.  
 695-B GAUDETTE  
 ST-JEAN-SUR-RICHELIEU, QUEBEC

**Description:** VÉRIFICATEUR D'HUMIDITÉ / MOISTURE METER  
**Fabricant/ Manufacturer:** DELMHORST  
**Modèle/ Model :** MCS-1 REFERENCE STANDARD  
**No série / Serial no :** N/A  
**# Inventaire / Asset # :** EM-191

**CERTIFICAT No / Certificate No:** **227990**

**PROCÉDURE / Procedure :**  
 TRESCAL - DELMHORST\_MCS-1 REFERENCE STANDARD

**Date étalonnage/ Calibration Performed :** **2017-12-22**

**Echéance/ Due Date :** **2018-12-22**

**Conditions de mesure / Measurement conditions**

TEMPÉRATURE / Temp. : 22°C  
 HUMIDITÉ / Humidity : 22%RH



Type de résultat / Results type :	As-Found = As-Left
Résultats d'essais / Test results :	Conforme / In Tolerance
Usage restreint/ Restricted use :	<input type="checkbox"/>
Réparation effectuée / Repair performed :	<input type="checkbox"/>
Ajustement effectué / Adjustment performed :	<input type="checkbox"/>

**ÉTALONS UTILISÉS/ Standards Used:**

Identification	Manuf.	Model	Description	Ser. #	Étalonné/ Cal.	Echéance/ Due
PR0661	FLUKE	8508A	REFERENCE MULTIMETER	389272208	2017-06-19	2018-06-19

Les spécifications mentionnées comme limites de tolérances d'essai sont celles établies par le manufacturier, sauf indication contraire.  
*Test tolerance limits are based on manufacturers specifications unless stated otherwise.*

**NOTES :**

  
 2018-01-11  
**Technicien / Technician**   
 A. GAUDETTE

Le système qualité de la société est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour le processus d'étalonnage sont retraçables au SI par l'entremise du CNRC et/ou du NIST.  
*Our quality system complies with the requirements of ISO 17025 and the standards used for the calibration are traceable to SI through NRC and/or NIST.*

LE DROIT D'AUTEUR DE CE CERTIFICAT APPARTIENT À TRESCAL / PRIMO INSTRUMENT INC. CE CERTIFICAT NE PEUT ÊTRE REPRODUIT AUTREMENT QU'EN ENTIER ET AVEC LE CONSENTEMENT PRÉALABLE ÉCRIT DU GROUPE TRESCAL.  
 TRESCAL / PRIMO INSTRUMENT INC. OWN COPYRIGHT OF THIS CERTIFICATE. THE CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN CONSENT OF THE TRESCAL GROUP.

CLIENT / Customer :

DESCRIPTION / Description :

MANUFACTURIER / Manufacturer :

MODÈLE / Model :

227990

SERVICES POLYTESTS INC.

VÉRIFICATEUR D'HUMIDITÉ / MOISTURE METER

DELMHORST

MCS-1 REFERENCE STANDARD

	DESCRIPTION Description	LIMITES Limits	LECTURES Readings	LIMITES Limits
<b>DOUGLAS-FIR @ 80°F</b>	Nominal			Déviaton Mohms
12 %	120 MOhms		116.5	3.5
22 %	1.10 MOhms		1.095	0.005

SP



## CERTIFICAT D'ÉTALONNAGE # 7274

Date d'étalonnage : 2017-09-29  
Date d'émission du certificat : 2017-09-29

Services Polytests  
695 B Gaudette street  
St-Jean-sur-Richelieu, Québec, Canada  
J3B 7S7

Étalonnage d'un  
Débitmètre volumétrique American Meter Company DTM-200A S/N : 99A274209

### CONFORMITÉ AU PROGRAMME DE QUALITÉ

Tous les étalonnages sont effectués conformément au manuel d'assurance qualité de Polycontrols et sont conformes à la norme ISO/IEC 17025 – 2005, à la norme ISO 9001 – 2008 ainsi qu'à tout autre exigences de qualité définies dans la description d'achat des clients.

### TRAÇABILITÉ

La traçabilité des étalons de débit au National Institute of Standards and Technology, NIST, est maintenue par les laboratoires de Fluke Corporation de Phoenix, Arizona et est conforme aux normes ISO/IEC 17025, AINSI/NCSL Z540-1-1994, ISO-10012-1, MIL-STD 45662A.

Le Service d'évaluation des laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et certifié la capacité d'étalonnage du laboratoire et la traçabilité au Système international d'unités (SI) ou à des étalons acceptables selon le CLAS. Le présent certificat d'étalonnage est délivré conformément aux conditions de certification du CLAS et aux conditions d'accréditation du Conseil canadien des normes (CCN). Le CLAS et le CCN ne garantissent pas l'exactitude des étalonnages individuels effectués par les laboratoires accrédités.


### APTITUDE EN MATIÈRE DE MESURE ET D'ÉTALONNAGE - CMC

Les références utilisées pour l'étalonnage de débit ont une incertitude de  $\pm 0.2\%$  de la lecture pour les mesures entre 5 SCCM à 10 SLPM,  $\pm 0.3\%$  de la lecture pour les mesures entre 10 SLPM à 30 SLPM,  $\pm 0.2\%$  de la lecture pour les mesures entre 30 SLPM à 3000 SLPM,  $\pm 0.3\%$  de la lecture pour les mesures supérieures à 3000 SLPM jusqu'à 6000 SLPM et  $\pm 0.5\%$  pour les mesures inférieures à 5 SCCM jusqu'à concurrence de 1 SCCM, équivalent air ou azote. Les incertitudes exprimées sont élargies avec un facteur d'élargissement  $k = 2$ , et ce, pour un niveau de confiance d'environ 95 %, dans l'hypothèse d'une distribution normale incluant la résolution de l'instrument. Le rapport d'incertitude des essais (RIE) de cet étalonnage respecte un ratio de 4:1 à moins d'indication contraire.

### SOMMAIRE DES CONDITIONS DE L'INSTRUMENT EN TEST

Conditions initiales	En bon état
Travail Effectué	Étalonnage de l'instrument
	Lectures Initiales = Lectures finales, aucun ajustement
Résultats	Lectures finales dans les tolérances
Remarques	Fréquence d'étalonnage aux 12 mois

  
Métrologiste

  
Responsable du laboratoire

## Certificat d'étalonnage # 7274

Numero de série:	99A274209	Station de mesure:	3
Date d'étalonnage:	2017-09-29	Procédure:	POS-CAL-005
Identification de l'instrument:	EM-130		

## Instrument de mesure de référence utilisé pour l'étalonnage final

Description	Modèle	# Série	Traçabilité	Date dû
DHI molbloc (120 slpm)	2E2-S	237	1500210395	2017-12-28
DHI molbloc (30 slpm)	3E4-VCR-V-Q	3444	1500218603	2018-06-05
DHI molbox1	Molbox1	755	1500215634	2018-04-18
RTD Mist	M22	1871501	2017002165	2018-04-20
Module 44.5 PSI avec Baro 163671	Module 30	160659	2017002162	2018-04-26

## Spécifications finales de l'appareil

## Condition d'étalonnage

Spécifications finales de l'appareil		Condition d'étalonnage	
Gaz	Air	Gaz	Air
Température d'opération		Température ambiante	24 °C
Pression à l'entrée		Pression ambiante	1010.52 mbar
Pression à la sortie		Orientation	Verticale
Température de référence		Élastomère	Viton
Pression de référence		Valve	Viton
Étendue d'échelle	0-200 ACFH		
Signaux Entrée/Sortie	-		
Alimentation			
Tolérance	±1 %O.R.		

## Lectures finales

Débit du test ACFH	Instrument en test ft <sup>3</sup>	Valeurs mesurées			Référence calculée ft <sup>3</sup>	Erreur calculée ft <sup>3</sup>	Tolérance acceptable ft <sup>3</sup>	TUR
		Pression PSIA	Température °C	Référence ft <sup>3</sup>				
41.7507	6.920	14.671	23.16	6.879	6.939	-0.019	0.069	2.92
70.7794	11.810	14.765	22.18	11.805	11.793	0.017	0.118	3.99
160.2473	26.690	14.870	22.27	26.906	26.697	-0.007	0.267	>4

Fact. cor : 1,00274566

*[Signature]*  
3 oct 2017

*[Signature]*  
Signature

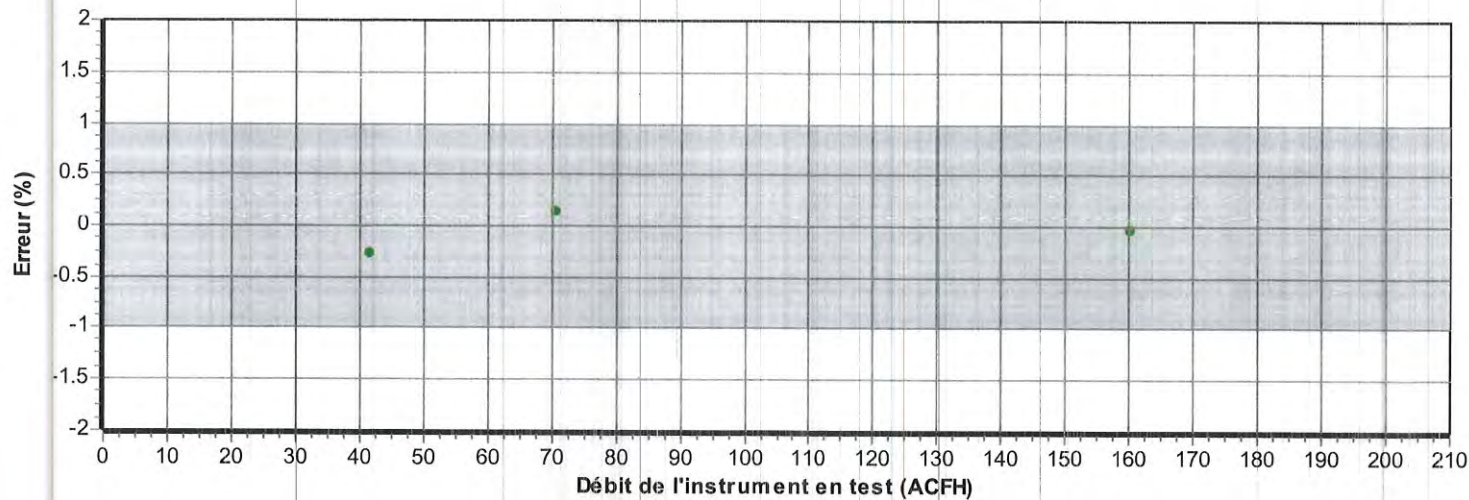
Bernard Poirier  
Métrologue



## Certificat d'étalonnage # 7274

Numero de série:	99A274209	Station de mesure:	3
Date d'étalonnage:	2017-09-29	Procédure:	POS-CAL-005
Identification de l'instrument:	EM-130		

## Résultats finaux



- La mesure (et son incertitude) se situe dans les tolérances
- La mesure (et son incertitude) se situe hors tolérance
- La mesure (et son incertitude) ne rencontre pas la marge de sécurité tel que spécifié dans le document G-8 de l'ILAC

*[Handwritten signature]*  
3 oct 2017

*[Handwritten signature]*  
Signature

Bernard Poirier  
Métrologue



## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-136 06/03/18

CLIENT		SPÉCIFICATION DE CALIBRATION	
<b>Compagnie:</b>	Services Polytests Inc	<b>Procédure de service:</b>	ISL-004
<b>Adresse:</b>	695 B rue Gaudette	<b>Précision requise:</b>	+/-2°C +/-3%RH
	St-Jean-sur-Richelieu, Québec, J3B 7S7	<b>Fréquence d'étalonnage: (jours)</b>	365

SPÉCIFICATION DE L'INSTRUMENT			
<b>Type d'instrument:</b>	Hygromètre	<b>Type d'entrée:</b>	Temp/%RH
<b>Manufacturier:</b>	Fluke	<b>Type de sortie:</b>	Digitale
<b>No. Model:</b>	971	<b>Type de mesure:</b>	Temp/humidité
<b>No. Série:</b>	10610850	<b>Gamme:</b>	5-95%RH -20a60°C
<b>Emplacement:</b>	N.A.	<b>No. Machine:</b>	N.A.

SPÉCIFICATION DE L'ÉTALON			
<b>Étalon Utilisé:</b>	Vaisala Portable 1	<b>No. du certificat d'étalonnage:</b>	2017004428
<b>No. Série:</b>	U4840010/U4920031	<b>Dernière date d'étalonnage:</b>	19-Jul-17
<b>Certificat fait par:</b>	Alpha Controls	<b>Prochaine date d'étalonnage:</b>	19-Jul-18
<b>Commentaire:</b>			

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage	Incertitude Élargie	Commentaire
25.0 °C	25.0 °C	25.2 °C	+0.2 °C	25.2 °C	1.0 °C	
40.0 °C	40.0 °C	40.1 °C	+0.1 °C	40.1 °C	1.0 °C	
33.0 %RH	33.0 %RH	32.5 %RH	-0.5 %RH	32.5 %RH	3.0 %RH	
50.0 %RH	50.0 %RH	49.1 %RH	-0.9 %RH	49.1 %RH	3.0 %RH	
80.0 %RH	80.0 %RH	79.2 %RH	-0.8 %RH	79.2 %RH	3.0 %RH	
<b>Conditions Environnementales:</b> Température: 21 °C      Humidité: 29 %RH						
<b>Type d'Étalonnage:</b>						

Instrumentation St-Laurent Inc. Certifie que l'instrument ci-haut, rencontre ou excède les spécifications établies par le fabricant. Le système qualité de l'entreprise est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour effectuer l'étalonnage est retraçable au CNRC et/ou au NIST. Le degré d'incertitude est basé sur un niveau de confiance=95%, K=2.

DATE D'ÉTALONNAGE / ÉMISSION DU CERTIFICAT	
<b>Date d'Étalonnage:</b>	6 Mars 2018
<b>Date du prochain Étalonnage:</b>	6 Mars 2019
<b>Date d'émission du certificat:</b>	6 Mars 2018

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
<b>Conforme:</b>	X	X
<b>Non Conforme:</b>		

Le Service d'évaluation des laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et certifié la capacité d'étalonnage du laboratoire et la traçabilité au Système international d'unités (SI) ou à des étalons acceptables selon le CLAS. Le présent certificat d'étalonnage est délivré conformément aux conditions de certification du CLAS et aux conditions d'accréditation du Conseil canadien des normes (CCN). Numéro d'accréditation du CCN: # 669. Le CLAS et le CCN ne garantissent pas l'exactitude des étalonnages individuels effectués par les laboratoires accrédités.



Stéphane - Technicien

# CERTIFICATE OF NIST TRACEABLE CALIBRATION

## Calibration Certificate No: 63484

### Customer Information

Customer: Services Polytests, Inc.

Address : 695-B Gaudette  
St-Jean-sur-richelieu  
J3B 7S7

Customer PO #: 100431



**LABORATORY ACCREDITATION BUREAU**  
a division of A-S-B  
**ACCREDITED** ISO/IEC 17025  
Certificate # L2115-1 Calibration

### Calibration Procedure Information

Procedure ID: GTP AIRVEL

Revision #: 6

Revision Date: 1/6/2013

### Calibration Standards Information

<u>Graffel ID</u>	<u>Manufacturer</u>	<u>Model #</u>	<u>Description</u>	<u>CAL Due</u>
10017	Hart Scientific/Burns	1502A/3925	Thermometer	2/18/2018
10086	Furness Controls	FC0332	DP Transmitter	6/6/2018
10100	Graffel	n/a	Temperature	10/29/2019
10155	HOBO	UX100-011	RH/Temp logger	11/15/2017
10171	Furness	FC0332-2W	0 - .4" H2O	11/10/2017
10187	Vaisala	PTB210	Barometric Pressure Gauge	12/6/2017

### Sensor Information

Manufacturer: Omega

Description: Anemometer

Method Used: Pitot Tube

Model #: HHF143

Rated Accuracy:  $\pm$  See Attachment

Accuracy Specified By: Omega

Instrument ID#: EM153

Range: 40 to 7800 fpm

Condition: Functional

Serial #: 1015949

Comments: Calibration Date: 08/22/2017 \*Limited calibration up to 5000 fpm  
Calibration Due: 08/22/2018

*The instruments(s) listed on this certificate have been calibrated against standards traceable to the National Institute of Standards & Technology (NIST) or compared to nationally or internationally recognized consensus standards. The reported calibration uncertainty has a confidence level of 95% ( $k=2$ ). A calibration uncertainty ratio of 4:1 was maintained unless required uncertainty is supported by analysis. Graffel, LLC. Quality Assurance System complies with applicable requirements of ISO/IEC-17025-2005, ANSI/NCCL Z540-1-1994 and ISO 9001: 2008. All results contained within this certificate relate only to item(s) calibrated. This certificate shall not be reproduced except in full and with the written consent of Graffel, LLC. Acceptance Criteria per Simple Acceptance Rule: Measurement Uncertainty is not applied to the measured value when in/out of tolerance statement is made.*

Performed By:

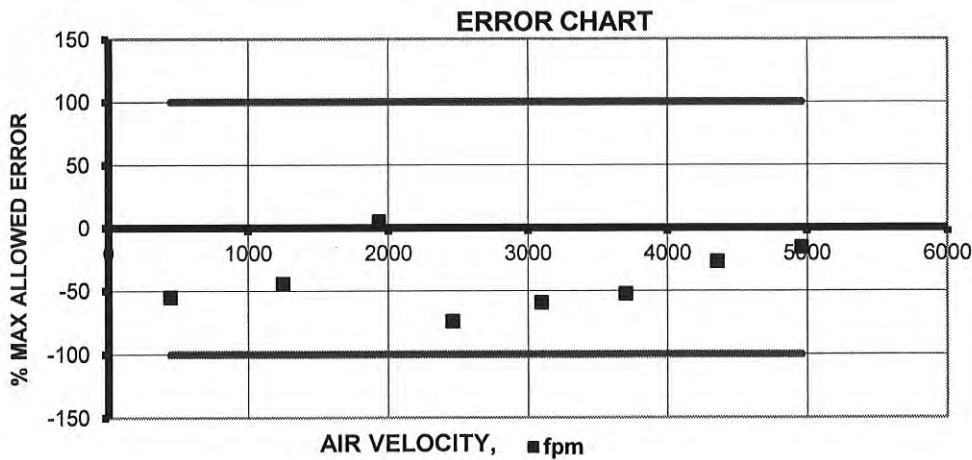
D. Paras  
Calibration Technician

Date: 8/22/2017



**ATTACHMENT TO CALIBRATION CERTIFICATE 63484  
AS FOUND/AS LEFT DATA  
Page 2 of 2**

Reading From Standard,	Lower Limit of Meter Reading,	Measured Reading From Meter,	Upper Limit of Meter Reading,	Error,	Measurement Uncertainty,	STATUS
<b>Actual Air Velocity</b>						
fpm	fpm	fpm	fpm	fpm	fpm	
446	441	443	451	-3	2.23	<b>Pass</b>
1249	1236	1243	1262	-6	6.25	<b>Pass</b>
1932	1912	1933	1952	1	9.66	<b>Pass</b>
2459	2433	2440	2485	-19	12.30	<b>Pass</b>
3096	3064	3077	3128	-19	15.48	<b>Pass</b>
3701	3663	3681	3739	-20	18.51	<b>Pass</b>
4361	4316	4349	4406	-12	21.81	<b>Pass</b>
4960	4909	4952	5011	-8	24.8	<b>Pass</b>



INSTRUMENT SPECIFICATIONS		
Test Fluid	Air	
Lower Range	40	fpm
Upper Range	7800	fpm
Rated Accuracy	+/- 1% reading +/-1 digit	
LABORATORY AMBIENT CONDITIONS		
Pressure	14.42	psia
Humidity	51.10	% RH
Temperature	78.65	F



Flow - Humidity - Temperature - Pressure - Design - Consulting - Engineering

**NIST Traceable Calibration Data Sheet**

Graftel, LLC. 870 Cambridge Drive, Elk Grove Village, IL 60007  
P. 847-364-2600 F. 847-364-2899

www.graftel.com

*[Signature]*  
sept 5<sup>th</sup> 2017



# Certificat d'Étalonnage / Certificate of Calibration

**CLIENT :**  
 SERVICES POLYTESTS INC.  
 695-B GAUDETTE  
 ST-JEAN-SUR-RICHELIEU, QUEBEC

**Description:** CHRONOMÈTRE / STOPWATCH TIMER  
**Fabricant/ Manufacturer:** EXTECH  
**Modèle/ Model :** 365510  
**No série / Serial no :** 131636  
**# Inventaire / Asset # :** EM-175

**CERTIFICAT No / Certificate No:** **227991**

**PROCÉDURE / Procedure :**  
 TRESICAL - EXTECH\_365510

**Date étalonnage/ Calibration Performed :** **2017-12-28**  
yyyy-mm-dd

**Echéance/ Due Date :** **2018-12-28**

Type de résultat / Results type :	As-Found = As-Left
Résultats d'essais / Test results :	Conforme / In Tolerance

Conditions de mesure / Measurement conditions

TEMPÉRATURE / Temp. : 22°C  
 HUMIDITÉ / Humidity : 23%RH

Usage restreint/ Restricted use :   
 Réparation effectuée / Repair performed :   
 Ajustement effectué / Adjustment performed :

ÉTALONS UTILISÉS/ Standards Used:

Identification	Manuf.	Model	Description	Ser. #	Étalonné/ Cal.	Echéance/ Due
PR0313	H-P	53132A	UNIVERSAL COUNTER	3546A03142	2017-06-20	2018-06-20
PR0392	AGILENT	33250A	FUNCTION/ARBITRARY WAVEFORM GENERATOR	MY40008014	2017-06-19	2019-06-19

Les spécifications mentionnées comme limites de tolérances d'essai sont celles établies par le fabricant, sauf indication contraire.  
*Test tolerance limits are based on manufacturers specifications unless stated otherwise.*

**NOTES :**

2018-01-11

**Technicien :**  
**Technician**

M. ZAIDI

Le système qualité de la société est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour le processus d'étalonnage sont retraçables au SI par l'entremise du CNRC et/ou du NIST.  
*Our quality system complies with the requirements of ISO 17025 and the standards used for the calibration are traceable to SI through NRC and/or NIST.*

LE DROIT D'AUTEUR DE CE CERTIFICAT APPARTIEN À TRESICAL / PRIMO INSTRUMENT INC. CE CERTIFICAT NE PEUT ÊTRE REPRODUIT AUTREMENT QU'EN ENTIER ET AVEC LE CONSENTEMENT PRÉALABLE ÉCRIT DU GROUPE TRESICAL.  
 TRESICAL / PRIMO INSTRUMENT INC. OWN COPYRIGHT OF THIS CERTIFICATE. THE CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN CONSENT OF THE TRESICAL GROUP.





CLIENT / Customer :

DESCRIPTION / Description :

MANUFACTURIER / Manufacturer :

MODÈLE / Model :

227991

SERVICES POLYTESTS INC.

CHRONOMÈTRE / STOPWATCH TIMER

EXTECH

365510

DESCRIPTION Description	LIMITES Limits	LECTURES Readings	LIMITES Limits
----------------------------	-------------------	----------------------	-------------------

Temps écoulé, chronomètre sous test / Elapsed time on test stopwatch			Min	LECTURES Chronomètre/timer	Max
Minutes	Seconds	1/100 sec		165115	
27	31	15			
Total au compteur / Reference timer:				165114.0	comptes/counts
(Δt) Deviation (1/100sec): 1.00  Deviation Par jour/ Per day (%): 0.0006 % Deviation Par jour/ Per day (sec): 0.52 sec			* Secondes -3.00	Deviation 24hrs 0.52	* Secondes 3.00
* Tolérances basées sur une déviation maximale de 3 sec/jour * Tolerances based on a 3 sec/day maximum deviation					
Incertitude/ Uncertainty: ±37 ms					
Lorsque fournies dans le rapport, les incertitudes de mesure sont des incertitudes élargies représentant un niveau de confiance d'approximativement 95% , obtenu en multipliant l'incertitude-type composée par un facteur de couverture de k=2. When supplied in the report, the measurement uncertainties are expanded uncertainties representing a confidence level of approximately 95% , obtain by multiplying the combined standard uncertainty by a coverage factor of k=2.					



## CERTIFICAT D'ÉTALONNAGE # 7275

Date d'étalonnage : 2017-09-29

Date d'émission du certificat : 2017-09-29

Services Polytests  
695 B Gaudette street  
St-Jean-sur-Richelieu, Québec, Canada  
J3B 7S7

Étalonnage d'un  
Shinigawa DCDA-2c S/N : 23544

### CONFORMITÉ AU PROGRAMME DE QUALITÉ

Tous les étalonnages sont effectués conformément au manuel d'assurance qualité de Polycontrols et sont conformes à la norme ISO/IEC 17025 – 2005, à la norme ISO 9001 – 2008 ainsi qu'à tout autre exigences de qualité définies dans la description d'achat des clients.

### TRAÇABILITÉ

La traçabilité des étalons de débit au National Institute of Standards and Technology, NIST, est maintenue par les laboratoires de Fluke Corporation de Phoenix, Arizona et est conforme aux normes ISO/IEC 17025, AINSI/NCSL Z540-1-1994, ISO-10012-1, MIL-STD 45662A.

Le Service d'évaluation des laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et certifié la capacité d'étalonnage du laboratoire et la traçabilité au Système international d'unités (SI) ou à des étalons acceptables selon le CLAS. Le présent certificat d'étalonnage est délivré conformément aux conditions de certification du CLAS et aux conditions d'accréditation du Conseil canadien des normes (CCN). Le CLAS et le CCN ne garantissent pas l'exactitude des étalonnages individuels effectués par les laboratoires accrédités.

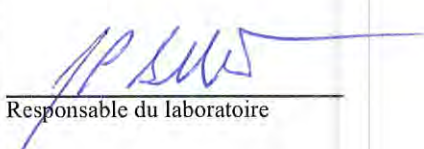
### APTITUDE EN MATIÈRE DE MESURE ET D'ÉTALONNAGE - CMC

Les références utilisées pour l'étalonnage de débit ont une incertitude de  $\pm 0.2\%$  de la lecture pour les mesures entre 5 SCCM à 10 SLPM,  $\pm 0.3\%$  de la lecture pour les mesures entre 10 SLPM à 30 SLPM,  $\pm 0.2\%$  de la lecture pour les mesures entre 30 SLPM à 3000 SLPM,  $\pm 0.3\%$  de la lecture pour les mesures supérieures à 3000 SLPM jusqu'à 6000 SLPM et  $\pm 0.5\%$  pour les mesures inférieures à 5 SCCM jusqu'à concurrence de 1 SCCM, équivalent air ou azote. Les incertitudes exprimées sont élargies avec un facteur d'élargissement  $k = 2$ , et ce, pour un niveau de confiance d'environ 95 %, dans l'hypothèse d'une distribution normale incluant la résolution de l'instrument. Le rapport d'incertitude des essais (RIE) de cet étalonnage respecte un ratio de 4:1 à moins d'indication contraire.

### SOMMAIRE DES CONDITIONS DE L'INSTRUMENT EN TEST

Conditions initiales	En bon état
Travail Effectué	Étalonnage de l'instrument
Résultats	Lectures Initiales = Lectures finales, aucun ajustement
Remarques	Lectures finales dans les tolérances
	Fréquence d'étalonnage aux 12 mois
	Tolérance placée à 2% OR à la demande du client

  
Métrologiste

  
Responsable du laboratoire

## Certificat d'étalonnage # 7275

Numéro de série:	23544	Station de mesure:	3
Date d'étalonnage:	2017-09-29	Procédure:	POS-CAL-005
Identification de l'instrument:	EM-178		

## Instrument de mesure de référence utilisé pour l'étalonnage final

Description	Modèle	# Série	Traçabilité	Date dû
DHI molbloc (30 slpm)	3E4-VCR-V-Q	3444	1500218603	2018-06-05
DHI molbox I	Molbox I	755	1500215634	2018-04-18
RTD Mist	M22	1871501	2017002165	2018-04-20
Module 44.5 PSI avec Baro 163671	Module 30	160659	2017002162	2018-04-26

## Spécifications finales de l'appareil


## Condition d'étalonnage

Gaz	Air	Gaz	Air
Température d'opération		Température ambiante	23 °C
Pression à l'entrée		Pression ambiante	1016.3 mbar
Pression à la sortie		Orientation	Horizontale
Température de référence		Élastomère	Viton
Pression de référence		Valve	
Étendue d'échelle	10-2000 ALH		
Signaux Entrée/Sortie	-		
Alimentation			
Tolérance	±2 %O.R.		

## Lectures finales

Débit du test ALH	Instrument en test L	Valeurs mesurées			Référence calculée L	Erreur calculée L	Tolérance acceptable L	TUR
		Pression PSIA	Température °C	Référence L				
379.0008	63.9100	14.7537	22.51	63.0822	63.1350	0.7750	1.2627	>4
603.4297	102.1200	14.7568	22.41	100.3666	100.3948	1.7252	2.0079	>4
1618.8469	273.9200	14.7824	22.31	269.9690	269.4835	4.4365	5.3897	>4

Facteur 0,98787357

3 oct 2017  
  
 Signature

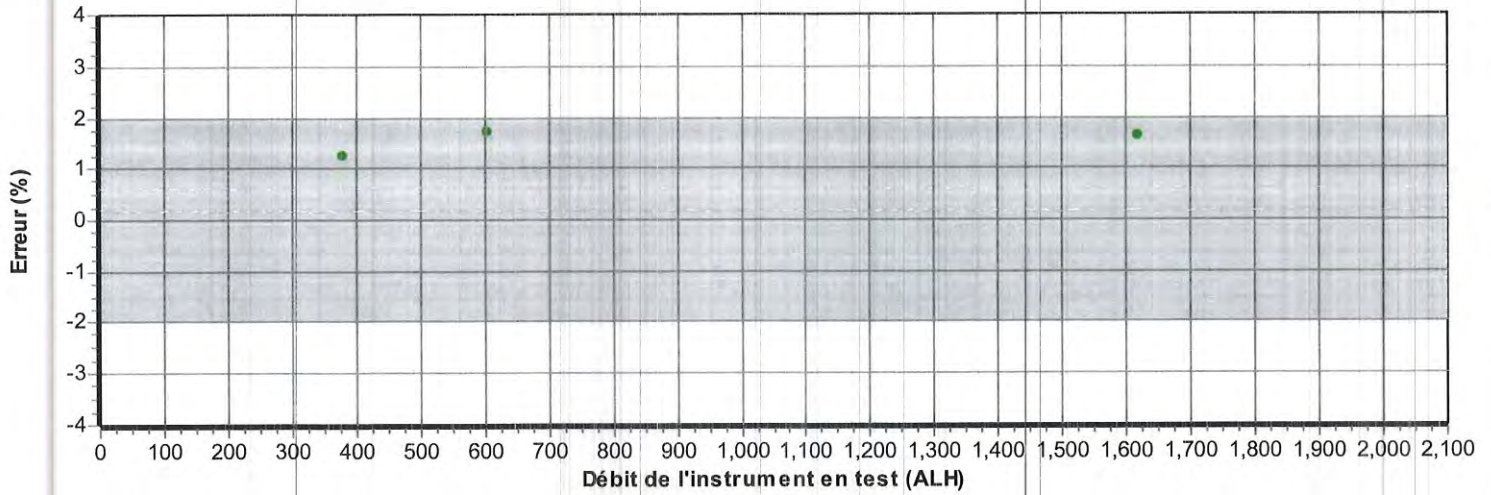
Bernard Poirier  
 Métrologiste



## Certificat d'étalonnage # 7275

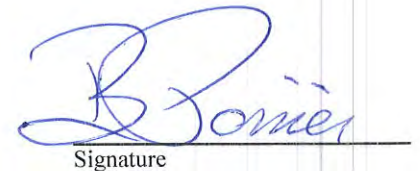
Numéro de série:	23544	Station de mesure:	3
Date d'étalonnage:	2017-09-29	Procédure:	POS-CAL-005
Identification de l'instrument:	EM-178		

## Résultats finaux



- La mesure (et son incertitude) se situe dans les tolérances
- La mesure (et son incertitude) se situe hors tolérance
- La mesure (et son incertitude) ne rencontre pas la marge de sécurité tel que spécifié dans le document G-8 de l'ILAC

Bernard Poirier  
Métrologue



Signature

## CERTIFICAT D'ÉTALONNAGE # 7276

Date d'étalonnage : 2017-09-29  
Date d'émission du certificat : 2017-09-29

Services Polytests  
695 B Gaudette street  
St-Jean-sur-Richelieu, Québec, Canada  
J3B 7S7

Étalonnage d'un  
Shinigawa DCDA-2c S/N : 23543

### CONFORMITÉ AU PROGRAMME DE QUALITÉ

Tous les étalonnages sont effectués conformément au manuel d'assurance qualité de Polycontrols et sont conformes à la norme ISO/IEC 17025 – 2005, à la norme ISO 9001 – 2008 ainsi qu'à tout autre exigences de qualité définies dans la description d'achat des clients.

### TRAÇABILITÉ

La traçabilité des étalons de débit au National Institute of Standards and Technology, NIST, est maintenue par les laboratoires de Fluke Corporation de Phoenix, Arizona et est conforme aux normes ISO/IEC 17025, AINSI/NCSL Z540-1-1994, ISO-10012-1, MIL-STD 45662A.

Le Service d'évaluation des laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et certifié la capacité d'étalonnage du laboratoire et la traçabilité au Système international d'unités (SI) ou à des étalons acceptables selon le CLAS. Le présent certificat d'étalonnage est délivré conformément aux conditions de certification du CLAS et aux conditions d'accréditation du Conseil canadien des normes (CCN). Le CLAS et le CCN ne garantissent pas l'exactitude des étalonnages individuels effectués par les laboratoires accrédités.

### APTITUDE EN MATIÈRE DE MESURE ET D'ÉTALONNAGE - CMC

Les références utilisées pour l'étalonnage de débit ont une incertitude de  $\pm 0.2\%$  de la lecture pour les mesures entre 5 SCCM à 10 SLPM,  $\pm 0.3\%$  de la lecture pour les mesures entre 10 SLPM à 30 SLPM,  $\pm 0.2\%$  de la lecture pour les mesures entre 30 SLPM à 3000 SLPM,  $\pm 0.3\%$  de la lecture pour les mesures supérieures à 3000 SLPM jusqu'à 6000 SLPM et  $\pm 0.5\%$  pour les mesures inférieures à 5 SCCM jusqu'à concurrence de 1 SCCM, équivalent air ou azote. Les incertitudes exprimées sont élargies avec un facteur d'élargissement  $k = 2$ , et ce, pour un niveau de confiance d'environ 95 %, dans l'hypothèse d'une distribution normale incluant la résolution de l'instrument. Le rapport d'incertitude des essais (RIE) de cet étalonnage respecte un ratio de 4:1 à moins d'indication contraire.

### SOMMAIRE DES CONDITIONS DE L'INSTRUMENT EN TEST

Conditions initiales	En bon état
Travail Effectué	Étalonnage de l'instrument Lectures Initiales = Lectures finales, aucun ajustement
Résultats	Lectures finales dans les tolérances
Remarques	Fréquence d'étalonnage aux 12 mois Tolérance placée à 2% OR à la demande du client



Métrologue



Responsable du laboratoire



## Certificat d'étalonnage # 7276

Numéro de série:	23543	Station de mesure:	3
Date d'étalonnage:	2017-09-29	Procédure:	POS-CAL-005
Identification de l'instrument:	EM-179		

### Instrument de mesure de référence utilisé pour l'étalonnage final

Description	Modèle	# Série	Traçabilité	Date dû
DHI molbloc (30 slpm)	3E4-VCR-V-Q	3444	1500218603	2018-06-05
DHI molbox1	Molbox1	755	1500215634	2018-04-18
RTD Mist	M22	1871501	2017002165	2018-04-20
Module 44.5 PSI avec Baro 163671	Module 30	160659	2017002162	2018-04-26

### Spécifications finales de l'appareil

### Condition d'étalonnage

Gaz	Air	Gaz	Air
Température d'opération		Température ambiante	23.5 °C
Pression à l'entrée		Pression ambiante	1016.63 mbar
Pression à la sortie		Orientation	Horizontale
Température de référence		Élastomère	Viton
Pression de référence		Valve	
Étendue d'échelle	10-2000 ALH		
Signaux Entrée/Sortie	-		
Alimentation			
Tolérance	±2 %O.R.		

### Lectures finales

Débit du test ALH	Instrument en test L	Valeurs mesurées			Référence L	Erreur calculée L	Tolérance acceptable L	TUR
		Pression PSIA	Température °C	Référence L				
358.4817	60.4100	14.7516	22.32	59.6919	59.7116	0.6984	1.1942	>4
608.1934	102.5600	14.7553	22.14	101.2793	101.2264	1.3336	2.0245	>4
1623.7775	271.8600	14.7817	22.09	270.7253	270.0544	1.8056	5.4011	>4

Fach. con. : 01988439

*[Signature]*  
3 oct 2017

*[Signature]*  
Signature

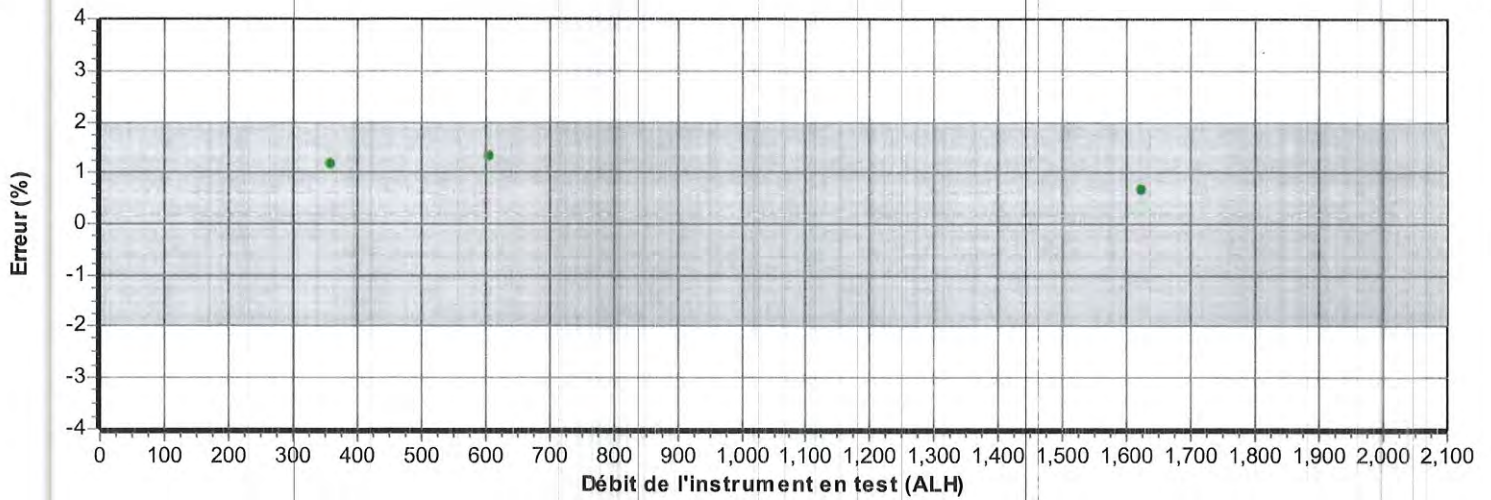
Bernard Poirier  
Métrologue



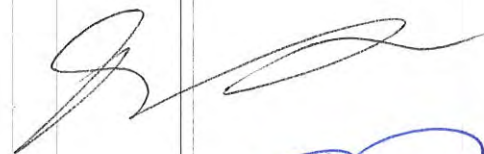
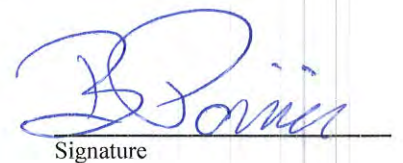
## Certificat d'étalonnage # 7276

Numéro de série:	23543	Station de mesure:	3
Date d'étalonnage:	2017-09-29	Procédure:	POS-CAL-005
Identification de l'instrument:	EM-179		

## Résultats finaux



- La mesure (et son incertitude) se situe dans les tolérances
- La mesure (et son incertitude) se situe hors tolérance
- La mesure (et son incertitude) ne rencontre pas la marge de sécurité tel que spécifié dans le document G-8 de l'ILAC

Signature

Bernard Poirier  
Métrologue

## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-224 06/03/18

CLIENT		SPÉCIFICATION DE CALIBRATION	
<b>Compagnie:</b>	Services Polytests Inc	<b>Procédure de service:</b>	ISL-022
<b>Adresse:</b>	695 B rue Gaudette	<b>Précision requise:</b>	+/- 1/32"
	St-Jean-sur-Richelieu, Québec, J3B 7S7	<b>Fréquence d'étalonnage: (jours)</b>	365

SPÉCIFICATION DE L'INSTRUMENT			
<b>Type d'instrument:</b>	Ruban à mesurer	<b>Type d'entrée:</b>	Mesure
<b>Manufacturier:</b>	Stanley	<b>Type de sortie:</b>	N/A
<b>No. Model:</b>	Leverlock 12&#39;	<b>Type de mesure:</b>	Inch
<b>No. Série:</b>	N/A	<b>Gamme:</b>	0 à 12'
<b>Emplacement:</b>	Portable	<b>No. Machine:</b>	N/A

SPÉCIFICATION DE L'ÉTALON			
<b>Étalon Utilisé:</b>	Ruban à mesurer	<b>No. du certificat d'étalonnage:</b>	1
<b>No. Série:</b>	1	<b>Dernière date d'étalonnage:</b>	1-Sep-17
<b>Certificat fait par:</b>	Marco Miron	<b>Prochaine date d'étalonnage:</b>	1-Sep-19
<b>Commentaire:</b> sert à titre indicatif seulement			

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage		Commentaire
1.00 "	1.00 "	1.00 "	0.00 "	1.00 "		
36.00 "	36.00 "	36.00 "	0.00 "	36.00 "		
72.00 "	72.00 "	72.00 "	0.00 "	72.00 "		
108.00 "	108.00 "	108.00 "	0.00 "	108.00 "		
132.00 "	132.00 "	132.00 "	0.00 "	132.00 "		
<b>Conditions Environnementales:</b> Température: 21 °C      Humidité: 28 %RH						
<b>Commentaire:</b>						

Instrumentation St-Laurent Inc. Certifie que l'instrument ci-haut, rencontre ou excède les spécifications établies par le fabricant. Les étalons utilisés pour effectuer l'étalonnage est retraçable au CNRC et/ou au NIST.

DATE D'ÉTALONNAGE / ÉMISSION DU CERTIFICAT	
<b>Date d'Étalonnage:</b>	6 Mars 2018
<b>Date du prochain Étalonnage:</b>	6 Mars 2019
<b>Date d'émission du certificat:</b>	6 Mars 2018

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
<b>Conforme:</b>	X	
<b>Non Conforme:</b>	X	



Stéphane - Technicien



22 Albiston Way  
 Auburn, ME 04210  
 800-292-6218  
 207-777-6218  
 Fax 207-777-6215  
 www.specair.com

Date: 08/14/2017

## Certificate of Analysis

**Customer:**  
 VAC OXY

Results are reported in mole percent, unless otherwise indicated. Mixes are prepared via partial pressure methods, or gravimetrically, using high load high sensitivity electronic scales. Prior to use, scales are verified for accuracy using applicable NIST traceable weights; analyses are calibrated against reference materials traceable to NIST weights and/or NIST gas reference materials.

**Cylinder Serial #:** 809277      **Cylinder Size:** K      **CGA Connection:** 350      **Fill Pressure:** 1450 PSI

**Analysis:** Certified Standard

**Lot #:** 4722621

Component(s):	Requested Concentration(s):	Actual Concentration(s):
Carbon Monoxide	3%	3.0%
Carbon Dioxide	18%	18.0%
Oxygen	2%	2.0%
Nitrogen	BALANCE	BALANCE

**Expiration Date:** 08/2020

**Approved By:**

Tom Bosse

EM-275  
  
 5-sept 2017

The information contained herein has been prepared at your request by qualified experts. While we believe that the information is accurate within the limits of the analytical methods employed, and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability arising out of the use of the information contained herein exceed the fee established for providing such information.



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Date: 08/14/2017

## Certificate of Analysis

**Customer:**

VAC OXY

Results are reported in mole percent, unless otherwise indicated. Mixes are prepared via partial pressure methods, or gravimetrically, using high load high sensitivity electronic scales. Prior to use, scales are verified for accuracy using applicable NIST traceable weights; analyses are calibrated against reference materials traceable to NIST weights and/or NIST gas reference materials.

**Cylinder Serial #:** K3886

**Cylinder Size:** K

**CGA Connection:** 590

**Fill Pressure:** 1450 PSI

**Analysis:** Certified Standard

**Lot #:** 4722622

<b>Component(s):</b>	<b>Requested Concentration(s):</b>	<b>Actual Concentration(s):</b>
Carbon Monoxide	1%	1.0%
Carbon Dioxide	10%	10.0%
Oxygen	10%	10.0%
Nitrogen	BALANCE	BALANCE

**Expiration Date:** 08/2020

**Approved By:**

Tom Bosse

EM. 276  
5 sept 2017

The information contained herein has been prepared at your request by qualified experts. While we believe that the information is accurate within the limits of the analytical methods employed, and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability arising out of the use of the information contained herein exceed the fee established for providing such information.



## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-015 05/03/18

CLIENT		SPÉCIFICATION DE CALIBRATION	
<b>Compagnie:</b>	Services Polytests Inc	<b>Procédure de service:</b>	4IN9101
<b>Adresse:</b>	695 B rue Gaudette	<b>Précision requise:</b>	+/- 2°C
	St-Jean-sur-Richelieu, Québec, J3B 7S7	<b>Fréquence d'étalonnage: (jours)</b>	365

SPÉCIFICATION DE L'INSTRUMENT			
<b>Type d'instrument:</b>	Enregistreur	<b>Type d'entrée:</b>	Temp
<b>Manufacturier:</b>	Keithley	<b>Type de sortie:</b>	Digitale
<b>No. Model:</b>	7700	<b>Type de mesure:</b>	Température
<b>No. Série:</b>	1213648	<b>Gamme:</b>	Divers
<b>Emplacement:</b>	N/A	<b>No. Machine:</b>	N.A.

SPÉCIFICATION DE L'ÉTALON			
<b>Étalon Utilisé:</b>	Fluke 744	<b>No. du certificat d'étalonnage:</b>	2017004079
<b>No. Série:</b>	7798010	<b>Dernière date d'étalonnage:</b>	5-Jul-17
<b>Certificat fait par:</b>	Alpha Controls	<b>Prochaine date d'étalonnage:</b>	5-Jul-18
<b>Commentaire:</b>			

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage	Incertitude Élargie	Commentaire
-190.0 °C	-190.0 °C	-190.7 °C	-0.7 °C	-190.7 °C	1.0 °C	Input#1TypeK
0.0 °C	0.0 °C	-0.3 °C	-0.3 °C	-0.3 °C	1.0 °C	Input#1TypeK
750.0 °C	750.0 °C	749.7 °C	-0.3 °C	749.7 °C	1.0 °C	Input#1TypeK
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#2 TypeK
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#3 TypeK
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	1.0 °C	Input#4 TypeK
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	1.0 °C	Input#5TypeK
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#6TypeK
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#7TypeK
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#8TypeK
100.0 °C	100.0 °C	99.8 °C	-0.2 °C	99.8 °C	1.0 °C	Input#9TypeK
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#10TypeJ
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#11TypeJ
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#12TypeJ
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#13 TypeJ
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#14TypeJ
100.0 °C	100.0 °C	99.8 °C	-0.2 °C	99.8 °C	1.0 °C	Input#15 TypeJ
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#16TypeJ
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#17TypeJ
100.0 °C	100.0 °C	99.8 °C	-0.2 °C	99.8 °C	1.0 °C	Input#18TypeJ
100.0 °C	100.0 °C	99.8 °C	-0.2 °C	99.8 °C	1.0 °C	Input#19TypeJ
100.0 °C	100.0 °C	99.9 °C	-0.1 °C	99.9 °C	1.0 °C	Input#20TypeJ
12.000 mA	12.000 mA	12.005 mA	+0.005 mA	12.005 mA	1.00 mA	Input#21
12.000 mA	12.000 mA	12.005 mA	+0.005 mA	12.005 mA	1.00 mA	Input#22

**Conditions Environnementales:**      Température: 21 °C      Humidité: 31 %RH



## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-015 05/03/18

CLIENT	
<b>Compagnie:</b>	Services Polytests Inc
<b>Adresse:</b>	695 B rue Gaudette St-Jean-sur-Richelieu, Québec, J3B 7S7

SPÉCIFICATION DE CALIBRATION	
<b>Procédure de service:</b>	4IN9101
<b>Précision requise:</b>	+/- 2°C
<b>Fréquence d'étalonnage: (jours)</b>	365

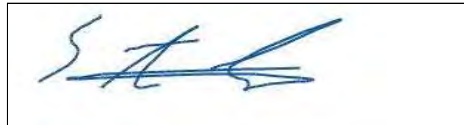
SPÉCIFICATION DE L'INSTRUMENT			
<b>Type d'instrument:</b>	Enregistreur	<b>Type d'entrée:</b>	Temp
<b>Manufacturier:</b>	Keithley	<b>Type de sortie:</b>	Digitale
<b>No. Model:</b>	7700	<b>Type de mesure:</b>	Température
<b>No. Série:</b>	1213648	<b>Gamme:</b>	Divers
<b>Emplacement:</b>	N/A	<b>No. Machine:</b>	N.A.
<b>Type d'Étalonnage:</b> Test avec EM-012			

Instrumentation St-Laurent Inc. Certifie que l'instrument ci-haut, rencontre ou excède les spécifications établies par le fabricant. Le système qualité de l'entreprise est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour effectuer l'étalonnage est retraçable au CNRC et/ou au NIST. Le degré d'incertitude est basé sur un niveau de confiance=95%, K=2.

DATE D'ÉTALONNAGE / ÉMISSION DU CERTIFICAT	
<b>Date d'Étalonnage:</b>	5 Mars 2018
<b>Date du prochain Étalonnage:</b>	5 Mars 2019
<b>Date d'émission du certificat:</b>	5 Mars 2018

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
<b>Conforme:</b>	X	X
<b>Non Conforme:</b>		

Le Service d'évaluation des laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et certifié la capacité d'étalonnage du laboratoire et la traçabilité au Système international d'unités (SI) ou à des étalons acceptables selon le CLAS. Le présent certificat d'étalonnage est délivré conformément aux conditions de certification du CLAS et aux conditions d'accréditation du Conseil canadien des normes (CCN). Numéro d'accréditation du CCN: # 669. Le CLAS et le CCN ne garantissent pas l'exactitude des étalonnages individuels effectués par les laboratoires accrédités.



Stéphane - Technicien

## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-154 05/03/18

CLIENT		SPÉCIFICATION DE CALIBRATION	
<b>Compagnie:</b>	Services Polytests Inc	<b>Procédure de service:</b>	4IN9101
<b>Adresse:</b>	695 B rue Gaudette	<b>Précision requise:</b>	+/- 2°C
	St-Jean-sur-Richelieu, Québec, J3B 7S7	<b>Fréquence d'étalonnage: (jours)</b>	365

SPÉCIFICATION DE L'INSTRUMENT			
<b>Type d'instrument:</b>	Enregistreur	<b>Type d'entrée:</b>	Temp
<b>Manufacturier:</b>	Keithley	<b>Type de sortie:</b>	Digitale
<b>No. Model:</b>	7700	<b>Type de mesure:</b>	Température
<b>No. Série:</b>	1306774	<b>Gamme:</b>	Divers
<b>Emplacement:</b>	N/A	<b>No. Machine:</b>	N.A.

SPÉCIFICATION DE L'ÉTALON			
<b>Étalon Utilisé:</b>	Fluke 744	<b>No. du certificat d'étalonnage:</b>	2017004079
<b>No. Série:</b>	7798010	<b>Dernière date d'étalonnage:</b>	5-Jul-17
<b>Certificat fait par:</b>	Alpha Controls	<b>Prochaine date d'étalonnage:</b>	5-Jul-18
<b>Commentaire:</b>			

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage	Incertitude Élargie	Commentaire
-17.000 mV	-17.000 mV	-16.985 mV	+0.015 mV	-16.985 mV	0.1 mV	Input#1
0.000 mV	0.000 mV	0.081 mV	+0.081 mV	0.081 mV	0.1 mV	Input#1
20.000 mV	20.000 mV	20.058 mV	+0.058 mV	20.058 mV	0.1 mV	Input#1
30.000 mV	30.000 mV	30.048 mV	+0.048 mV	30.048 mV	0.1 mV	Input#2
Input#3 Non-Conforme						
5.000 V.DC.	5.000 V.DC.	4.999 V.DC.	-0.001 V.DC.	4.999 V.DC.	0.1 V.DC.	Input#4
30.000 mV	30.000 mV	30.026 mV	+0.026 mV	30.026 mV	0.1 mV	Input#5
30.000 mV	30.000 mV	29.992 mV	-0.008 mV	29.992 mV	0.1 mV	Input#6
100.00 Ohms	100.00 Ohms	99.99 Ohms	-0.01 Ohms	99.99 Ohms	1.0 Ohms	Input#7
100.00 Ohms	100.00 Ohms	99.99 Ohms	-0.01 Ohms	99.99 Ohms	1.0 Ohms	Input#8
100.00 Ohms	100.00 Ohms	100.01 Ohms	+0.01 Ohms	100.01 Ohms	1.0 Ohms	Input#9
100.00 Ohms	100.00 Ohms	99.92 Ohms	-0.08 Ohms	99.92 Ohms	1.0 Ohms	Input#10
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	1.0 °C	Input#11 TypeT
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	1.0 °C	Input#12 TypeT
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#13 TypeJ
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#14 TypeJ
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	1.0 °C	Input#15 TypeJ
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	1.0 °C	Input#16 TypeJ
100.00 Ohms	100.00 Ohms	99.98 Ohms	-0.02 Ohms	99.98 Ohms	1.0 Ohms	Input#17
100.00 Ohms	100.00 Ohms	99.89 Ohms	-0.11 Ohms	99.89 Ohms	1.0 Ohms	Input#18
100.00 Ohms	100.00 Ohms	99.90 Ohms	-0.10 Ohms	99.90 Ohms	1.0 Ohms	Input#19
100.00 Ohms	100.00 Ohms	99.86 Ohms	-0.14 Ohms	99.86 Ohms	1.0 Ohms	Input#20
12.000 mA	12.000 mA	12.003 mA	+0.003 mA	12.003 mA	1.00 mA	Input#21
12.000 mA	12.000 mA	12.005 mA	+0.005 mA	12.005 mA	1.00 mA	Input#22

**Conditions Environnementales:**      Température: 21 °C      Humidité: 31 %RH

## CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-154 05/03/18

CLIENT	
<b>Compagnie:</b>	Services Polytests Inc
<b>Adresse:</b>	695 B rue Gaudette St-Jean-sur-Richelieu, Québec, J3B 7S7

SPÉCIFICATION DE CALIBRATION	
<b>Procédure de service:</b>	4IN9101
<b>Précision requise:</b>	+/- 2°C
<b>Fréquence d'étalonnage: (jours)</b>	365

SPÉCIFICATION DE L'INSTRUMENT			
<b>Type d'instrument:</b>	Enregistreur	<b>Type d'entrée:</b>	Temp
<b>Manufacturier:</b>	Keithley	<b>Type de sortie:</b>	Digitale
<b>No. Model:</b>	7700	<b>Type de mesure:</b>	Température
<b>No. Série:</b>	1306774	<b>Gamme:</b>	Divers
<b>Emplacement:</b>	N/A	<b>No. Machine:</b>	N.A.
<b>Type d'Étalonnage:</b> Test avec EM-012			

Instrumentation St-Laurent Inc. Certifie que l'instrument ci-haut, rencontre ou excède les spécifications établies par le fabricant. Le système qualité de l'entreprise est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour effectuer l'étalonnage est retraçable au CNRC et/ou au NIST. Le degré d'incertitude est basé sur un niveau de confiance=95%, K=2.

DATE D'ÉTALONNAGE / ÉMISSION DU CERTIFICAT	
<b>Date d'Étalonnage:</b>	5 Mars 2018
<b>Date du prochain Étalonnage:</b>	5 Mars 2019
<b>Date d'émission du certificat:</b>	5 Mars 2018

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
<b>Conforme:</b>	X	X
<b>Non Conforme:</b>		

Le Service d'évaluation des laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et certifié la capacité d'étalonnage du laboratoire et la traçabilité au Système international d'unités (SI) ou à des étalons acceptables selon le CLAS. Le présent certificat d'étalonnage est délivré conformément aux conditions de certification du CLAS et aux conditions d'accréditation du Conseil canadien des normes (CCN). Numéro d'accréditation du CCN: # 669. Le CLAS et le CCN ne garantissent pas l'exactitude des étalonnages individuels effectués par les laboratoires accrédités.



Stéphane - Technicien

## APPENDIX 4: Unit pre burn

<b>Product:</b>	38SFC	<b>Test Duration:</b>	680	<b>LHV:</b>	N/A
<b>Manufacturer</b>	Foyers Suprême Inc.	<b>Emission Rate [g/hr]:</b>	0.5099	<b>HHV:</b>	N/A
<b>Test:</b>	38SFC180209	<b>Burn Rate [dry kg/hr]:</b>	0.8336		
<b>Date:</b>	2018-02-09	<b>Category:</b>	2		

Load Configuration							
	W (in)	H (in)	L (in)	Humidity (%)	Spacers	Weight (lb)	Species
1	3.5	3.5	22	21	4	5.5	BC Fir
2	3.5	3.5	22	20	4	5.1	BC Fir
3	3.5	3.5	22	19	4	5.1	BC Fir
4	3.5	3.5	22	19	4	5.1	BC Fir
5	3.5	3.5	22	22	4	5.3	BC Fir

26.1

ET [min]	BR	FB Temp. [°F]			DGM Temp. [°F]		Filt. 1 Temp. [°F]	Flue Gas Temp. [°F]	Amb. Room Temp. [°F]	Gas Analyzer [%]			Weight [lbs]	Avg. FB Temp. [°F]				
		Top	Bot.	Back	RH	LH				BM	1_IN	1_OUT			CO <sub>2</sub>	CO	O <sub>2</sub>	
0	0.00	191	432	285	428	280	155	67	67				233	2.998	2.136	15.288	26.100	323
10	2.22	690	421	302	404	313	301	68	67				618	12.330	0.548	7.582	23.875	426
20	2.18	653	430	289	394	326	308	69	68				631	12.687	0.408	7.483	21.696	418
30	2.27	663	426	294	409	357	333	69	69				645	13.281	0.385	6.946	19.426	430
40	2.25	688	418	310	430	378	340	70	69				659	14.262	0.353	6.050	17.177	445
50	2.22	636	417	333	455	408	339	71	70				635	14.395	0.367	5.881	14.956	450
60	1.97	607	399	357	481	427	324	70	70				612	14.130	0.421	6.070	12.983	454
70	1.70	579	399	369	501	441	305	69	70				563	13.495	0.326	6.704	11.285	458
80	1.39	556	392	371	506	451	284	68	70				522	12.874	0.295	7.308	9.899	455
90	1.20	533	383	369	508	443	270	67	70				490	12.324	0.589	7.679	8.701	447
100	1.08	531	380	363	508	431	273	67	69				481	12.542	0.322	7.580	7.616	443
110	1.11	560	371	366	517	435	294	67	69				495	13.532	0.675	6.311	6.506	450
120	0.88	466	385	365	530	437	267	67	69				459	10.519	1.168	8.449	5.622	437
130	0.45	332	399	352	529	423	215	67	69				363	7.797	2.055	10.564	5.169	407
140	0.29	298	404	336	512	404	189	66	68				301	7.121	2.322	11.031	4.875	391
150	0.20	274	398	320	488	388	167	66	68				259	6.326	2.683	11.395	4.673	373
160	0.16	268	385	304	465	363	156	66	68				234	6.669	2.778	10.986	4.516	357
170	0.13	257	379	292	446	347	149	66	68				216	6.506	2.963	11.077	4.382	344



180	0.14	237	371	277	427	326	145	66	67	200	5.717	3.275	11.659	4.247	327
190	0.11	221	363	269	408	313	140	66	67	185	5.131	3.357	12.205	4.132	315
200	0.09	209	351	257	389	292	135	66	67	174	4.793	3.442	12.499	4.043	300
210	0.09	201	344	245	370	276	132	66	67	163	4.642	3.388	12.650	3.952	287
220	0.11	203	328	238	352	260	129	66	67	161	4.889	3.637	12.333	3.837	276
230	0.12	197	319	234	336	248	128	66	67	157	4.763	3.501	12.605	3.722	267
240	0.06	190	306	229	320	240	125	66	67	152	4.522	3.274	12.960	3.658	257
250	0.09	190	297	222	307	230	124	65	67	149	4.533	3.285	12.967	3.567	255
260	0.09	184	286	218	294	221	121	66	67	144	4.274	3.108	13.352	3.478	254
270	0.05	170	278	211	283	214	119	65	67	137	3.960	2.864	13.806	3.431	252
280	0.07	167	268	204	274	207	117	65	66	132	3.941	2.860	13.835	3.366	251
290	0.07	143	250	201	266	199	120	65	66	128	4.093	2.991	13.798	3.296	249
300	0.07	137	238	200	260	188	120	65	66	125	3.972	3.036	13.904	3.226	247
310	0.06	133	232	200	253	177	117	65	66	120	3.866	2.994	12.969	3.169	245
320	0.08	129	223	203	245	165	114	65	66	116	3.860	2.999	13.035	3.089	244
330	0.04	128	216	206	236	162	109	64	66	112	3.836	2.995	13.148	3.049	189
340	0.04	133	207	203	228	152	104	64	65	108	3.806	2.990	13.269	3.009	185
350	0.07	134	201	202	219	147	102	64	65	107	3.776	2.986	13.413	2.943	181
360	0.07	130	194	196	212	144	101	64	65	104	3.746	2.977	13.556	2.877	175
370	0.04	121	187	191	207	136	104	64	65	103	3.709	2.972	13.692	2.834	169
380	0.09	120	181	187	203	133	105	63	65	103	3.679	2.968	13.829	2.745	165
390	0.14	122	175	181	201	132	107	63	64	104	3.642	2.959	13.972	2.609	162
400	0.18	128	173	178	204	130	113	63	64	108	3.613	2.954	14.100	2.430	163
410	0.11	137	174	183	208	136	112	63	64	107	3.576	2.945	14.236	2.318	168
420	0.11	137	174	183	211	136	115	63	64	109	3.546	2.936	14.372	2.206	168
430	0.11	136	175	182	212	137	118	63	64	111	3.510	2.927	14.477	2.095	168
440	0.14	140	180	176	214	140	120	63	64	116	3.479	2.913	14.609	1.957	170
450	0.13	141	196	171	219	139	123	63	64	119	3.449	2.905	14.726	1.823	173
460	0.09	142	211	168	222	137	123	63	64	122	3.420	2.886	14.849	1.735	176
470	0.11	143	219	165	225	138	123	63	64	124	3.389	2.877	14.947	1.622	178
480	0.14	142	226	163	229	138	124	63	64	125	3.365	2.864	15.067	1.486	180
490	0.13	144	233	161	233	139	124	63	64	127	3.335	2.846	15.165	1.351	182
500	0.11	144	238	161	237	139	124	63	63	128	3.305	2.828	15.264	1.237	184
510	0.09	140	240	158	238	137	121	62	63	125	3.274	2.814	15.362	1.147	183

520	0.09	138	241	157	238	136	119	62	63	122	3.250	2.792	15.460	1.055	182
530	0.09	136	240	154	238	135	117	62	63	119	3.226	2.778	15.559	0.963	181
540	0.09	134	236	153	236	133	116	62	63	117	3.196	2.760	15.634	0.869	179
550	0.09	133	232	151	234	130	114	62	63	115	3.171	2.742	15.725	0.778	176
560	0.09	132	229	148	234	129	114	62	63	115	3.141	2.719	15.801	0.688	174
570	0.11	131	227	146	232	125	113	62	63	115	3.123	2.701	15.899	0.574	172
580	0.06	130	227	143	229	122	112	62	63	113	3.099	2.678	15.975	0.510	170
590	0.05	126	223	140	227	122	109	62	63	109	3.069	2.656	16.050	0.464	168
600	0.07	122	214	136	226	120	106	62	63	105	3.045	2.638	16.133	0.399	164
610	0.05	118	204	131	222	114	103	62	63	101	3.027	2.615	16.209	0.352	158
620	0.05	116	198	127	218	114	102	62	63	99	3.002	2.597	16.277	0.306	155
630	0.05	115	189	123	213	112	100	62	63	97	2.978	2.579	16.345	0.259	150
640	0.04	117	181	119	205	110	100	62	63	97	2.960	2.556	16.414	0.216	146
650	0.04	115	173	116	198	108	99	62	63	96	2.936	2.533	16.481	0.173	142
660	0.04	116	167	113	191	108	99	62	63	96	2.912	2.511	16.541	0.128	139
670	0.07	112	161	110	185	105	97	62	63	95	2.894	2.489	16.594	0.057	135

<b>Product:</b>	38SFC	<b>Test Duration:</b>	538	<b>LHV:</b>	N/A
<b>Manufacturer:</b>	Foyers Suprême Inc.	<b>Emission Rate [g/hr]:</b>	2.1478	<b>HHV:</b>	N/A
<b>Test:</b>	38SFC180213	<b>Burn Rate [dry kg/hr]:</b>	1.0358		
<b>Date:</b>	2018-02-13	<b>Category:</b>	2		

Load Configuration							
	W (in)	H (in)	L (in)	Humidity (%)	Spacers	Weight (lb)	Species
1	3.5	3.5	22	20	4	5.2	BC Fir
2	3.5	3.5	22	20	4	5.1	BC Fir
3	3.5	3.5	22	19	4	5.1	BC Fir
4	3.5	3.5	22	19	4	5.1	BC Fir
5	3.5	3.5	22	19	4	5.0	BC Fir

25.5

ET [min]	BR	FB Temp. [°F]		DGM Temp. [°F]				Filt. 1 Temp. [°F]	Flue Gas Temp. [°F]	Amb. Room Temp. [°F]	Gas Analyzer [%]			Weight [lbs]	Avg. FB Temp. [°F]
		Top	Bot.	Back	RH	LH	BM				1_IN	1_OUT	CO <sub>2</sub>		
0	0.00	176	410	230	358	270	127	63	64					25.500	289
10	1.44	627	396	239	330	256	212	63	64					24.062	370
20	2.42	534	421	261	360	283	283	64	64					21.647	372
30	2.44	659	429	278	399	324	321	64	65					19.212	418
40	2.39	695	432	316	426	365	344	65	65					16.825	447
50	2.16	618	433	341	455	373	312	65	65					14.667	444
60	1.73	570	425	349	482	386	287	65	66					12.940	442
70	1.57	569	414	355	495	345	279	65	66					11.374	435
80	1.43	565	407	351	511	395	277	65	66					9.941	446
90	1.27	539	402	351	522	394	273	65	66					8.673	442
100	1.13	516	399	355	531	385	265	65	66					7.541	438
110	0.75	409	394	351	524	377	219	65	66					6.788	411
120	0.54	341	387	345	508	406	204	65	66					6.246	397
130	0.50	283	369	339	490	387	182	65	66					5.745	373
140	0.38	241	360	333	473	363	165	65	66					5.361	354
150	0.20	220	350	321	456	347	155	65	66					5.159	339
160	0.15	201	331	306	439	322	149	65	66					5.006	320
170	0.09	198	327	290	416	301	142	65	65					4.916	306

180	0.11	202	319	275	396	292	135	65	65	161	4.805	3.488	12.333	4.803	297
190	0.09	205	309	257	379	279	132	65	65	156	5.089	3.601	12.029	4.715	286
200	0.11	200	303	241	366	267	129	66	65	152	5.155	3.650	11.953	4.602	275
210	0.09	176	299	229	353	256	135	66	66	144	5.348	2.851	12.187	4.513	263
220	0.09	170	293	217	338	242	132	66	66	136	4.533	3.279	12.786	4.424	252
230	0.07	166	287	205	323	234	128	66	66	130	4.418	3.176	13.005	4.355	243
240	0.05	156	287	196	308	226	127	66	66	125	4.322	3.081	13.164	4.308	235
250	0.09	153	278	187	295	220	124	66	66	121	4.291	3.036	13.284	4.219	232
260	0.05	155	273	180	283	211	121	66	66	117	4.189	2.986	13.472	4.170	231
270	0.09	169	267	173	275	209	116	66	66	117	4.763	3.390	12.884	4.082	229
280	0.12	167	262	169	269	202	114	65	66	117	4.696	3.343	12.932	3.965	228
290	0.08	148	258	165	264	199	118	65	66	115	4.750	3.000	13.081	3.881	227
300	0.07	144	251	160	257	192	117	65	66	112	4.431	3.219	13.363	3.816	225
310	0.06	149	250	156	249	189	114	65	66	109	4.204	3.064	12.543	3.759	223
320	0.09	158	245	152	243	184	111	65	65	110	4.223	3.067	12.536	3.671	222
330	0.07	160	240	149	237	179	109	64	65	111	4.211	3.058	12.642	3.605	193
340	0.11	165	238	148	233	176	109	64	65	116	4.193	3.058	12.747	3.494	192
350	0.09	148	234	147	231	171	108	64	65	114	4.175	3.054	12.876	3.404	186
360	0.09	158	229	145	228	166	106	63	64	116	4.139	3.049	13.027	3.315	185
370	0.09	161	228	143	227	167	107	63	64	116	4.097	3.044	13.171	3.226	185
380	0.06	157	230	142	226	165	105	63	64	115	4.054	3.040	13.321	3.161	184
390	0.09	153	227	139	223	159	103	63	64	114	4.012	3.040	13.481	3.071	180
400	0.12	155	224	138	221	158	104	63	64	113	3.970	3.036	13.617	2.956	179
410	0.07	153	225	137	220	154	103	63	64	114	3.928	3.027	13.768	2.887	178
420	0.07	132	223	135	217	150	105	63	64	110	3.885	3.022	13.919	2.819	171
430	0.07	125	218	134	214	146	109	62	63	109	3.837	3.013	14.048	2.753	167
440	0.07	122	214	133	211	142	106	62	63	107	3.795	2.999	14.183	2.685	164
450	0.05	116	204	134	210	135	104	62	63	104	3.759	2.995	14.320	2.638	160
460	0.07	113	194	136	210	133	101	62	63	101	3.716	2.977	14.439	2.570	157
470	0.09	114	184	140	213	128	102	62	63	98	3.674	2.968	14.562	2.481	156
480	0.09	115	174	144	217	125	104	62	63	97	3.637	2.954	14.675	2.392	155
490	0.09	117	166	146	226	123	106	62	63	98	3.601	2.941	14.804	2.302	156
500	0.07	120	159	147	233	121	107	62	63	99	3.565	2.923	14.917	2.231	156
510	0.09	123	155	147	234	123	109	62	63	101	3.528	2.909	15.013	2.145	156

520	0.11	126	153	144	236	124	112	62	63	103	3.498	2.891	15.128	2.031	157
530	0.07	126	153	141	239	124	112	62	63	105	3.462	2.873	15.226	1.962	157



<b>Product:</b>	38SFC	<b>Test Duration:</b>	460	<b>LHV:</b>	N/A
<b>Manufacturer:</b>	Foyers Suprême Inc.	<b>Emission Rate [g/hr]:</b>	5.31	<b>HHV:</b>	N/A
<b>Test:</b>	38SFC180215	<b>Burn Rate [dry kg/hr]:</b>	1.2383		
<b>Date:</b>	2018-02-15	<b>Category:</b>	2		

Load Configuration							
	W (in)	H (in)	L (in)	Humidity (%)	Spacers	Weight (lb)	Species
1	3.5	3.5	22	19	4	5.0	BC Fir
2	3.5	3.5	22	22	4	5.4	BC Fir
3	3.5	3.5	22	20	4	5.2	BC Fir
4	3.5	3.5	22	20	4	5.2	BC Fir
5	3.5	3.5	22	20	4	5.2	BC Fir

26.0

ET [min]	BR	FB Temp. [°F]						DGM Temp. [°F]		Filt. 1 Temp. [°F]	Flue Gas Temp. [°F]	Amb. Room Temp. [°F]	Gas Analyzer [%]			Weight [lbs]	Avg. FB Temp. [°F]
		Top	Bot.	Back	RH	LH	BM	1_IN	1_OUT				CO <sub>2</sub>	CO	O <sub>2</sub>		
0	0.00	169	429	244	383	253	137	65	66		170		3.675	1.761	14.962	26.000	296
10	1.35	362	#####	223	345	252	173	66	66		394		7.756	0.693	12.252	24.645	
20	2.01	400	#####	225	337	238	220	66	66		432		6.823	0.985	12.840	22.631	
30	1.16	367	409	231	324	238	183	66	66		379		7.302	1.164	12.439	21.473	314
40	1.62	518	407	241	319	279	207	67	67		451		10.199	0.825	9.771	19.857	353
50	2.11	573	400	264	345	307	326	67	67		563		14.187	0.527	5.924	17.743	378
60	1.99	572	#####	286	370	324	295	67	67		534		13.843	0.451	6.365	15.749	
70	1.59	581	385	303	394	344	298	68	68		537		13.619	0.266	6.674	14.158	401
80	1.49	603	377	317	420	378	310	68	68		548		14.674	0.268	5.704	12.668	419
90	1.62	627	#####	335	447	404	321	68	68		565		14.772	0.276	5.572	11.047	
100	1.93	632	382	362	479	427	328	68	69		582		15.441	0.361	4.725	9.113	456
110	1.52	624	394	395	510	438	324	68	69		582		15.262	0.454	4.726	7.595	
120	1.11	568	#####	418	538	395	312	69	69		547		13.157	0.394	6.378	6.483	
130	0.94	473	#####	397	554	405	279	69	69		470		10.607	0.932	8.536	5.540	
140	0.42	356	#####	372	546	431	213	68	69		372		8.776	1.744	9.988	5.120	
150	0.29	301	#####	346	526	416	195	68	69		308		8.278	1.936	10.016	4.834	
160	0.43	267	431	327	506	398	197	68	69		276		8.377	2.029	9.820	4.401	56.696
170	0.18	262	#####	309	488	380	186	68	69		248		7.730	2.233	10.203	4.220	

180	-0.01	229	424	292	470	366	178	68	69	225	7.379	2.488	10.454	4.232	356
190	0.18	218	#####	276	450	344	174	68	69	211	7.364	2.700	10.430	4.056	
200	0.29	210	406	263	432	336	169	68	69	200	7.118	2.737	10.693	3.765	330
210	0.23	202	395	251	416	322	167	68	69	192	7.014	2.934	10.709	3.535	317
220	-0.15	198	386	244	403	307	167	68	69	187	7.042	2.991	10.706	3.682	308
230	0.30	196	381	236	391	299	167	68	68	185	6.879	3.258	10.716	3.384	301
240	0.00	190	375	229	379	287	162	68	68	181	6.765	3.203	10.888	3.386	292
250	0.14	186	371	222	368	281	159	68	68	178	6.433	3.438	11.053	3.249	290
260	0.21	198	#####	220	358	273	161	68	68	179	8.138	2.738	10.121	3.034	289
270	0.12	203	372	218	350	270	162	68	68	180	7.747	2.679	10.351	2.911	288
280	0.14	200	374	217	344	267	159	68	68	174	7.471	2.950	10.518	2.772	287
290	0.18	201	371	213	337	263	157	68	68	169	8.092	2.272	10.338	2.591	286
300	0.14	197	373	210	332	259	158	68	69	170	7.797	2.371	10.525	2.456	284
310	0.16	195	361	208	328	251	156	68	69	170	7.267	2.673	9.699	2.299	284
320	0.17	202	361	202	322	246	149	67	68	175	7.250	2.673	9.776	2.126	284
330	0.17	199	359	200	319	248	149	67	68	172	7.214	2.670	9.920	1.952	265
340	0.13	194	356	199	315	244	148	67	68	171	7.148	2.669	10.124	1.821	262
350	0.22	194	360	199	314	239	163	66	67	180	7.064	2.665	10.343	1.604	261
360	0.18	191	361	202	314	241	162	66	67	182	6.979	2.660	10.585	1.425	262
370	0.18	188	363	202	315	240	159	66	67	183	6.883	2.646	10.826	1.248	261
380	0.16	183	364	202	314	239	155	66	67	179	6.792	2.642	11.068	1.090	260
390	0.16	177	357	199	311	235	149	66	67	171	6.702	2.633	11.302	0.931	256
400	0.11	180	350	196	307	229	142	65	66	161	6.612	2.628	11.544	0.818	252
410	0.13	174	348	192	304	221	141	65	66	158	6.521	2.619	11.756	0.684	248
420	0.14	170	341	187	300	214	140	65	66	154	6.437	2.610	11.967	0.546	242
430	0.13	165	333	182	295	209	138	65	66	152	6.340	2.601	12.179	0.416	237
440	0.14	168	328	177	291	201	141	65	66	158	6.262	2.592	12.377	0.280	233
450	0.16	172	335	176	287	192	145	65	66	163	6.184	2.579	12.566	0.121	232
460	0.09	164	331	172	284	188	139	65	66	159	6.112	2.570	12.740	0.030	228

<b>Product:</b>	38SFC	<b>Test Duration:</b>	740	<b>LHV:</b>	N/A
<b>Manufacturer:</b>	Foyers Suprême Inc.	<b>Emission Rate [g/hr]:</b>	1.2674	<b>HHV:</b>	N/A
<b>Test:</b>	38SFC180216	<b>Burn Rate [dry kg/hr]:</b>	0.794		
<b>Date:</b>	2018-02-16	<b>Category:</b>	1		

Load Configuration							
	W (in)	H (in)	L (in)	Humidity (%)	Spacers	Weight (lb)	Species
1	3.5	3.5	22	21	4	5.2	BC Fir
2	3.5	3.5	22	22	4	5.4	BC Fir
3	3.5	3.5	22	22	4	5.5	BC Fir
4	3.5	3.5	22	22	4	5.4	BC Fir
5	3.5	3.5	22	22	4	5.4	BC Fir

26.9

ET [min]	BR	FB Temp. [°F]		DGM Temp. [°F]				Filt. 1 Temp. [°F]	Flue Gas Temp. [°F]	Amb. Room Temp. [°F]	Gas Analyzer [%]			Weight [lbs]	Avg. FB Temp. [°F]		
		Top	Bot.	Back	RH	LH	BM				1_IN	1_OUT	CO <sub>2</sub>			CO	O <sub>2</sub>
0	0.00	172	506	267	413	310	141	66	66				2.909	1.892	15.634	26.900	334
10	1.82	645	473	251	371	287	238	66	67				12.715	0.820	6.954	25.081	405
20	1.56	511	459	258	367	289	281	67	67				10.031	1.146	9.590	23.522	377
30	1.84	600	455	273	376	308	302	67	67				12.757	0.901	6.765	21.678	402
40	1.95	671	437	293	393	333	334	68	68				14.956	0.575	4.868	19.725	426
50	2.10	703	431	318	418	353	359	68	68				15.596	0.448	4.466	17.628	444
60	2.07	705	425	340	443	381	366	69	69				15.681	0.448	4.421	15.559	459
70	2.00	707	421	363	466	408	363	69	69				15.961	0.471	4.111	13.563	473
80	1.84	668	423	381	491	436	349	69	70				15.271	0.439	4.747	11.723	480
90	1.70	672	427	408	518	443	346	69	70				15.298	0.473	4.678	10.019	494
100	1.51	622	428	436	539	460	341	69	70				14.461	0.379	5.403	8.510	497
110	1.21	566	#####	459	558	477	307	69	70				13.614	0.253	6.076	7.302	25
120	0.88	505	429	468	569	488	283	69	70				11.355	0.453	8.123	6.419	492
130	0.48	370	418	423	559	476	219	69	70				7.155	1.833	11.386	5.942	449
140	0.31	313	411	416	532	448	181	68	70				6.530	2.453	11.620	5.627	424
150	0.25	275	403	402	501	419	167	68	70				5.909	2.670	11.960	5.379	400
160	0.27	251	#####	367	475	386	158	68	69				4.994	3.135	12.268	5.112	63
170	0.00	236	#####	336	449	364	148	67	69				4.981	2.918	12.398	5.108	64

180	0.09	221	362	314	426	340	142	67	69	190	4.720	2.973	12.619	5.022	333
190	0.07	211	353	294	406	323	137	67	69	176	4.587	2.905	12.778	4.953	317
200	0.08	195	338	279	388	302	136	67	68	164	4.569	2.873	12.952	4.870	300
210	0.08	175	322	261	371	283	136	66	68	156	4.744	2.887	12.793	4.788	282
220	0.06	188	312	245	357	268	130	66	68	152	4.575	2.719	13.141	4.728	274
230	0.06	170	303	230	344	255	128	66	68	146	4.352	2.778	13.322	4.665	260
240	0.06	159	295	216	330	245	129	66	67	141	4.353	2.655	12.330	4.607	249
250	0.02	154	290	206	317	234	126	66	67	134	4.366	2.650	12.376	4.583	249
260	0.04	147	281	198	306	223	123	66	67	129	4.367	2.646	12.467	4.539	245
270	0.04	143	268	188	296	212	120	66	67	125	4.355	2.641	12.595	4.494	243
280	0.04	140	255	183	288	201	119	66	67	123	4.324	2.632	12.728	4.452	242
290	0.07	138	246	178	283	196	119	65	67	121	4.288	2.632	12.890	4.384	240
300	0.07	137	236	174	278	190	118	65	67	120	4.252	2.628	13.041	4.317	238
310	0.07	143	225	170	271	184	113	65	67	116	4.210	2.619	13.192	4.248	236
320	0.05	149	217	167	263	182	108	65	66	114	4.168	2.619	13.350	4.202	235
330	0.08	148	213	162	256	179	106	65	66	114	4.120	2.610	13.510	4.120	191
340	0.07	128	207	156	251	174	107	65	66	109	4.084	2.606	13.661	4.049	183
350	0.07	127	202	154	251	168	109	65	66	108	4.042	2.597	13.805	3.980	180
360	0.09	126	197	154	252	165	110	65	66	107	4.005	2.588	13.948	3.890	179
370	0.07	126	191	151	251	159	110	65	66	106	3.963	2.579	14.091	3.820	176
380	0.07	124	186	150	247	154	109	65	66	106	3.927	2.570	14.220	3.753	172
390	0.07	123	181	150	241	151	108	65	66	105	3.885	2.556	14.349	3.686	169
400	0.07	121	176	149	237	148	105	65	66	103	3.848	2.542	14.478	3.617	166
410	0.09	119	171	150	233	145	105	65	66	100	3.812	2.529	14.599	3.526	164
420	0.07	118	166	148	230	139	104	65	65	100	3.776	2.516	14.712	3.459	161
430	0.07	118	162	151	229	138	106	64	65	100	3.740	2.497	14.833	3.389	159
440	0.09	120	158	151	225	136	106	64	65	100	3.703	2.484	14.946	3.299	158
450	0.11	123	155	155	220	135	109	64	65	102	3.667	2.466	15.059	3.185	158
460	0.11	122	154	156	220	135	109	64	65	103	3.631	2.448	15.157	3.075	157
470	0.12	124	154	159	220	135	111	64	65	105	3.600	2.430	15.249	2.960	158
480	0.12	129	155	168	221	136	114	64	65	108	3.570	2.412	15.361	2.844	162
490	0.16	133	158	181	223	136	118	64	65	112	3.534	2.393	15.445	2.686	166
500	0.14	135	163	196	223	139	119	64	65	113	3.504	2.375	15.539	2.550	171
510	0.14	137	168	204	223	142	120	64	65	115	3.478	2.353	15.634	2.414	175

520	0.14	139	175	204	224	144	120	64	65	117	3.450	2.339	15.725	2.278	177
530	0.13	142	181	197	225	147	122	64	65	118	3.419	2.317	15.800	2.144	179
540	0.14	145	187	192	227	149	125	64	65	123	3.395	2.299	15.890	2.007	180
550	0.11	148	192	188	234	151	126	64	65	127	3.365	2.280	15.981	1.894	183
560	0.13	151	197	185	242	153	129	64	65	131	3.335	2.258	16.057	1.759	185
570	0.13	148	201	178	249	155	127	64	65	132	3.310	2.240	16.125	1.625	186
580	0.09	147	203	173	251	161	123	64	65	128	3.286	2.222	16.193	1.533	187
590	0.11	144	201	169	252	163	121	64	65	126	3.256	2.199	16.276	1.420	186
600	0.11	141	201	166	253	164	119	64	64	124	3.232	2.181	16.344	1.307	185
610	0.09	147	200	163	248	166	113	64	64	120	3.202	2.159	16.412	1.216	185
620	0.11	157	199	160	239	168	108	64	64	118	3.178	2.140	16.465	1.102	185
630	0.09	158	197	158	231	171	106	64	64	118	3.154	2.118	16.533	1.011	183
640	0.09	155	195	157	224	170	105	64	64	117	3.129	2.100	16.594	0.918	180
650	0.12	159	192	156	218	170	104	64	64	118	3.105	2.082	16.692	0.802	179
660	0.09	157	192	152	212	167	104	63	64	120	3.081	2.059	16.730	0.712	176
670	0.11	158	191	151	207	167	103	63	64	119	3.057	2.041	16.782	0.599	175
680	0.09	157	190	150	203	169	103	63	64	120	3.033	2.019	16.836	0.512	174
690	0.11	158	188	149	201	174	103	63	64	120	3.009	2.005	16.889	0.399	174
700	0.09	153	185	148	197	181	102	63	64	118	2.990	1.982	16.947	0.308	173
710	0.07	145	183	144	193	180	100	63	64	117	2.966	1.964	17.009	0.240	169
720	0.09	148	181	144	189	179	99	63	64	115	2.942	1.942	17.039	0.150	168
730	0.09	145	181	143	185	174	100	63	64	113	2.924	1.924	17.088	0.057	166
740	0.02	144	181	146	181	169	98	63	64	112	2.900	1.906	17.153	0.034	164



<b>Product:</b>	38SFC	<b>Test Duration:</b>	530	<b>LHV:</b>	N/A
<b>Manufacturer</b>	Foyers Suprême Inc.	<b>Emission Rate [g/hr]:</b>	1.782	<b>HHV:</b>	N/A
<b>Test:</b>	32SFC180219	<b>Burn Rate [dry kg/hr]:</b>	1.0982		
<b>Date:</b>	2018-02-19	<b>Category:</b>	2		

Load Configuration							
	W (in)	H (in)	L (in)	Humidity (%)	Spacers	Weight (lb)	Species
1	3.5	3.5	22	22	4	5.4	BC Fir
2	3.5	3.5	22	21	4	5.3	BC Fir
3	3.5	3.5	22	21	4	5.1	BC Fir
4	3.5	3.5	22	23	4	5.5	BC Fir
5	3.5	3.5	22	22	4	5.5	BC Fir

26.8

ET [min]	BR	FB Temp. [°F]			DGM Temp. [°F]			Filt. 1 Temp. [°F]	Flue Gas Temp. [°F]	Amb. Room Temp. [°F]	Gas Analyzer [%]			Weight [lbs]	Avg. FB Temp. [°F]		
		Top	Bot.	Back	RH	LH	BM				1_IN	1_OUT	CO <sub>2</sub>			CO	O <sub>2</sub>
0	0.00	189	418	235	372	233	129	61	62				4.347	1.902	14.215	26.800	289
10	1.41	504	396	218	342	237	197	62	62				9.564	0.670	10.614	25.389	340
20	2.43	642	412	242	356	243	318	63	62				13.331	0.503	6.758	22.962	379
30	2.07	649	421	260	374	246	309	63	63				14.130	0.607	6.032	20.892	390
40	2.30	710	416	287	405	308	339	64	64				15.920	0.489	4.433	18.593	425
50	2.32	710	414	323	435	352	358	64	64				16.377	0.507	3.968	16.273	447
60	2.16	690	414	359	471	373	353	65	65				16.028	0.444	4.240	14.114	462
70	1.86	636	417	390	511	404	331	65	65				14.848	0.417	5.360	12.254	471
80	1.66	623	420	411	538	410	318	65	66				15.041	0.344	5.178	10.596	481
90	1.52	622	424	432	561	402	318	65	66				14.986	0.362	5.111	9.071	488
100	1.33	604	428	442	581	433	309	66	66				14.261	0.394	5.730	7.739	498
110	1.21	592	424	435	593	463	296	66	66				13.355	0.326	6.665	6.533	502
120	0.86	467	430	414	596	461	260	66	67				9.895	1.147	9.355	5.671	473
130	0.45	312	431	382	573	441	212	66	67				7.730	1.964	10.873	5.217	428
140	0.34	259	429	359	544	404	198	66	67				6.710	2.466	11.434	4.879	399
150	0.18	233	425	336	515	371	182	66	67				6.059	2.792	11.598	4.697	376
160	0.13	219	412	316	487	347	170	66	67				5.414	3.280	11.893	4.564	356
170	0.11	208	400	298	461	321	164	66	66				5.173	3.352	12.120	4.450	338

180	0.11	195	387	283	437	295	155	66	66	191	4.761	3.447	12.484	4.339	320
190	0.09	187	366	270	415	280	150	66	66	178	4.720	3.406	12.575	4.249	304
200	0.07	185	357	257	394	266	148	66	66	170	5.003	3.673	12.278	4.180	292
210	0.11	181	346	245	376	251	146	66	66	165	4.967	3.695	12.293	4.072	280
220	0.11	178	335	235	360	239	144	66	66	163	4.931	3.704	12.356	3.957	269
230	0.09	175	325	225	348	221	142	66	66	160	4.835	3.641	12.499	3.866	259
240	0.12	171	317	216	337	222	140	66	66	157	4.684	3.510	12.763	3.750	252
250	0.09	164	307	206	325	215	136	66	66	153	4.696	3.524	12.930	3.662	251
260	0.12	157	301	198	312	214	134	66	66	147	5.523	2.665	12.598	3.547	249
270	0.09	156	299	193	301	208	133	66	66	145	5.505	2.683	12.567	3.457	248
280	0.12	192	301	187	293	205	123	66	66	145	5.650	2.923	12.356	3.339	245
290	0.11	185	299	183	286	189	120	66	66	144	4.823	2.754	13.277	3.226	243
300	0.09	156	296	179	280	182	124	66	66	138	4.956	3.040	13.032	3.134	243
310	0.11	177	285	175	273	177	116	65	66	135	5.291	2.637	11.930	3.028	241
320	0.11	173	282	171	266	176	114	64	65	134	5.279	2.633	11.999	2.921	239
330	0.08	151	273	168	261	173	120	64	65	131	5.262	2.633	12.135	2.838	206
340	0.08	152	265	164	259	163	124	63	64	131	5.225	2.633	12.301	2.753	201
350	0.08	149	262	162	257	159	122	63	64	129	5.171	2.629	12.454	2.670	198
360	0.07	148	257	158	256	154	121	63	64	128	5.117	2.624	12.628	2.603	194
370	0.15	141	255	153	252	146	117	62	63	125	5.051	2.620	12.794	2.449	190
380	0.20	181	266	154	245	150	113	62	63	127	4.991	2.615	12.975	2.248	199
390	0.15	181	280	156	241	159	116	62	63	131	4.930	2.611	13.141	2.094	203
400	0.14	181	296	158	239	166	116	62	63	131	4.869	2.606	13.300	1.956	208
410	0.13	183	307	160	239	157	118	62	63	133	4.810	2.602	13.466	1.822	209
420	0.11	182	314	161	239	153	117	62	63	132	4.750	2.593	13.617	1.712	210
430	0.11	180	318	161	237	165	116	62	63	132	4.695	2.583	13.776	1.600	212
440	0.14	179	317	161	236	161	116	62	62	131	4.635	2.574	13.904	1.461	211
450	0.16	199	310	161	234	161	117	62	62	140	4.575	2.565	14.048	1.305	213
460	0.18	210	307	163	234	157	124	62	62	151	4.526	2.556	14.199	1.122	214
470	0.16	177	308	165	242	154	136	61	62	152	4.471	2.547	14.328	0.964	209
480	0.18	190	308	168	250	163	130	61	62	150	4.423	2.533	14.456	0.780	216
490	0.16	201	307	168	256	167	125	61	62	153	4.375	2.520	14.577	0.620	220
500	0.18	194	304	168	259	157	125	61	62	152	4.326	2.506	14.683	0.441	216
510	0.13	171	301	167	260	163	120	61	62	142	4.284	2.493	14.804	0.307	213

520	0.14	160	301	165	258	160	126	61	62	142	4.236	2.475	14.909	0.169	209
530	0.14	161	306	165	259	159	135	61	62	151	4.193	2.461	15.015	0.032	210

<b>Product:</b>	38SFC	<b>Test Duration:</b>	380	<b>LHV:</b>	N/A
<b>Manufacturer:</b>	Foyers Suprême Inc.	<b>Emission Rate [g/hr]:</b>	5.5595	<b>HHV:</b>	N/A
<b>Test:</b>	38SFC180228_A	<b>Burn Rate [dry kg/hr]:</b>	1.3237		
<b>Date:</b>	2018-02-28	<b>Category:</b>	3		

Load Configuration							
	W (in)	H (in)	L (in)	Humidity (%)	Spacers	Weight (lb)	Species
1	3.5	3.5	22	19	4	4.4	BC Fir
2	3.5	3.5	22	19	4	4.5	BC Fir
3	3.5	3.5	22	20	4	4.7	BC Fir
4	3.5	3.5	22	20	4	4.8	BC Fir
5	3.5	3.5	22	19	4	4.6	BC Fir

23.0

ET [min]	BR	FB Temp. [°F]			DGM Temp. [°F]			Filt. 1 Temp. [°F]	Flue Gas Temp. [°F]	Amb. Room Temp. [°F]	Gas Analyzer [%]			Weight [lbs]	Avg. FB Temp. [°F]
		Top	Bot.	Back	RH	LH	BM				1_IN	1_OUT	CO <sub>2</sub>		
0	0.00	255	471	345	531	341	156	68	70					23.000	389
10	1.43	318	444	271	432	297	158	68	69					21.571	352
20	2.13	435	418	254	412	263	238	68	69					19.440	357
30	2.20	565	407	254	440	297	269	68	69					17.240	393
40	1.95	517	402	254	465	316	255	69	70					15.295	391
50	1.86	547	381	257	486	321	258	69	70					13.433	399
60	1.86	559	375	266	505	332	263	69	70					11.577	408
70	1.68	540	384	279	522	357	266	69	70					9.899	416
80	1.34	451	371	287	528	316	232	69	70					8.559	391
90	1.13	417	363	294	534	305	221	69	70					7.428	383
100	1.04	428	370	302	533	329	213	69	70					6.386	393
110	0.89	438	368	300	522	327	198	69	70					5.501	391
120	0.79	394	374	294	517	329	187	69	70					4.710	382
130	0.52	316	383	284	505	332	180	69	70					4.189	364
140	0.41	281	383	277	490	351	166	69	69					3.781	357
150	0.27	242	383	271	470	329	156	68	69					3.509	339
160	0.23	223	380	263	444	320	148	68	69					3.281	326
170	0.18	209	384	257	425	303	144	68	69					3.103	316

180	0.21	201	391	251	410	288	141	67	69	241	5.572	1.995	11.904	2.896	308
190	0.20	198	399	245	398	273	138	67	69	233	5.584	2.000	11.958	2.700	303
200	0.16	195	414	239	386	259	135	67	68	225	5.603	1.990	12.057	2.543	299
210	0.13	178	408	233	373	245	132	67	68	217	5.602	1.986	12.208	2.412	287
220	0.16	172	396	230	363	235	129	67	68	210	5.596	1.981	12.339	2.255	279
230	0.13	167	389	226	356	225	128	66	68	205	5.591	1.977	12.482	2.123	273
240	0.13	167	372	227	347	213	126	66	67	201	5.579	1.972	12.633	1.991	265
250	0.14	161	359	221	339	207	122	66	67	193	5.567	1.968	12.776	1.853	263
260	0.15	158	355	219	326	203	121	66	67	189	5.543	1.963	12.935	1.700	262
270	0.16	155	346	218	316	196	119	66	67	184	5.507	1.963	13.071	1.542	260
280	0.14	152	335	215	308	190	117	66	67	181	5.471	1.959	13.215	1.406	258
290	0.16	159	328	221	302	186	115	65	66	177	5.452	1.954	13.356	1.247	258
300	0.14	156	319	228	301	185	114	65	66	175	5.440	1.950	13.502	1.111	257
310	0.14	150	312	221	295	177	112	65	66	172	5.417	1.945	13.630	0.976	256
320	0.21	152	303	211	294	175	116	65	66	177	5.392	1.941	13.759	0.768	255
330	0.16	153	296	206	295	174	116	65	66	179	5.356	1.936	13.872	0.611	225
340	0.13	152	292	203	294	175	115	65	66	178	5.338	1.927	14.000	0.477	223
350	0.16	150	287	200	290	172	113	65	66	175	5.326	1.923	14.121	0.319	220
360	0.11	147	281	197	286	171	112	65	66	173	5.301	1.918	14.227	0.205	216
370	0.11	142	279	191	279	168	109	65	66	167	5.266	1.909	14.333	0.092	212
380	0.07	139	274	185	273	166	108	65	66	163	5.218	1.905	14.432	0.023	207



<b>Product:</b>	38SFC	<b>Test Duration:</b>	338	<b>LHV:</b>	N/A
<b>Manufacturer</b>	Foyers Suprême Inc.	<b>Emission Rate [g/hr]:</b>	1.661	<b>HHV:</b>	N/A
<b>Test:</b>	38SFC180302	<b>Burn Rate [dry kg/hr]:</b>	1.6516		
<b>Date:</b>	2018-03-02	<b>Category:</b>	3		

Load Configuration							
	W (in)	H (in)	L (in)	Humidity (%)	Spacers	Weight (lb)	Species
1	3.5	3.5	22	20	4	5.1	BC Fir
2	3.5	3.5	22	21	4	5.3	BC Fir
3	3.5	3.5	22	22	4	5.3	BC Fir
4	3.5	3.5	22	21	4	5.1	BC Fir
5	3.5	3.5	22	20	4	5.0	BC Fir

25.8

ET [min]	BR	FB Temp. [°F]			DGM Temp. [°F]			Filt. 1 Temp. [°F]	Flue Gas Temp. [°F]	Amb. Room Temp. [°F]	Gas Analyzer [%]			Weight [lbs]	Avg. FB Temp. [°F]
		Top	Bot.	Back	RH	LH	BM				1_IN	1_OUT	CO <sub>2</sub>		
0	0.00	313	424	313	493	383	170	66	67					25.750	385
10	1.85	565	411	274	431	334	224	67	67					23.898	403
20	2.29	609	406	259	431	335	281	67	67					21.607	408
30	2.20	615	400	265	445	356	300	68	68					19.403	416
40	1.91	542	398	265	453	376	275	68	68					17.498	407
50	2.06	617	386	274	474	383	288	68	68					15.437	427
60	1.88	582	386	287	499	403	277	69	69					13.556	432
70	1.79	579	377	296	525	411	278	69	69					11.767	437
80	1.68	560	370	305	551	421	272	69	69					10.087	442
90	1.56	555	372	321	575	415	271	69	70					8.522	448
100	1.40	551	370	339	592	429	265	69	70					7.123	456
110	1.25	504	374	367	606	450	246	69	70					5.874	460
120	0.91	435	379	388	608	428	221	69	70					4.969	447
130	0.70	403	386	399	601	447	205	69	70					4.269	447
140	0.57	386	392	407	595	432	200	69	70					3.699	442
150	0.45	342	389	427	593	415	186	69	70					3.246	433
160	0.36	320	388	447	592	407	176	69	70					2.885	431
170	0.34	308	392	446	578	423	169	68	70					2.542	429

180	0.25	289	409	410	539	398	160	68	70	325	5.757	1.516	13.003	2.296	409
190	0.22	273	444	379	507	381	155	68	69	310	5.522	1.471	13.433	2.073	397
200	0.23	262	475	355	477	360	152	68	69	297	5.298	1.561	13.705	1.845	386
210	0.18	253	480	328	450	346	146	68	69	281	5.021	1.498	14.045	1.668	371
220	0.20	242	494	308	430	327	143	68	69	271	4.743	1.435	14.377	1.463	360
230	0.20	225	483	294	409	310	137	67	69	259	4.133	1.607	14.960	1.264	344
240	0.15	215	471	280	391	284	132	67	69	247	3.976	1.688	15.088	1.114	328
250	0.15	216	459	272	374	273	130	67	68	238	4.079	1.516	15.141	0.960	326
260	0.16	210	451	267	358	258	126	67	68	231	3.946	1.557	15.247	0.803	324
270	0.16	200	440	258	345	250	124	67	68	225	3.546	1.720	15.534	0.645	322
280	0.09	188	435	249	331	225	120	67	68	215	3.027	1.724	16.078	0.559	320
290	0.13	185	413	241	318	215	117	67	68	207	2.984	1.851	16.101	0.426	319
300	0.13	175	394	244	307	206	115	67	68	201	2.966	1.982	16.086	0.292	316
310	0.11	174	374	243	297	196	114	66	68	197	2.967	1.986	16.085	0.181	315
320	0.14	171	354	241	290	190	112	66	67	194	2.888	2.036	16.192	0.044	312
330	0.02	166	332	239	283	186	111	66	67	189	2.834	1.964	16.267	0.020	241

## APPENDIX 5: Participants

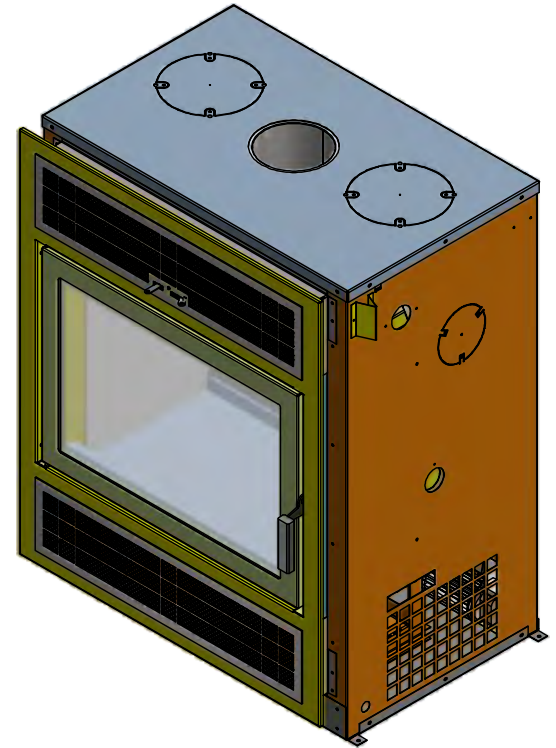
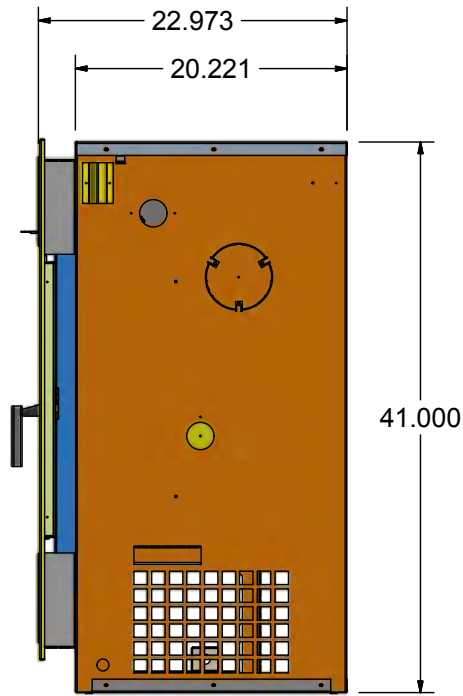
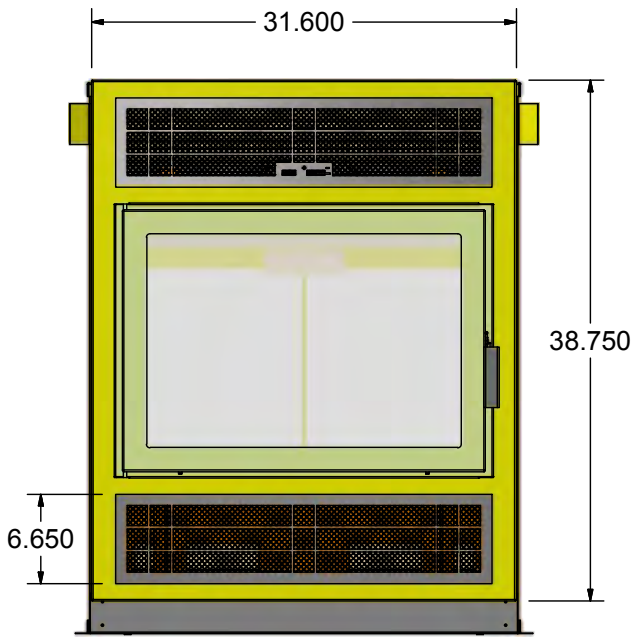
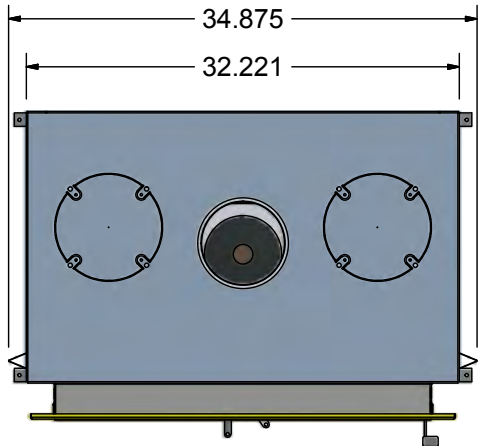
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v-p operation  
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450.741.3636  
[www.polytests.com](http://www.polytests.com)

**Maxime Martin**  
Technicien  
**Services Polytests inc.**  
450.741.3636  
[www.polytests.com](http://www.polytests.com)

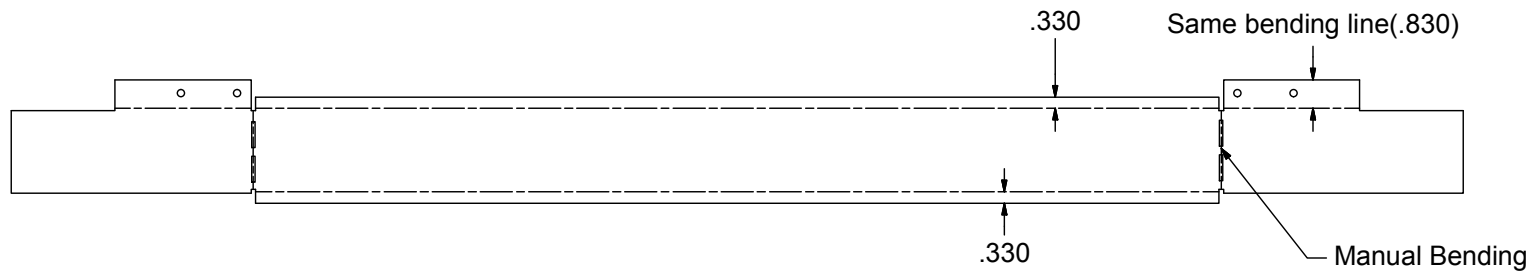
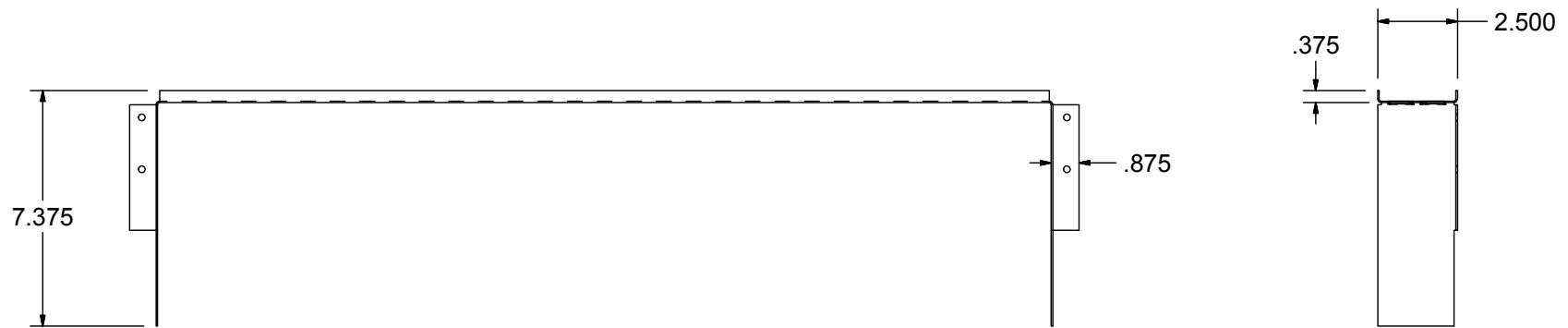
**Alexandre Markakis**  
Foyer Supreme

## APPENDIX 6: Drawings and specifications





Dwg By: <b>SIMON</b>			
MFG Apr. Date <b>9/22/2017</b>			
Material		<b>38SF</b>	
Qty <b>1</b>	Scale	Part # <b>38SF1100-4 : FIREBOX ASSEMBLY STAGE 4</b>	
No. of Sheets <b>6 OF 70</b>		Dwg File <b>38SF_TECH_DRAW.idw</b>	Rev. <b>A</b>



Dwg By: <b>SIMON</b>			
MFG Apr. Date <b>9/22/2017</b>			
Material		<b>38SF</b>	
Qty <b>2</b>	Scale	Part # <b>38SF8162 : LOUVER SUPPORT BOT</b>	
No. of Sheets <b>70 OF 70</b>		Dwg File <b>38SF_Tech_DRAW.idw</b>	Rev. <b>A</b>

## 6 Electrical Components

The following table is the information of the electrical components for the blower kit:

<u>Component</u>	<u>Part Number</u>	<u>Manufacturer</u>	<u>Rating</u>	<u>Listing</u>
Tangential Fan (2 per unit)	55416.32130	ebm-papst	115VAC, 60Hz, 56W	VDE, CSA, UL, CE
Thermo-disk (1 per unit)	36T22	Emerson	120VAC, 15A	UL, CSA
Speed Control (1 per unit)	KBWC-13K	KB Electronics Inc.	120 VAC, 2.5 A	UL, CSA
High Temperature Wiring	F18096	Coleman Cable Inc	150°C & 200°C 300V & 600V	UL, CSA
Ground Wire	20-050	Deca Cables	105°C, 600V	UL, CSA

The following figure illustrates the electrical connection for the optional blower kit:

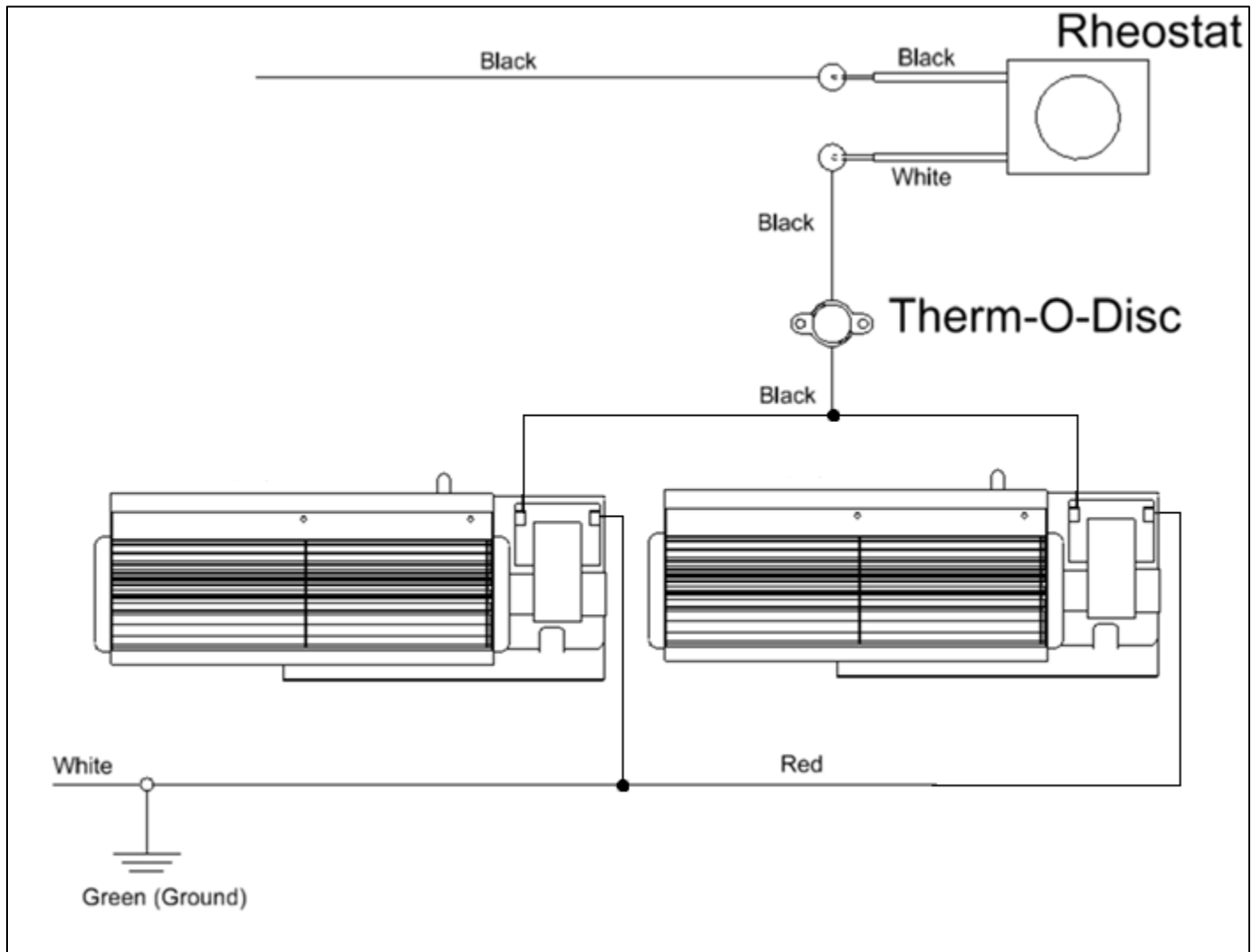


Figure 6-1: Electrical Connection for Optional Blower Kit

## APPENDIX 7: Operator's manual



# AMBIANCE

FIREPLACES | GRILLS

## Elegance 42

Owner's Manual



Model Number: 38SF

This product is proudly developed and manufactured in North America by **SUPREME FIREPLACES INC.**

3594 Jarry East, Montreal, QC H1Z 2G4

T: 877-593-4722, F: 514-593-4424

[www.supremem.com](http://www.supremem.com)

Revised: June 2023

**IMPORTANT: Keep the owner's manual for future use.**



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# 1 SAFETY

SUPREME FIREPLACES INC. congratulates you on purchasing an Elegance 42 wood burning fireplace. This manual describes the installation and operation of the Elegance 42 non-catalytic wood heater. This heater meets the 2020 U.S. Environmental Protection Agency's crib wood emission limits for wood heaters sold after May 15, 2015. Under specific test conditions this heater has been shown to deliver heat at rates ranging from 11,704 to 26,354 Btu/hr. In addition, this fireplace complies with the ULC-S610 and UL-127 standards.

**SAFETY NOTICE: Carefully read this manual before installation and operation of this fireplace. A house fire may result if not properly installed. To reduce the risk of a fire, follow the installation instructions. Failure to follow instructions presented in this manual can lead to property damage, bodily injury or even death. Alterations or modifications made on the unit or the installation is strictly forbidden as it may predispose the user to hazardous risks. Contact your local building or fire officials for restrictions and installation inspection requirements in your area and the need to obtain a permit.**

**WARNING: This unit is hot during operation; keep children, pets, flammable liquids, or combustible materials at a safe distance. Ensure that all clearances to combustible materials are respected. Contact with the unit during operation may cause severe harm. Install a safety screen to keep children and pets away.**

## CAUTION:

- Do not connect this unit to a chimney flue serving another appliance.
- Do not connect to any air distribution duct or system.
- Never use chemicals to ignite the fire.
- Never burn waste or flammable fluids (such as gasoline, naphtha, or engine oil).
- Only burn dry natural cordwood.
- Never leave the unit unattended with the door open or unlatched.
- Only refuel this unit when the wood is reduced to embers.
- Always keep the door closed during operation.
- Do not operate this unit with a fireplace grate.
- Do not install an unvented gas log set into the firebox.
- Do not install this unit in a mobile home.
- Do not clean or service the unit while it is hot.
- Allow proper air flow by keeping the louvers/openings clear of any obstructions.

Note: Failure to respect the above cautions may cause damages to the unit, damages to personal property, bodily harm and will void the warranty. "This wood heater needs periodic inspection and repair for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual."



This product can expose you to chemicals including carbon monoxide, which is known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to [www.P65warnings.ca.gov/](http://www.P65warnings.ca.gov/)

## 2 GENERAL INFORMATION

### 2.1 Overall Dimensions

#### 2.1.1 Traditional Dimensions

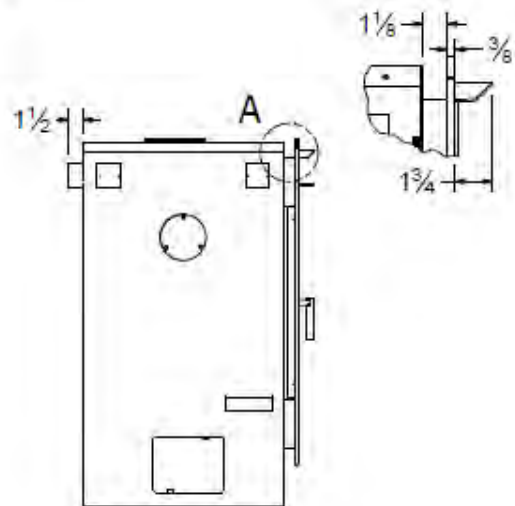
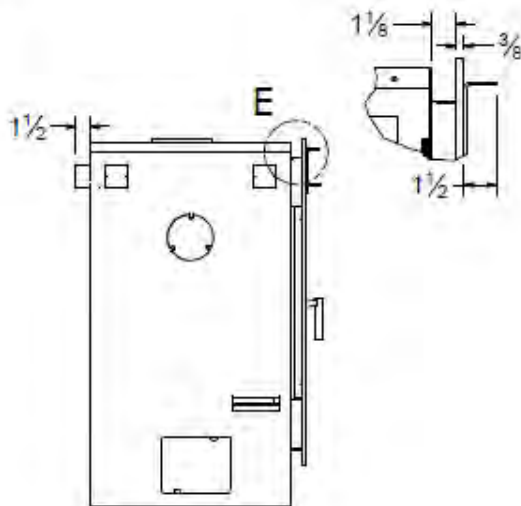
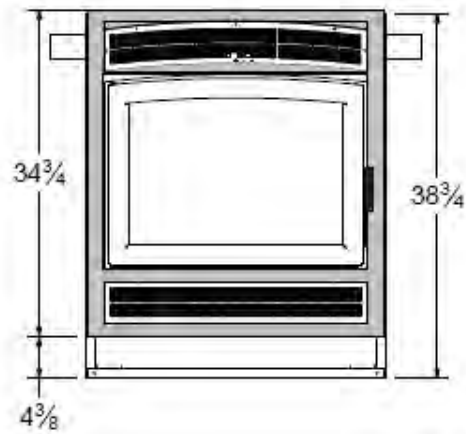
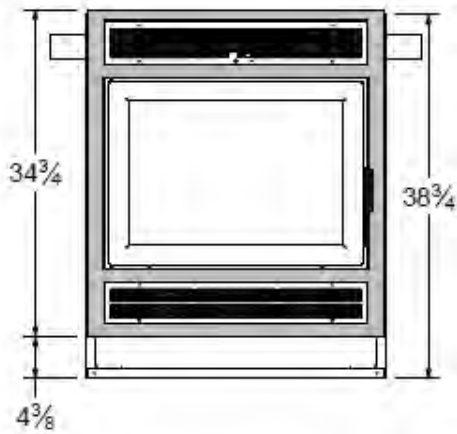
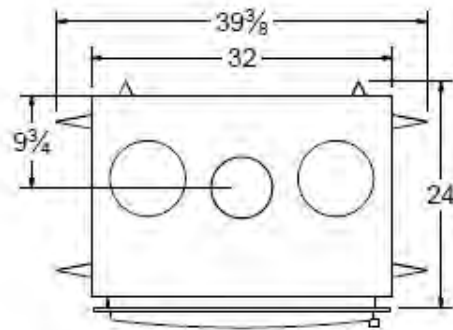
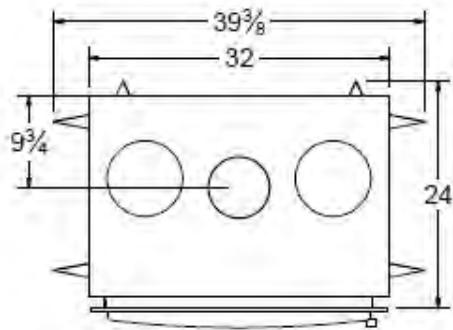


Figure 2-1: Elegance 42 Traditional Rectangular Dimensions

Figure 2-2: Elegance 42 Traditional Arched Dimensions

## 2.1.2 Clean Face Dimensions

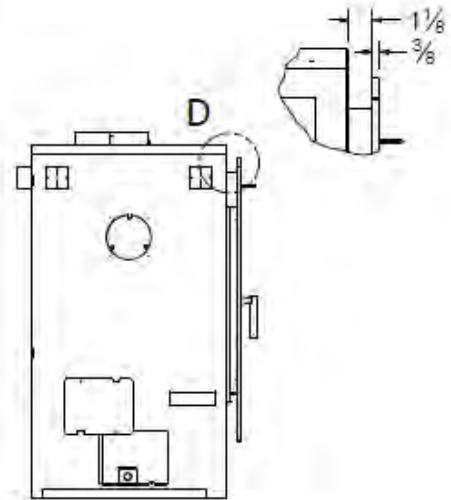
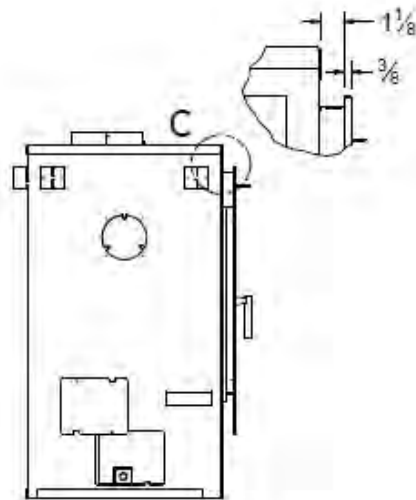
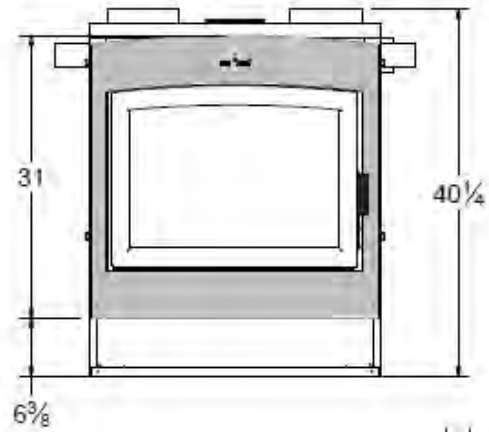
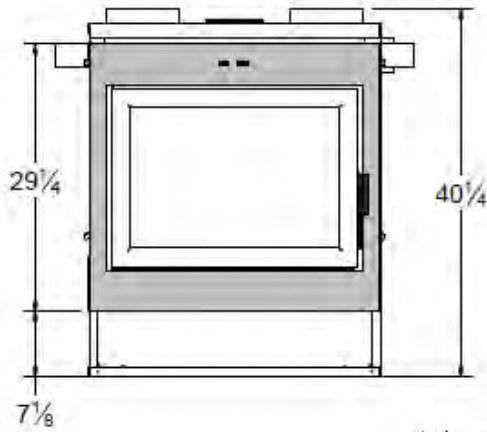
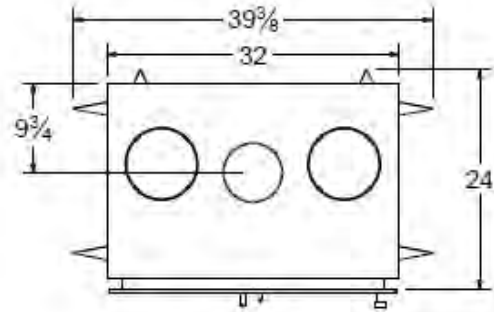
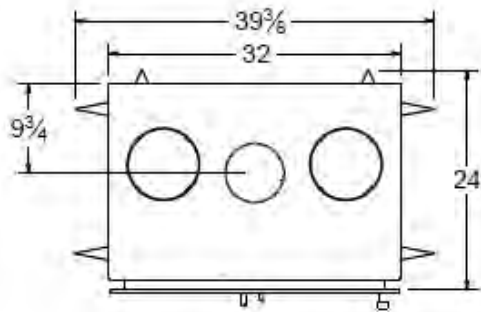


Figure 2-3: Elegance 42 Clean Face Rectangular Dimensions

Figure 2-4: Elegance 42 Clean Face Arched Dimensions



## 2.2 Specifications

Appliance Type:	Adjustable Burn Rate Wood Heater – Non-Catalytic
Fuel Type:	Dry Cordwood
Maximum Log Length:	24 in (6.09 cm)
Burn Time <sup>1</sup> :	6 to 12 hrs
Firebox Volume:	4.09 ft <sup>3</sup> (0.116 m <sup>3</sup> ) <sup>2</sup>
Heating Area:	1,000 to 2,500 ft <sup>2</sup> (93 to 232 m <sup>2</sup> )
Average Particulate Emissions Rate <sup>3</sup> :	1.8 g/hr
Average CO Emissions Rate <sup>4</sup> :	2.09 g/min
EPA Protocol:	Method 28R, ASTM2780-10, and ASTM2515-11
Efficiency (Crib Wood):	HHV <sup>5</sup> : 67.83%   LHV <sup>6</sup> : 72.9%
Heat Output (Crib Wood):	11,704 to 26,354 BTU/hr (3,431 to 7,724 W)
Optimum Efficiency:	75%
Optimum Heat Output:	125,000 BTU (36.6 kWh)
Efficiency Protocol:	CSA B415.1-10

### WARRANTY REGISTRATION

Please register your SUPREME product online at <http://www.supremem.com/warranty.php> to ensure full warranty coverage. Proof of purchase is required for all warranty claims.

<sup>1</sup> Depending on combustion air control setting (see Section 5.3 for further details).

<sup>2</sup> Usable volume according to ASTM E2780-10 standards calculated at 3.50 ft<sup>3</sup> - figure used in EPA Method 28R testing.

<sup>3</sup> Officially tested and certified by an independent laboratory.

<sup>4</sup> Note that rate is smaller for low to medium/low burn rates.

<sup>5</sup> Higher Heating Value.

<sup>6</sup> Lower Heating Value.

## 2.3 Combustion Air Control

The Combustion Air Control is a patented mechanism (Patent No: US 7,325,541 B2) that regulates the air flow into the firebox based on the temperature of the unit. It is located on the top of the firebox, at the front center of the unit. The combustion air control of the Elegance 42 has two components: the Activator and the Burn Rate Selector (see Figure 2-5). The left combustion control lever is the Activator. When starting a fire or adding a new load of wood, the Activator must be pushed in to allow a primary source of air to enter the firebox. The Activator will retract automatically with heat. The right combustion control lever is the Burn Rate Selector. The Burn Rate Selector can slide sideways to achieve different burn rates. When the Burn Rate Selector is positioned to the left, a maximum burn rate is achieved and when it is positioned to the right, a minimum burn rate is set.

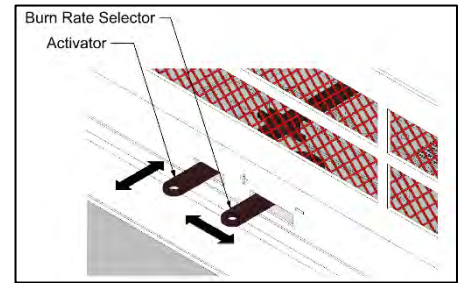


Figure 2-5: Combustion Air Control's Activator and Burn Rate Selector

**WARNING: Never manipulate the Combustion Air Control with bare hands as it gets hot when the Elegance 42 is in operation. Use the Cold Hand Key (see Section 2.4) to adjust the Combustion Air Control.**

## 2.4 Cold Hand Key

The Cold Hand Key is an accessory that comes standard with the Elegance 42 fireplace (Figure 2-6). The Cold Hand Key is a tool used to manipulate the Combustion Air Control Levers when they are hot.



Figure 2-6: Cold Hand Key

## 2.5 Chimney Sweeping Cap

The chimney sweeping cap found at the baffle of the Elegance 42 allows easy access for chimney sweeping without having to remove any components of the firebox (Figure 2-7).

**WARNING: The chimney sweeping cap should be blocking the access to the chimney at all times during combustion. A chimney sweeping cap that is not blocking the baffle hole during combustion is a safety hazard, will overheat the fireplace and void the warranty.**

## 2.6 Door

The Elegance 42 wood burning fireplace comes with a Pyroceramic glass panel door. Pyroceramic is the highest grade available for fireplaces and stoves and can withstand temperatures up to 1300°F. To remove the door, open the door, lift it and pull it towards the bottom until the rod exits from the hinge holes.

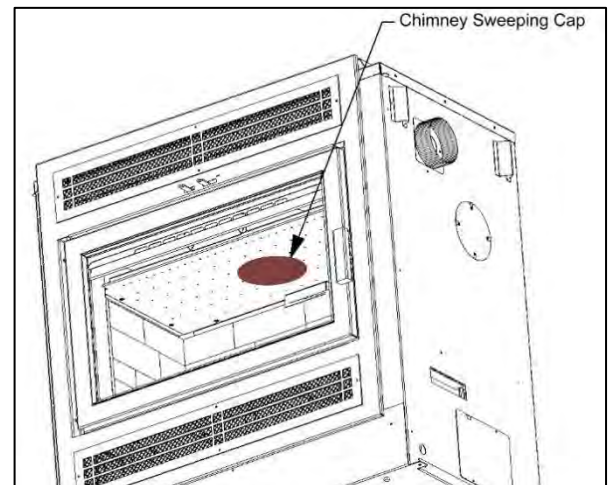


Figure 2-7: Chimney Sweeping Cap

## 2.7 Certification Label

The certification label contains important information regarding the installation and operation of the Elegance 42 fireplace. In addition, the serial number of the unit is permanently embossed onto the top right corner. See Figure 2-8 for the location of the certification label.

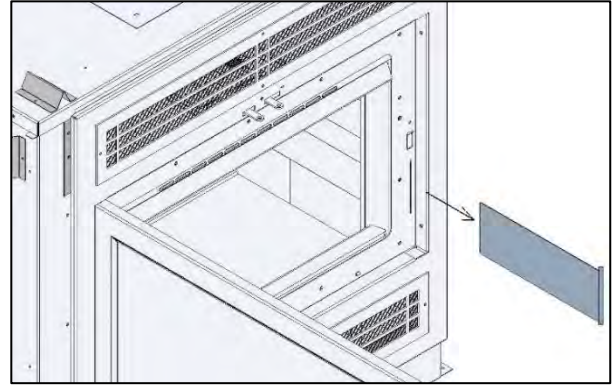


Figure 2-8: Location of Certification Label with Product Serial Number

## 2.8 Removable Ash Lip

The Ash Lip is a removable accessory that comes standard with the Elegance 42 fireplace (Figure 2-9). It is installed on the door holder (under the two small angled tags below the door) and prevents ashes from falling onto the front of the hearth. The Ash Lip can be installed with the door open or closed. It is safe to operate the unit without the Ash Lip.

**NOTE: The door of the Elegance 42 must remain closed at all times during operation.**

## 2.9 SUPREME Radiation Shield Offset

The SUPREME Radiation Shield Offset is a standard component for the Elegance 42 fireplace (Figure 2-10). Prior to installing the chimney manufacturer's radiation shield, the SUPREME Radiation Shield Offset is fastened below the chimney opening within the chase, with the flanges along the component providing a 1/2" offset.

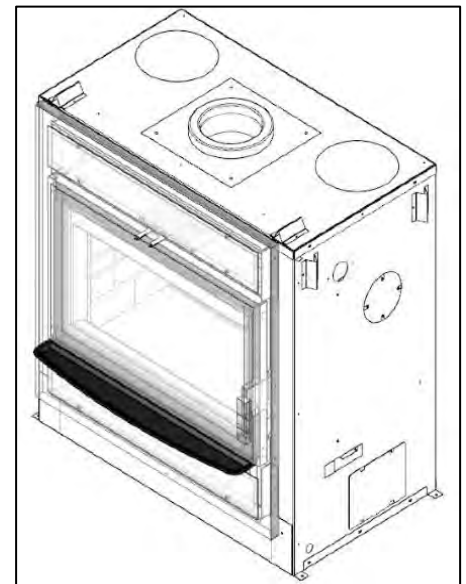


Figure 2-9: Removable Ash Lip

## 2.10 Baffle Secondary Burn Technology

An innovative baffle design comprises of carefully engineered perforations that allow the introduction of secondary air to increase the efficiency and heat output while offering an uncompromising view of the fire (Figure 2-11).

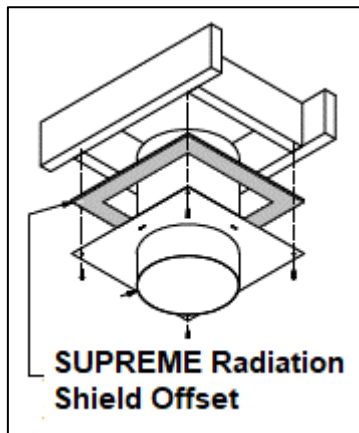


Figure 2-10: SUPREME Radiation Shield Offset

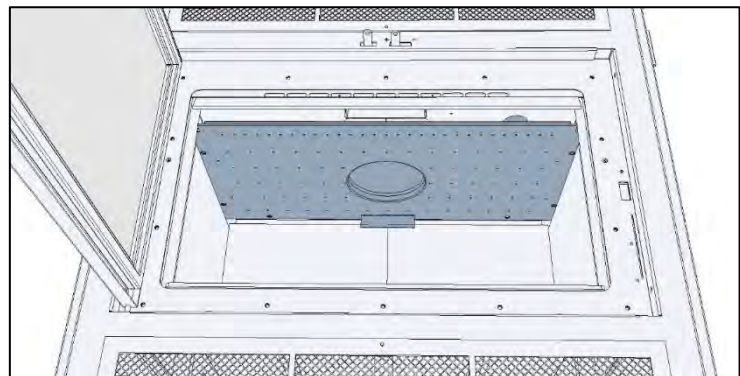


Figure 2-11: Baffle Secondary Burn Technology

## 2.11 Soapstone Interior

The Elegance 42 is lined with 1.25 inch thick soapstone slabs. Soapstone offers unparalleled advantages in a fireplace beyond its natural aesthetics: it radiates five times more heat and absorbs 15% more heat when compared to firebrick.

## 2.12 Blower Kit

A dual AC tangential blower (electrical rating: 115V, 60Hz, and 56W) with a variable speed control is installed into the Elegance 42 wood burning fireplace to maximize efficiency. Refer to Section 3.9 for installation instructions.

**WARNING: Make certain that the fireplace is not in operation and the blowers are unplugged (breaker off) before accessing the electrical wiring of the blower kit.**

**CAUTION: Only a blower provided by SUPREME FIREPLACES INC. can be installed into the fireplace. Substituting the blower kit may result in overheating, will void the warranty and can be hazardous.**

## 2.13 Optional Hot Air Kit

The Optional Hot Air Kit (kit number SU250) allows heat to be drawn from the unit by a thermostatically controlled blower (electrical rating: 115 V and 60 Hz) and dispersed to different areas of the house. This option is recommended when the fireplace is installed in an area below the maximum heating space. A total of three kits can be installed onto one unit with a maximum distance of 25 feet each. Note that a 5 inch insulated duct (part number UCAC5) is required for the installation (item ordered separately). Refer to Section 4.1 for installation instructions.

**WARNING: Make certain that the fireplace is not in operation and that hot air blower is not powered (breaker off) before accessing the electrical wiring of the hot air kit.**

**CAUTION: Only a hot air kit provided by SUPREME FIREPLACES INC. can be installed onto the fireplace. Substituting the hot air kit may result in overheating, will void the warranty and can be hazardous.**

## 2.14 Optional Fresh Air Kit

The Optional Fresh Air Kit (kit number UPEA4) allows for exterior air (outdoors) to be drawn into the fireplace during operation of the unit. Note that a 4 inch insulated duct is required for the installation (item ordered separately). Refer to Section 4.2 for installation instructions. Contact your local building official regarding mandatory fresh air kit installations within your area.

**CAUTION: Only a fresh air kit provided by SUPREME FIREPLACES INC. can be installed onto the fireplace. Substituting the fresh air kit may result in overheating and will void the warranty.**

## 3 INSTALLATION INSTRUCTIONS

Before installing the unit, consult an authority having jurisdiction (such as your municipal building department, your fire department, your fire prevention department...) for any local codes and whether a permit is required. In the absence of local codes, refer to the CSA B365 Installation Code for Solid Burning Appliances and Equipment (Canada) or the ANSI NFPA 211 Standard for Chimneys, Fireplaces, Vents and Solid Fuel-Burning Appliances (USA).

**CAUTION: Modifications/alterations to the unit/installation without written authorization from SUPREME FIREPLACES INC. are strictly forbidden and will void the warranty.** Refer to Section 1 for further safety information. Carefully read the instructions below before installing your Elegance 42.

### 3.1 Location

Determine the location of the Elegance 42 by taking into consideration the following criteria:

- The size of the room with respect to the heat output of the fireplace.
- The proximity of windows, doors, and traffic flow.
- The necessary amount of space in front of the unit for the hearth extension and mantel (Refer to Sections 3.6 and 3.8).
- The clearances to combustible materials.
- The passage of the chimney.

If possible, select a location for the fireplace that will minimize the number of offsets in the chimney course. Offsets will reduce the draft, complicate the chimney sweeper's work, and increase installation costs. Do not install an offset directly onto the unit/anchor plate. Technical drawings outlining the chimney route should be prepared prior to the installation. NOTE: The cutting of joists and rafters for floor, ceiling, and roof chimney penetrations will affect the load bearing capacities of the dwelling structure. To determine whether additional support is required, consult your local building codes. Improper cutting of chimney openings in the attic and roof will affect the bearing and thermal insulating capacity, as well as the weather tightness of the dwelling. Avoid incorrect workmanship by consulting a professional engineer or a certified installer.

Through examination of the floor construction, ensure that the fireplace and chimney system is resting on a surface capable of withstanding its weight. Consult your building codes to see whether additional structural supports are required (applicable for rare and isolated cases).

Avoid having the chimney outlet near any obstructions (such as trees and roof offsets) as the draft of the chimney may be affected by wind turbulence. Ideally position the outlet of the chimney at the highest area of the roof.

**NOTE: It is strongly recommended to install a carbon monoxide (CO) and smoke detector near the location of the unit.**

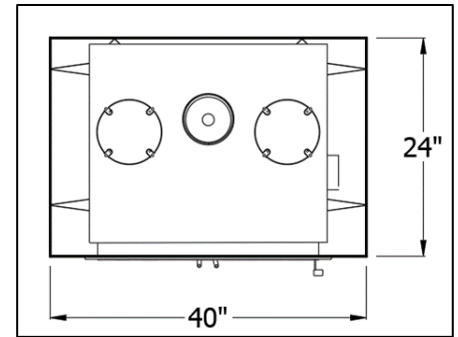


Figure 3-1: Straight Wall Installation

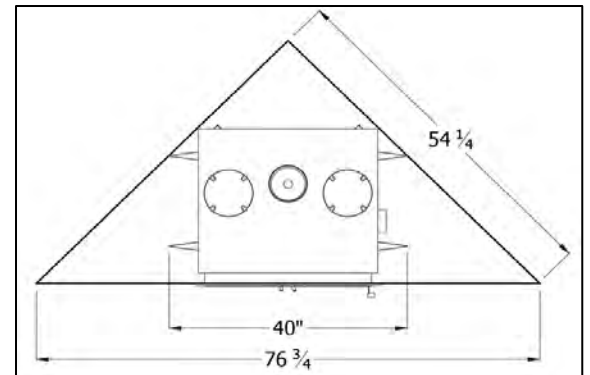


Figure 3-2: Corner Installation

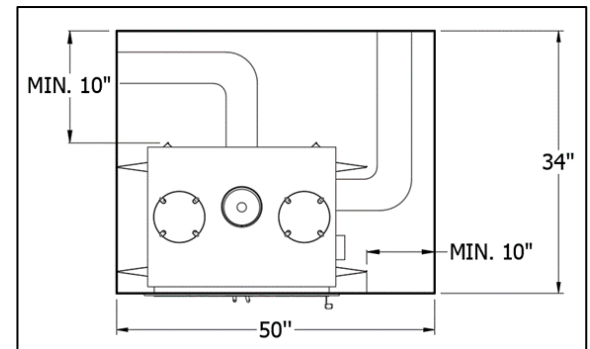


Figure 3-3: Space Required for Forced Hot Air System Installations

Refer to Sections 4.1 and 4.2

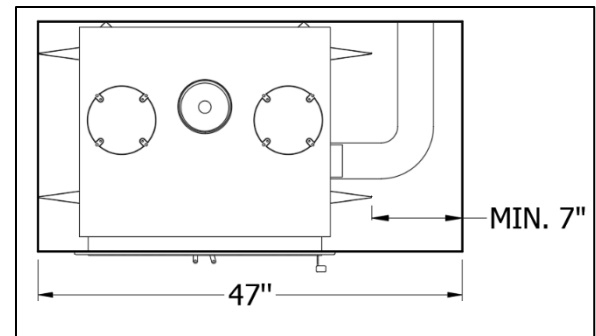


Figure 3-4: Space Required for Fresh Air Kit Installations

Refer to Sections 4.1 and 4.2



## 3.2 Chimney Installation

The Elegance 42 is approved with a 6" chimney that is listed under the UL 103 / ULC S629 standards (refer to Table 3-1). **WARNING: Mixing chimney components from different brands is a safety hazard and will void the warranty on the unit.** When connecting the unit to an existing chimney, thoroughly inspect the condition of the chimney and that the installation conforms to the requirements of the chimney manufacturer and the building codes. **Note that to avoid any unnecessary risk, it is often recommended to replace the chimney system.** Always respect the clearances to combustibles from the chimney manufacturers; a minimum clearance of 2 inches is usually required for prefabricated chimneys.

### 3.2.1 General Rules and Guidelines

1. Carefully read the instructions from the chimney manufacturer prior to installation (manuals can be obtained from the chimney manufacturer's website or from the vendor). Unless specified, follow the chimney manufacturer's instructions for proper installation.
2. For optimal performance of the unit, it is recommended to install the chimney system in an interior setting. To prevent drafting issues and creosote buildups, avoid exterior installations of the chimney system in regions that experience extreme cold conditions.
3. The minimum and the maximum height of the chimney from the base of the unit are 15 and 35 feet respectively.
4. A minimum length of 12 inches of straight chimney is required from the top of the unit before having an offset.
5. Only chimneys approved under the UL 103 / ULC S629 standards can be installed onto the unit (refer to Table 3-1 in Section 3.2.2).
6. A 6 inch anchor plate is required to connect the fireplace to the chimney system. The anchor plate can be secured onto the unit with 4 self-tapping screws.
7. The chimney installed onto the unit cannot be connected to another appliance.
8. Enclose any portion of the chimney that extends to accessible spaces.
9. The clearance of the chimney to any combustible material cannot be less than 2 inches; the 2 inch clearance cannot be filled with insulation or any non-combustible material.
10. At least one support is to be incorporated in any chimney installation.
11. A firestop is required in the joists/frames where the chimney goes through (ceilings, floors, walls, and attic).
12. A roof and a vented flashing is required in the installation of the Elegance 42.
13. To prevent drafting issues, avoid deviations wherever possible.
14. The chimney shall extend at least 3 feet above its point of contact with the roof and at least 2 feet higher than any wall, roof, or adjacent building within a 10 foot radius.
15. A secure brace is to be installed if the chimney extends a minimum of 5 feet above the contact point with the roof.
16. A rain cap must be installed on top of the chimney to avoid internal damage and/or corrosion.
17. Consult the chimney manufacturer for clearances to combustibles when installing a combustible chimney enclosure above the roof.

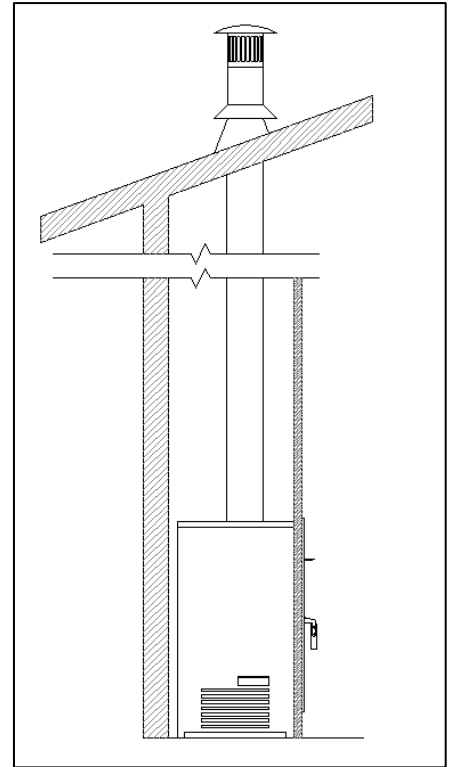


Figure 3-5: Straight Interior Installation

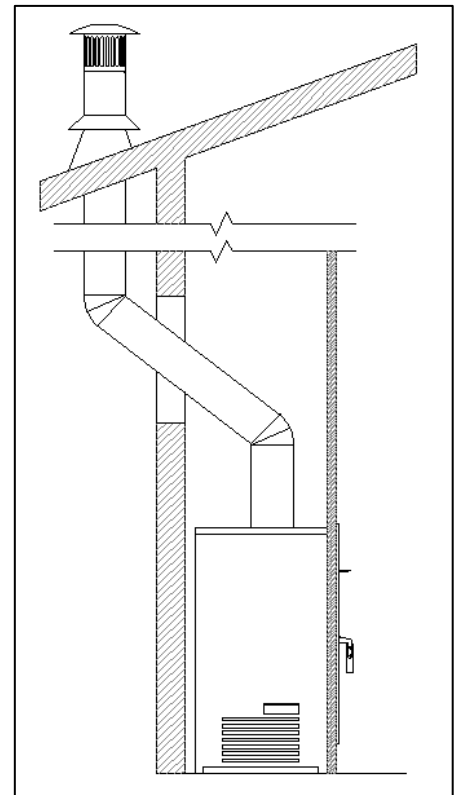


Figure 3-6: Exterior Installation

### 3.2.2 Listed UL 103 / ULC S629 Approved Chimney Models (Reference Table)

Note that only chimney models listed in Table 3-1 can be installed for the Elegance 42.

Table 3-1: List of Approved Chimney Models

<u>Manufacturer</u>	<u>Models</u>
American Metal	<ul style="list-style-type: none"> <li>• HS, AC Triple Wall, 6" inner diameter</li> <li>• HSS, AC Triple Wall, 6" inner diameter</li> </ul>
FMI (US only)	<ul style="list-style-type: none"> <li>• AC, AC Triple Wall, 6" inner diameter</li> </ul>
ICC	<ul style="list-style-type: none"> <li>• Excel 2100, 1" Solid Pack, 6" inner diameter</li> </ul>
Metal Fab	<ul style="list-style-type: none"> <li>• Temp Guard, 1" Solid Pack, 6" inner diameter</li> </ul>
Olympia Chimney	<ul style="list-style-type: none"> <li>• Ventis, 1" Solid Pack, 6" inner diameter</li> </ul>
Security Chimney	<ul style="list-style-type: none"> <li>• ASHT+, 1" Solid Pack, 6" inner diameter</li> <li>• S-2100+, 2" Solid Pack, 6" inner diameter</li> </ul>
Selkirk	<ul style="list-style-type: none"> <li>• Super Pro (SPR), 1" Solid Pack, 6" inner diameter</li> <li>• Super Pro 2100 (ALT), 2" Solid Pack, 6" inner diameter</li> <li>• Hart &amp; Cooley (TLC), 1" Solid Pack, 6" inner diameter</li> <li>• Sure-Temp (ST), 1" Solid Pack, 6" inner diameter</li> <li>• Super Vent (JSC), 1" Solid Pack, 6" inner diameter</li> <li>• Super Vent 2100 (JM), 2" Solid Pack, 6" inner diameter</li> <li>• Ultra-Temp (UT), 1" Solid Pack, 6" inner diameter</li> <li>• UltimateOne, 1" Solid Pack, 6" inner diameter</li> <li>• CF Sentinel (CF), 2" Solid Pack, 6" inner diameter</li> </ul>
Simpson Dura-Vent	<ul style="list-style-type: none"> <li>• Dura Tech, 1" Solid Pack, 6" inner diameter</li> <li>• Dura Plus HTC, 2" Solid Pack, 6" inner diameter</li> <li>• Dura Plus, AC Triple Wall, 6" inner diameter</li> </ul>

### 3.2.3 Chimney Installation Instructions

1. Cut and frame square openings in the floors, ceilings, and roof where the chimney will pass through while taking into consideration the minimum clearance to combustibles.
2. For an installation with the chimney running through the ceiling, install the SUPREME Radiation Shield Offset below the chimney opening prior to installing the radiation shield (refer to Figures 2-10 and 3-7).
3. In the ceiling/floor openings, install a chimney manufacturer's firestop from below. Install the chimney manufacturer's attic radiation shield from above in the chimney opening to the attic. Install the chimney manufacturer's roof radiation shield in the opening of the roof – adjust the shield so that it is extruding approximately 1" above the roof surface. Ensure to install the appropriate firestop for ceilings and walls.
4. Install the chimney manufacturer's anchor plate onto the unit.
5. Install the chimney lengths according to the manufacturer's instructions and ensure proper fastening/locking of the joints.
6. Install the roof support once the desired height has been reached.
7. Position the vented roof flashing. Note that for sloping roofs, position the upper portion of the vented flashing under the shingles and position the lower portion of the vented flashing above the shingles. Seal the joint between the roof and the vented flashing with roofing cement or silicone. Secure the vented flashing to the roof with roofing nails.
8. Install the storm collar over the vented flashing by tightening the supplied bolt or through the flange mechanism (depends on chimney brand). Seal the joint between the storm collar and the chimney using a silicone caulking. **WARNING: Do not seal, caulk, or obstruct the ventilation openings.**
9. Install the chimney rain cap.

Refer to Figures 3-5 and 3-6 for typical chimney installations.

### 3.2.4 Offset Installation

An offset installation (Figure 3-7) consists of the use of elbows to deviate from unavoidable obstacles or to extend the chimney outside. The following list is a few general rules to take note when installing offsets:

- A maximum of 2 offsets (2 elbows per offset) is permitted per installation.
- A minimum length of 12 inches of straight chimney is required from the top of the unit before having an offset.
- The maximum deviation is 45° in Canada and 30° in the US.
- Secure the elbows and the chimney components according to the instructions from the chimney manufacturer.
- A support strap, a wall support, or a roof support must be installed above each offset to allow adequate support to the vertical chimney lengths.
- **Never install an elbow in an opening of a floor, wall, ceiling, or roof.** In addition, only vertical chimney sections can be installed within ceiling/floor openings.
- A minimum length of 12 inches of straight chimney is required from the top of the unit before having an offset.
- Install a support for the first 15 feet of chimney.

The following are instructions for offset installations:

1. Rotate the elbow in the required direction and secure it to the adjacent chimney section according to the chimney manufacturer's instructions.
2. Follow the chimney manufacturer's instructions to install the chimney length(s) necessary for the offset.
3. Once the desired offset length has been achieved, install the second elbow to redirect the venting to the vertical position.
4. Cut an opening in the floor/ceiling to allow the chimney to pass through.
5. Install the appropriate firestop.

**CAUTION: For offset installations, always install a ventilated flashing and a roof firestop unless otherwise specified by the chimney manufacturer. Never install an elbow directly onto the unit.**

### 3.2.5 Angled Wall Radiation Shield

For chimney installations requiring to pass through a combustible wall at a 30° (Canada) or 45° (Canada and US) angle, an angled firestop or an angled wall radiation shield from the chimney manufacturer must be installed within the wall opening. Install the angled firestop and angled wall radiation shield according to the manufacturer's instructions. It is recommended to use an insulated angled wall radiation shield in areas that experience cold climates.

### 3.2.6 Connecting to a Masonry Chimney

The Elegance 42 fireplace can be connected to a masonry chimney that complies with current national and municipal building codes. A 6 inch chimney liner that complies with ULC S635 M2000 (Canada) or UL 1777 (US) standards must be installed within the existing masonry chimney. Note that the 6CON connector (manufactured by SUPREME FIREPLACES INC.) must be installed to connect the prefabricated chimney to the liner (6CON sold separately). Refer to figure 3-8.

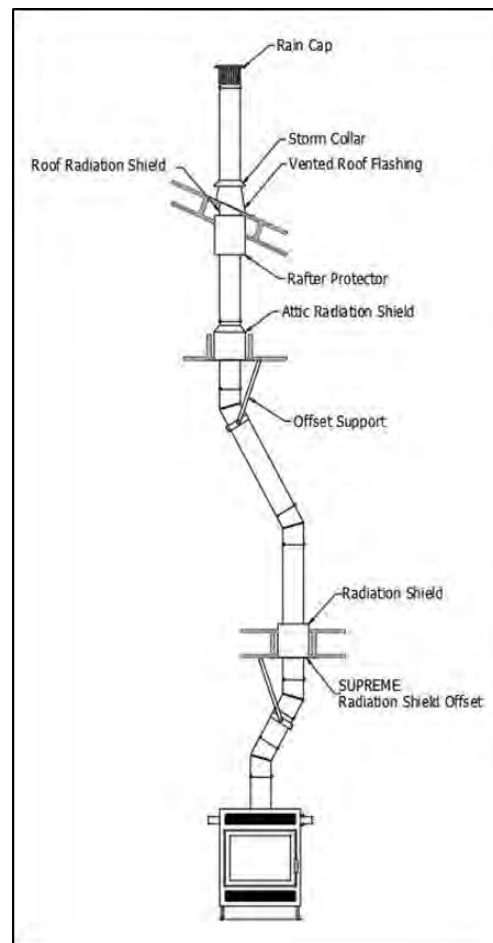


Figure 3-7: Offset Installation

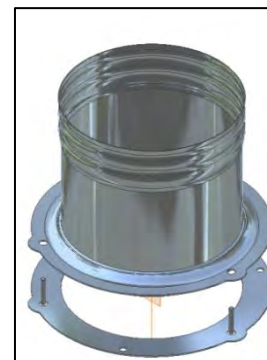


Figure 3-8: 6CON Liner Connector

Note that prior to installation, an inspection from an authority having jurisdiction is required to determine whether the masonry chimney:

- Is constructed in accordance with national and municipal building codes.
- Is in good condition. Note that repairs must be performed on any cracked or missing bricks.
- Is thoroughly cleaned of any soot or creosote.
- Is not connected to another appliance such as a furnace, hot water heater, or another fireplace.
- Has a flue of adequate size for proper installation of the venting.
- Respects minimum clearances to combustibles.

It is recommended to position the fireplace as close as possible to the masonry chimney to ensure proper venting. The prefabricated chimney must penetrate at least 3 inches within the masonry chimney before connecting the liner. Elbows can be used within the masonry chimney, with a maximum deviation of 30° in US and 45° in the Canada. **Note: A minimum length of 12 inches of straight chimney is required from the top of the unit before having an offset.**

The installation of the prefabricated chimney and the liner must comply with the manufacturer's instructions. The following are instructions in installing the venting of the Elegance 42 running through a masonry chimney:

1. Install the anchor plate onto the unit.
2. Position the fireplace to the recommended location.
3. Install the initial prefabricated chimney lengths and elbows.
4. Mark the area where the prefabricated chimney will penetrate the masonry chimney.
5. Remove the fireplace to allow for sufficient space to work.
6. Make a hole to the required size to allow for the prefabricated chimney to be inserted freely in the masonry chimney. Note that the appropriate firestops need to be installed if running the prefabricated chimney through a combustible wall.
7. Install the remaining prefabricated chimney components center with the masonry chimney.
8. Align the flange holder of the 6CON connector with the studs facing upwards to the center of the prefabricated chimney section (elbow or tee) and secure it with three self-tapping screws.
9. Reposition the fireplace to its initial position.
10. Overlap by 1 inch the lower end of the liner in the expanded portion of the 6CON connector and secure the joint with 3 #8 stainless steel self-tapping screws.
11. From the roof, slide the liner down the masonry chimney until it reaches the upper end of the prefabricated chimney.
12. Install the upper portion of the 6CON liner connector to the flange holder by aligning the threaded studs to the holes and complete the connection by tightening the wing nuts.
13. Seal any openings around the prefabricated chimney and the 6CON connector with refractory cement resistant to high temperatures.

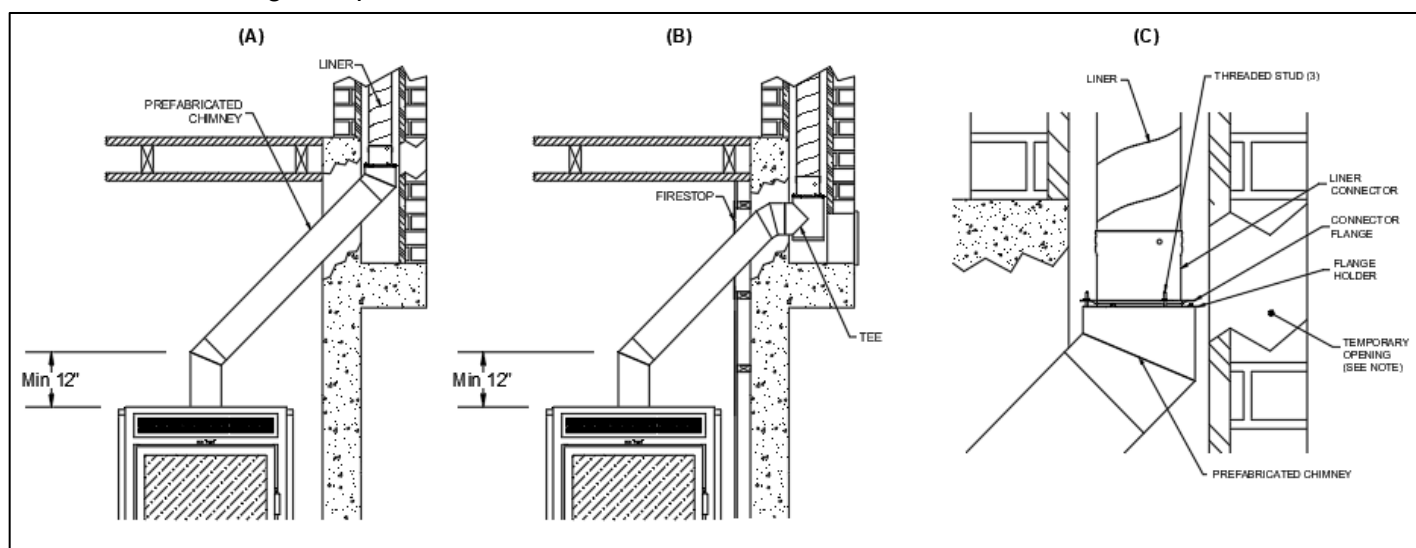


Figure 3-9: (A) Connection into a masonry chimney through an elbow/liner; (B) connection into a masonry chimney through a tee/liner; (C) detailed drawing of masonry chimney connection.

### 3.3 Framing

The Elegance 42 can be placed directly onto or against normal, combustible construction materials such as lumber, plywood, millboard, particleboard, drywall and decorative wood paneling. The fireplace should NOT be placed directly against or be in contact with an insulation material. A portion of the framing on the face of the chase must be constructed with nominal 2" x 3" or 2" x 4" metal studs and the remainder can be constructed with nominal 2" x 3" or 2" x 4" lumber. Refer to Figure 3-10 for an example of a framing design and Figure 3-11 for the framing for installations of the single linear front louver gravity kit. The framing must be nailed or screwed onto the floor and to the ceiling.

The recommended framing dimensions of the single linear front louver is 40" x 7.5". A minimum distance from the ceiling to the top of the louver is 5.5". The base of the louver must be at least 64" from the base of the unit.

**CAUTION:** Respect the framing design outlined in Figure 3-11 as well as the chimney manufacturer's clearances to combustibles.

**WARNING:** Do not nail or screw framing components onto the fireplace.

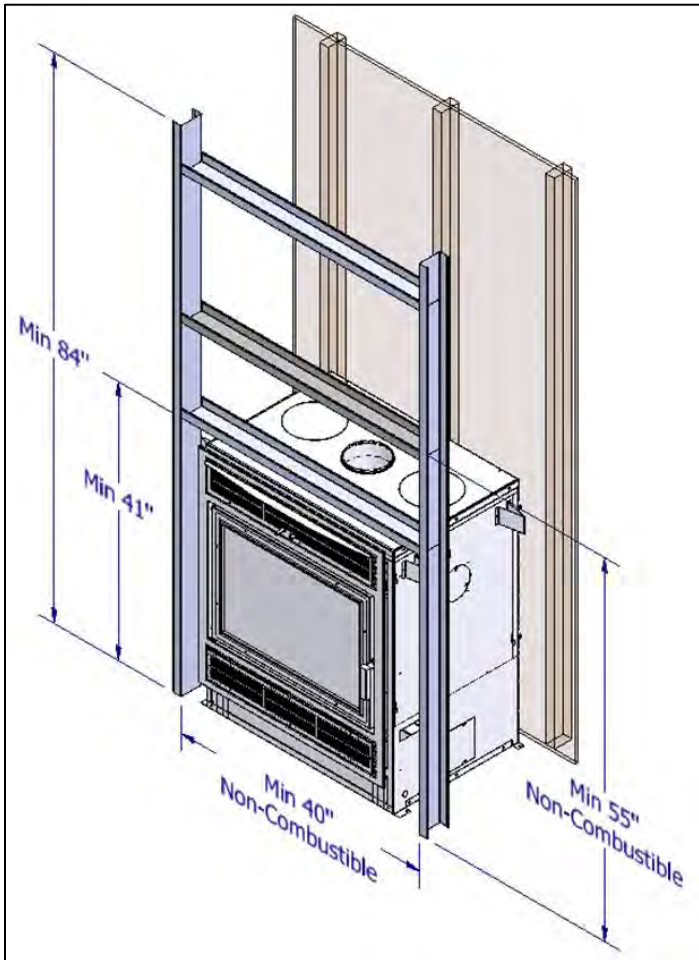


Figure 3-10: Minimum Elegance 42 Framing Dimensions

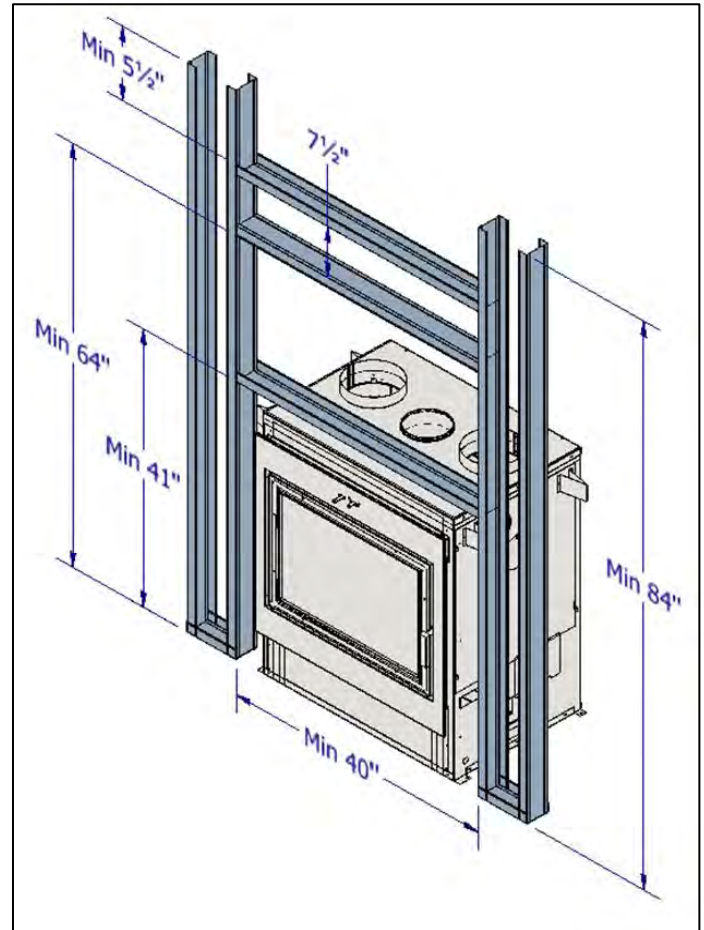


Figure 3-11: Minimum Framing Dimensions for Single Linear Front Louver Gravity Kit Installations

Refer to Figure 3-10 for minimum non-combustible framing dimensions



## 3.4 Surround Installation

The Elegance 42 can be installed with either the traditional surround or the clean face surround.

### 3.4.1 Traditional Surround

The traditional surround comprises louvers below (intake) and above (outtake) the door. All components and fasteners are included in the surround kit. Refer to Figures 3-13 and 3-14 and Tables 3-2 and 3-3 for the instructions below.

1. Remove the door of the unit and place it on a soft surface, such as a carpet or cardboard, to avoid any scratches or damages.
2. Align the lower support bracket (Item 6) to the intake opening and fasten it in place (Figure 3-13).
3. Bend the ends of the upper support bracket (Item 7), align it to the outtake opening and fasten it in place (Figure 3-13).
4. Place the surround (Item 1 in Figure 3-14 or Item 3 in Figure 3-15) within the door holder and secure it in place with four black screws (one on each corner). Make sure that the handles of the Combustion Air Control pass through the slots of the surround.
5. Reinstall the door onto the unit.
6. Secure the Intake Swivel Covers on the bottom sides of the unit to the closed position (Figure 3-12).

**WARNING: For traditional surround installations only.**

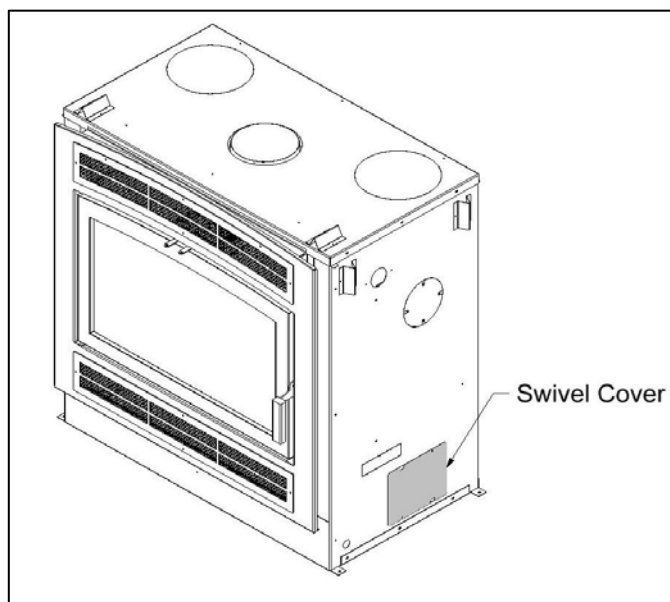


Figure 3-12: Intake Swivel Cover Closed

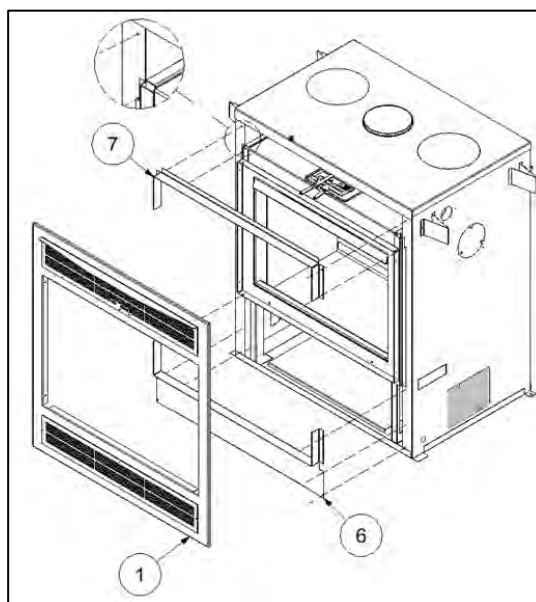


Figure 3-13: Traditional Surround Installation

**WARNING: For Traditional Surround Installations Only**

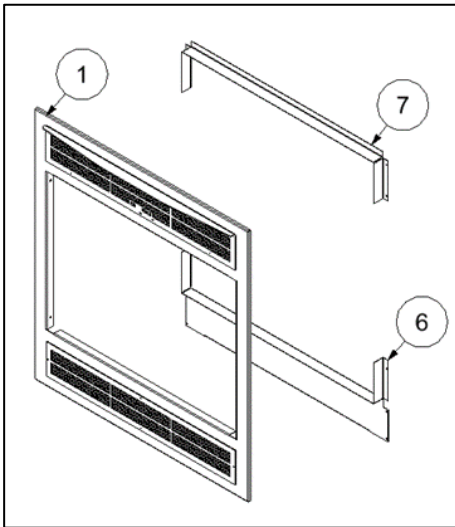


Figure 3-14: Traditional Rectangular Surround Components

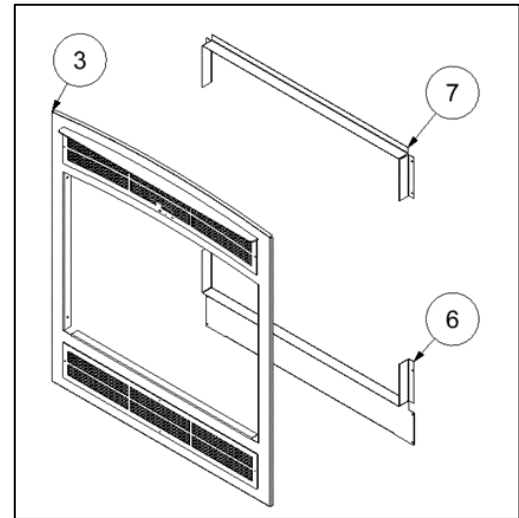


Figure 3-15: Traditional Arched Surround Components

Table 3-2: UWA600 Components

TRADITIONAL RECTANGULAR		
ITEM	DESCRIPTION	QTY
1	Traditional Rectangular Surround	1
6	Lower Support Bracket	1
7	Upper Support Bracket	1

Table 3-3: UWA610 Components

TRADITIONAL ARCHED		
ITEM	DESCRIPTION	QTY
3	Traditional Arched Surround	1
6	Lower Support Bracket	1
7	Upper Support Bracket	1

### 3.4.2 Clean face Surround

The Clean Face surround comprises no louvers; however, an intake into the chase and an outtake through gravity ducts is required for this configuration. The instructions below describe the installation of the Clean Face surround. Refer to Figures 3-18 and 3-19 and Tables 3-4 and 3-5 for the instructions below. Refer to Section 3.5 for Gravity Kit installation instructions.

1. Remove the door of the unit and place it on a soft surface, such as a carpet or cardboard, to avoid any scratches or damages.
2. Align the Clean Face lower cover (Item 8) and fasten it in place (Figure 3-17).
3. Bend the ends of the Clean Face upper cover (Item 7), align it and fasten it in place (Figure 3-17).
4. Place the surround (Item 4 in Figure 3-18 or Item 5 in Figure 3-19) within the door holder and secure it in place with 4 black screws (one on each corner). Make sure that the handles of the Combustion Air Control pass through the slots of the surround.
5. Reinstall the door onto the unit.
6. Secure the Intake Swivel Covers on the bottom sides of the unit to the **open** position (Figure 3-16).
7. Remove the two 8" knockouts at the top of the unit using a flat head screwdriver (Figure 3-20).
8. Through the openings of the knockouts, cut the exposed insulation. Make sure to remove any pieces of insulation that has fallen into the unit.
9. Bend the tabs inside the 8 inch knockouts (Figure 3-21) upwards.
10. Install the 8 inch duct adapters (Item 9 in Figure 3-17) through the newly cut knockouts and screw them to the bent tabs (Figure 3-22).

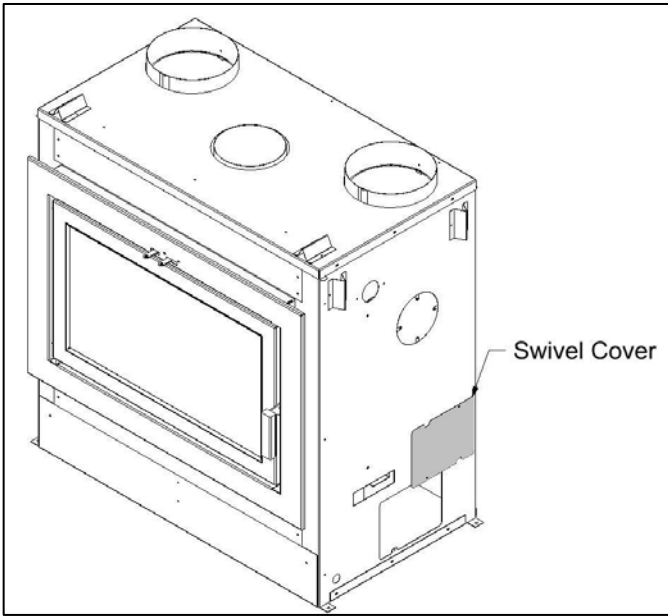


Figure 3-16: Intake Swivel Cover Kept Open for Clean Face Installations

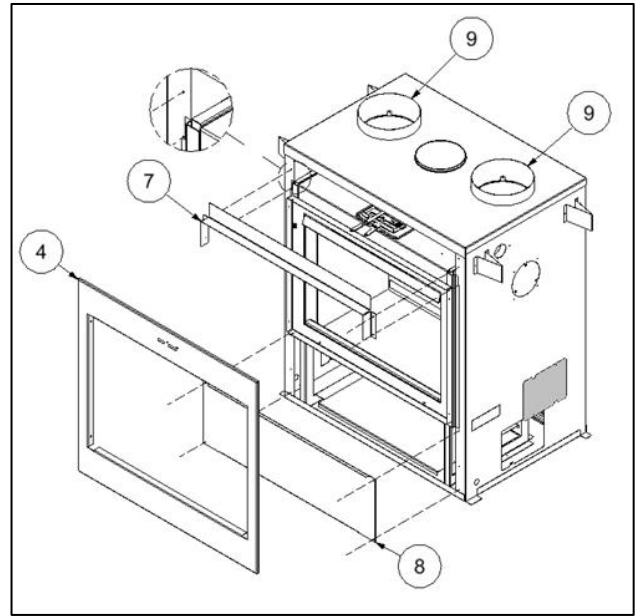


Figure 3-17: Clean Face Surround Installation

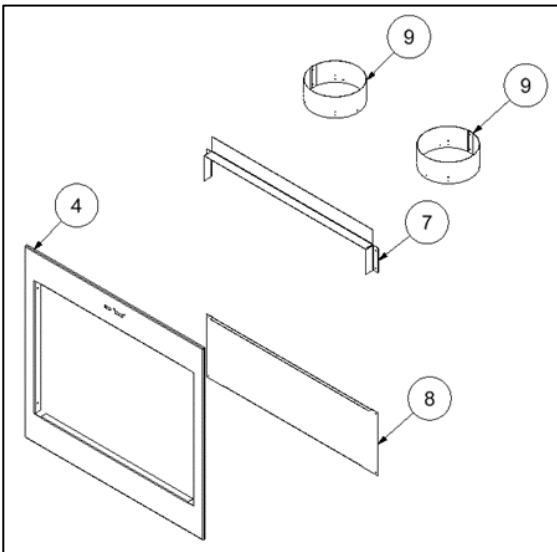


Figure 3-18: Clean Face Rectangular Surround Components

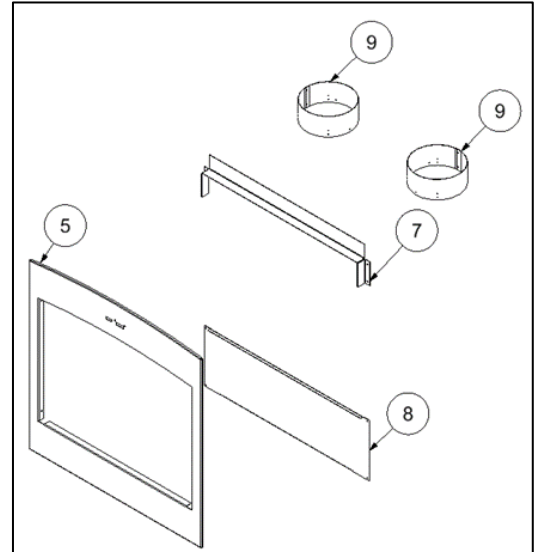


Figure 3-19: Clean Face Arched Surround Components

Table 3-4: UWA620 Components

CLEAN FACE RECTANGULAR		
ITEM	DESCRIPTION	QTY
4	Clean Face Rectangular Surround	1
7	Clean Face Upper Cover	1
8	Clean Face Lower Cover	1
9	Duct Adapter	2

Table 3-5: UWA630 Components

CLEAN FACE ARCHED		
ITEM	DESCRIPTION	QTY
5	Clean Face Arched Surround	1
7	Clean Face Upper Cover	1
8	Clean Face Lower Cover	1
9	Duct Adapter	2

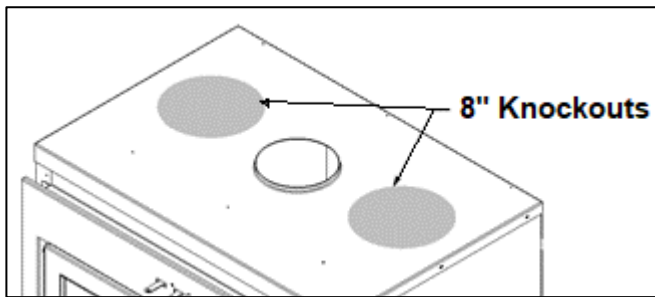


Figure 3-20: 8 Inch Knockouts for Gravity Kit

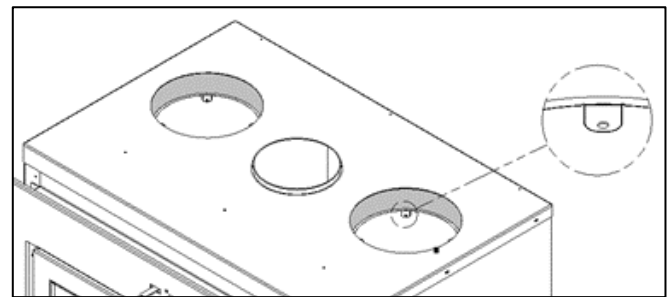


Figure 3-21: Tabs Inside the 8 Inch Knockouts

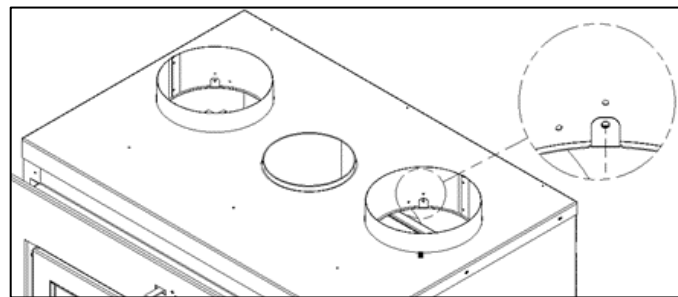


Figure 3-22: Installation of 8 Inch Duct Adapters

## 3.5 Gravity Kit Installation

The Clean Face surround comprises no louvers; however, an intake into the chase and an outtake through gravity ducts is required for this configuration. The instructions below describe the installation of the intake openings, and the gravity ducts/outtakes. Note that in order to connect the gravity ducts to the sides of the chase, the sides of the chase need to be constructed and the front of the chase needs to remain open; to connect the gravity ducts to the front of the chase, the sides need to remain open and the front of the chase needs to be constructed (Figure 3-24). Please note that the SUPREME KG540 kit and the UCAC8 semi-rigid insulated ducts are required for the Gravity Kit installation (Figure 3-23).

### 3.5.1 Dual Louver Gravity Ducts

1. Determine the two locations of the air intakes on the chase and cut a rectangular opening 10.5" (W) X 9.5" (H). Note that a distance of 5" is required from the floor.
2. Determine the two locations of the air outtakes on the chase and cut a rectangular opening 10.5" (W) X 9.5" (H). Note that a minimum distance of 64" is required from the floor and a minimum of 6" is required from the ceiling (Figure 3-40). Please note that the air outtake grilles can be installed in the same room or in different rooms from each other. If the grilles are installed at different heights, more heat will be distributed to the highest one.
3. From the exterior of the chase, place the duct/louver adapter into the air outtake hole and secure it onto the wall with screws. Repeat for the other outtake.
4. Within the chase, place the grooved end of the adjustable 45° elbow into the flange of the duct/louver adapter and secure it using aluminum tape. Repeat for the other outtake.
5. Measure the distance between the duct adapter on top of the unit and the flange of the duct/louver adapter and cut the 8" semi-rigid insulated duct (SUPREME part number UCAC8) to the necessary length. Repeat for the other outtake.
6. Complete the connections by sliding the ducts over the duct adapters and the flanges of the duct/louver adapters and tighten both ends with the worm gear clamps.
7. From the exterior of the chase, fasten the grilles over the intake and outtake openings with the beige screws.

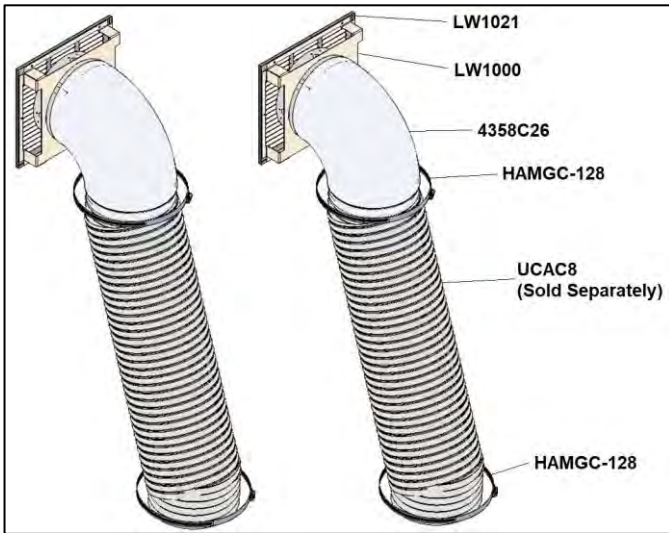


Figure 3-23: KG540 Assembly Diagram

Table 3-6: KG540 Components

ITEM	DESCRIPTION	QTY	ILLUSTRATION
LW1021	11"x 12" grille for intakes and outtakes	4	
LW1000	Duct/louver adapter	2	
4358C26	45° elbow, 8" diameter	2	
HAMGC-128	8" worm gear clamp	4	

**WARNINGS:**

- The gravity ducts must extend upwards from the top of the unit and cannot exceed 10 feet.
- The ducts should never extend downwards; only upwards.
- The air outtakes must be installed at a minimum of 64 inches from the floor.
- The gravity ducts must not be connected to a central heating system.
- A clearance must be maintained between the gravity ducts and the chimney.
- The intake swivel covers at the bottom sides must remain open for all Clean Face installations. Refer to Figure 3-16.

**Refer to Figure 3-39 for clearances to combustibles.**

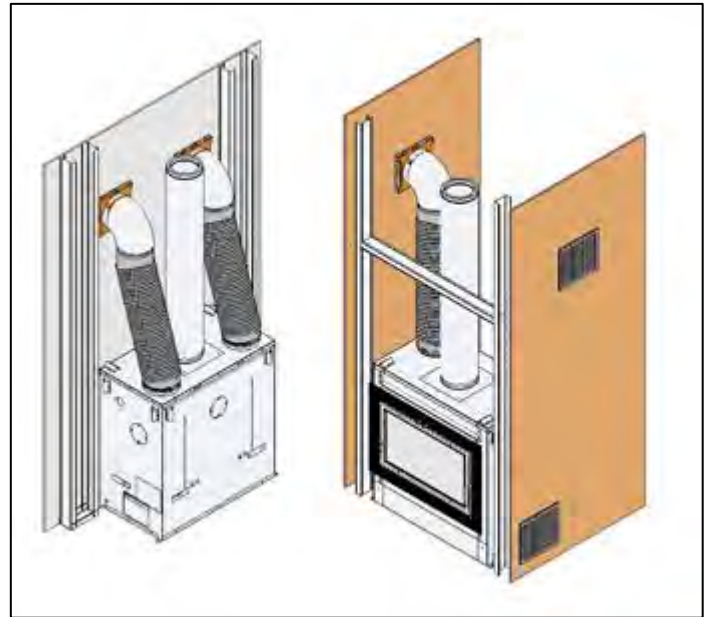


Figure 3-24: Gravity Kit Installation



### 3.5.2 Single Linear Front Louver

The clean face surround comprises no louvers; however, an intake into the chase and outtake through gravity ducts is required for this surround configuration. The instructions below describe the installation of the intake openings and the single linear front gravity ducts/outtakes. Please note that the SUPREME LV32 kit is required for the Gravity Kit installation with a single linear front louver (Figure 3-25).

**ATTENTION:** The single linear front louver requires framing for installation. The recommended framing dimensions of the single linear front louver are 40" x 7.5". A minimum distance from the ceiling to the top of the louver is 5.5". The base of the louver must be at least 64" from the base of the unit.

**Refer to Figure 3-11 in Section 3.3 for framing requirements of single linear front louver installations.**

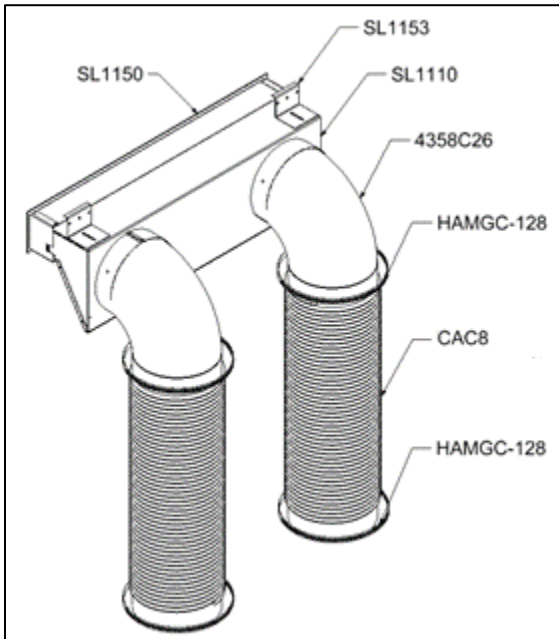


Figure 3-25: LV32 Assembly Diagram

Table 3-7: LV32 Components

ITEM	DESCRIPTION	QTY	ILLUSTRATION
SL1150	Linear front outtake louver	1	
SL1110	Linear duct/louver adapter	1	
4358C26	90° elbow, 8" diameter	2	
HAMGC-128	8" worm gear clamp	4	
CAC8	8" duct 5' long	2	

**WARNINGS:**

- A minimum clearance of 1 inch is required from the CAC8 ducts to combustible materials.
- The gravity ducts must extend upwards from the top of the unit and cannot exceed 10 feet.
- The ducts should never extend downwards; only upwards.
- The gravity ducts must not be connected to a central heating system.
- The intake swivel covers at the bottom sides must remain open for all Clean Face installations. Refer to Figure 3-16.

**Refer to Figure 3-41 for single linear louver front chase.**

## INSTALLATION:

1. Install the linear duct/louver adapter (item SL1110 of Figure 3-25 and Table 3-7) onto the framing of the single linear front louver (Figure 3-26). The brackets of the SL1110 (SL1153 of Figure 3-25) are adjustable to accommodate different wall finishing materials (Figure 3-27).
2. Temporarily install one of the 90° elbows (4358C26 of Figure 3-25 and Table 3-7) on the linear duct/louver adapter (Figure 3-28) and measure the distance L indicated in Figure 3-29.

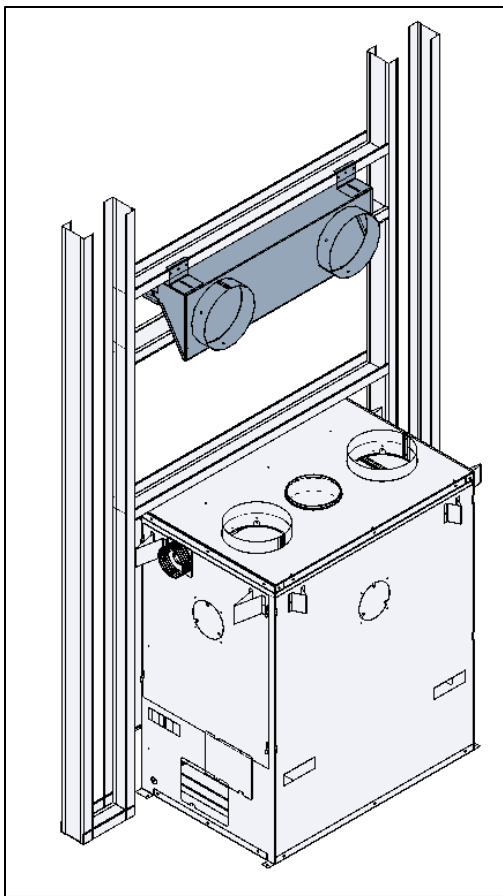


Figure 3-26: Linear Duct/Louver Adapter Installation

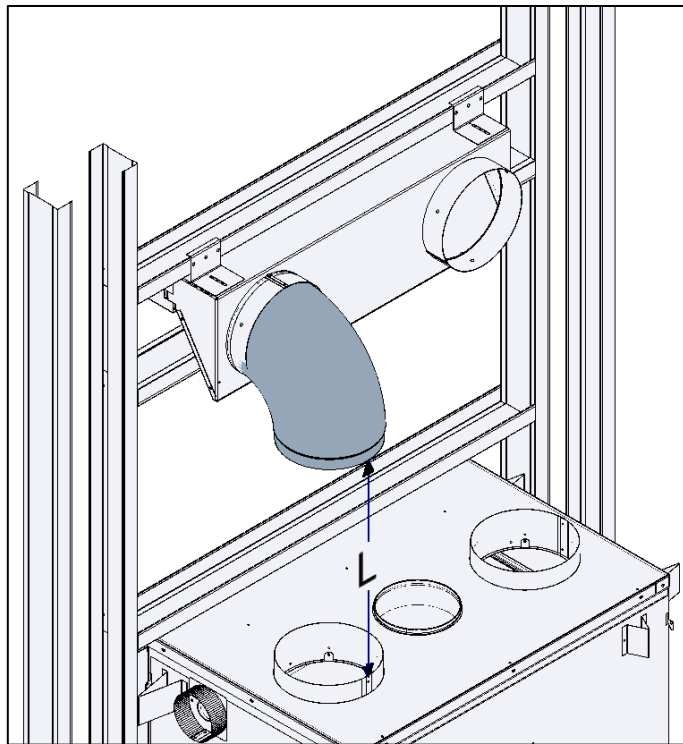


Figure 3-28: Elbow Temporarily Installed on Linear Duct/Louver Adapter

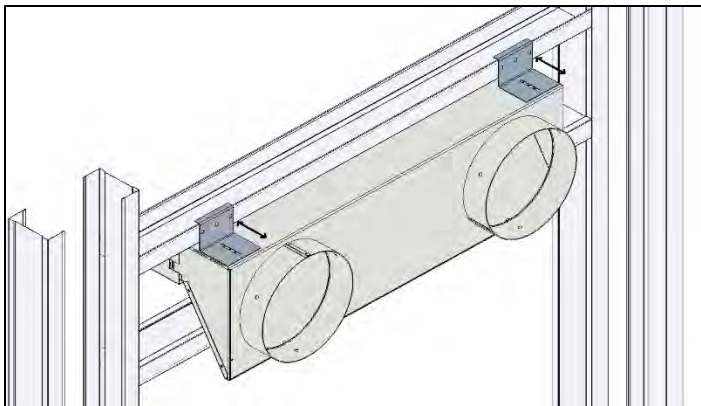


Figure 3-27: Adjustable Brackets of Linear Duct/Louver Adapter

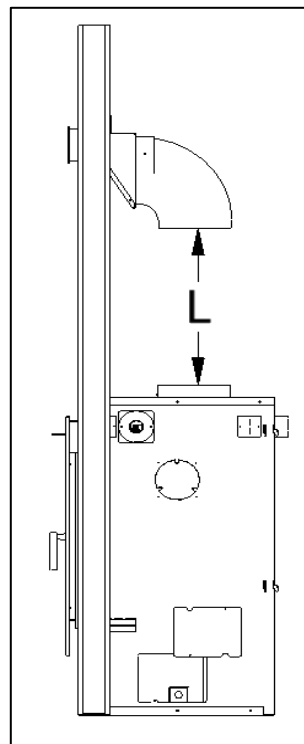
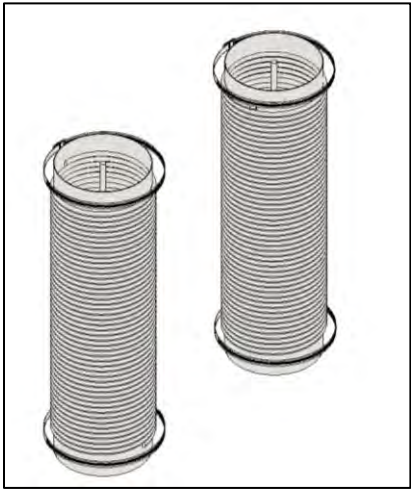
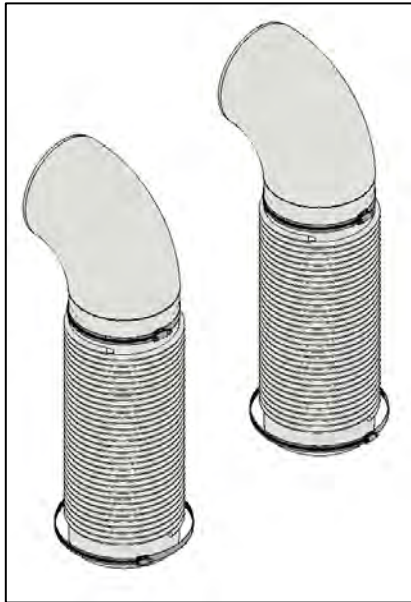


Figure 3-29: Distance L

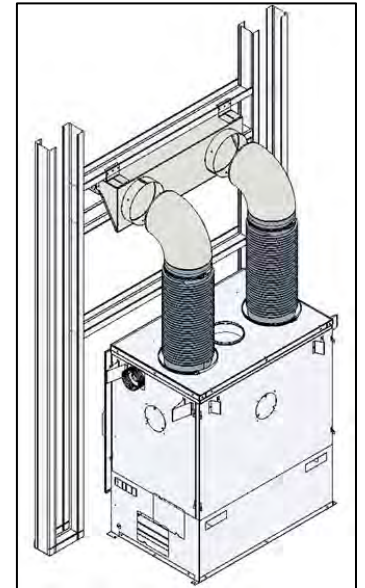
3. Uninstall the 90° elbow from the linear duct/louver adapter.
4. Add 3 inches to the distance L and cut the two CAC8 ducts (Figure 3-25 and Table 3-7) to that length.
5. Insert a worm gear clamp on each end of the ducts (Figure 3-30).
6. Install the 90° elbows on one end of the ducts and secure them with the worm gear clamps (Figure 3-31).
7. Insert the other ends of the ducts on the 8 inch duct adapters on top of the fireplace (Figure 3-32).



**Figure 3-30: CAC8 Ducts with Worm Gear Clamps**

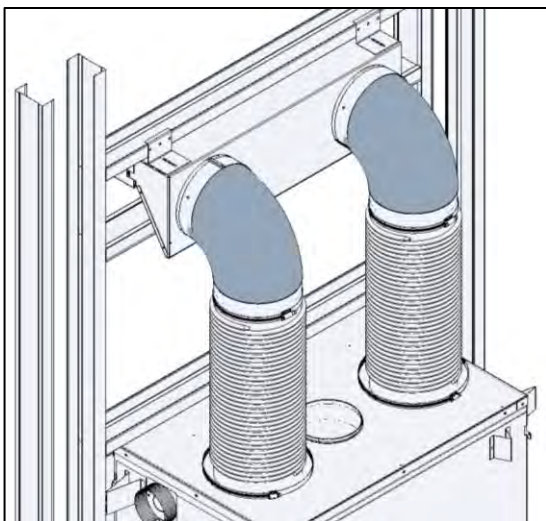


**Figure 3-31: Installation of 90° Elbows on CAC8 Ducts**

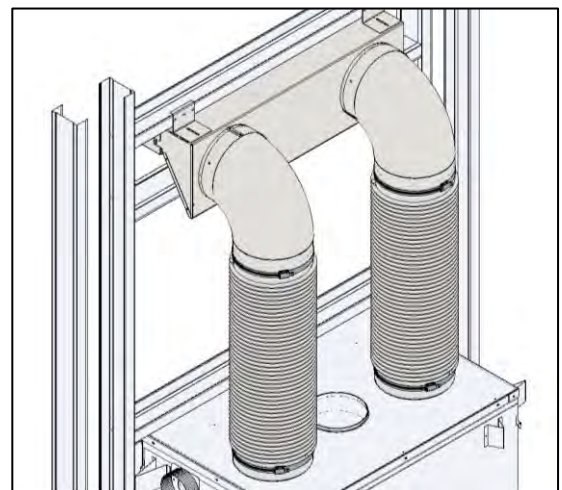


**Figure 3-32: CAC8 Duct Installation**

8. Connect the elbows to the linear duct/louver adapter and secure them with sheet metal screws (Figure 3-33).
9. Tighten the worm gear clamps to secure the assembly on top of the fireplace (Figure 3-34).



**Figure 3-33: Installation of 90° Elbows onto Linear Duct/Louver Adapter**



**Figure 3-34: The Two Bottom Worm Gear Clamps Tightened**

- Once the chase has been built, locate the linear duct/louver adapter outlet and cut an opening on the chase finishing material of 30.75" (W) X 4.5" (H) centered with the outlet (Figure 3-35).

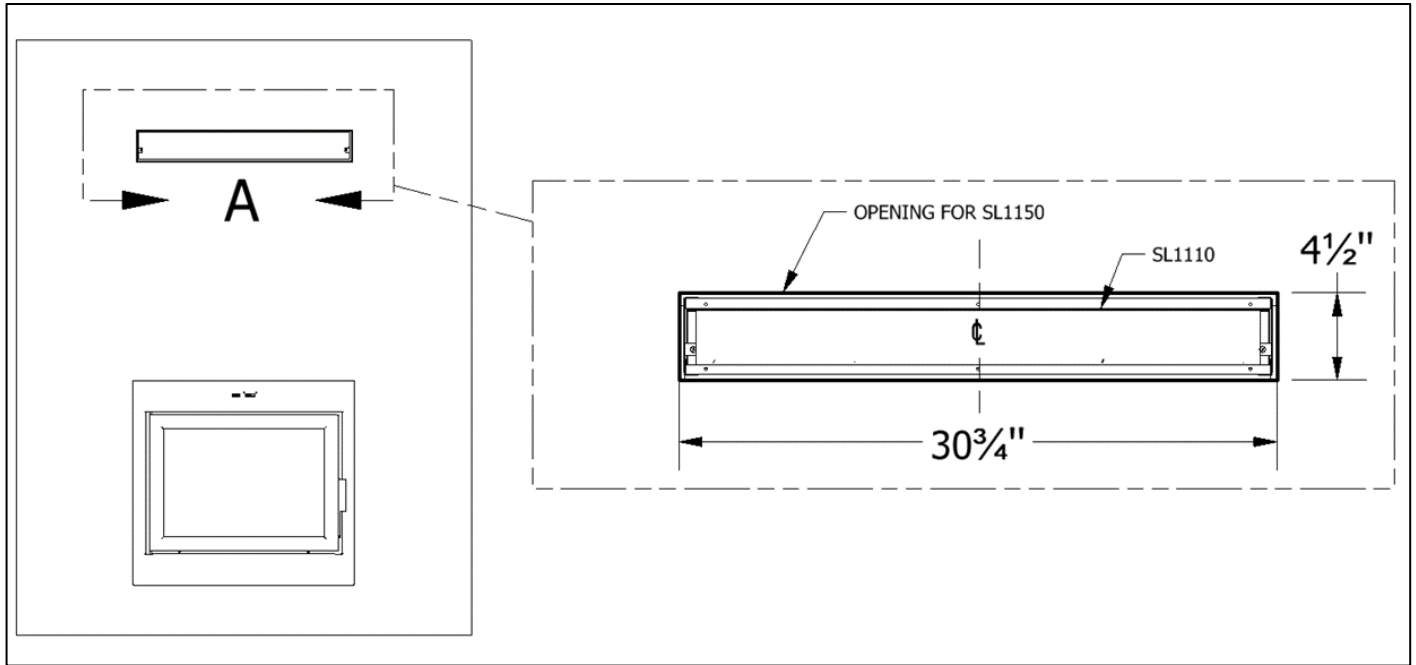


Figure 3-35: Opening for Air Outtake

- Determine the two locations of the air intakes on the chase and cut the rectangular openings of 10.5" (W) X 9.5" (H) (Figure 3-36).  
Note: A distance of 5 inches is required from the floor.
- From the exterior of the chase, fasten the SL1150 linear front outtake louver and the two LW1021 intake grilles (Refer to Table 3-7).

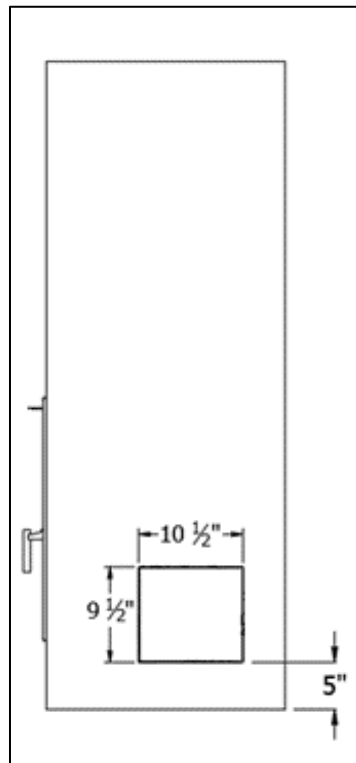


Figure 3-36 Opening for Air Intake Two Required

### 3.6 Hearth Extension

The hearth extension of the Elegance 42 must comprise of a non-combustible material, such as steel, cement or mortar, bricks, or ceramic tiles. Note that unidentified materials may be combustible; verify product specifications prior to installation. The hearth extension must extend a minimum of 18" from the front of the door, 8" from side of the outer frame of the door and extended all the way to the unit (see Figure 3-37 for dimensions and Figure 3-38).

**CAUTION: Make sure to remove any carpet or fabric under the hearth extension.**

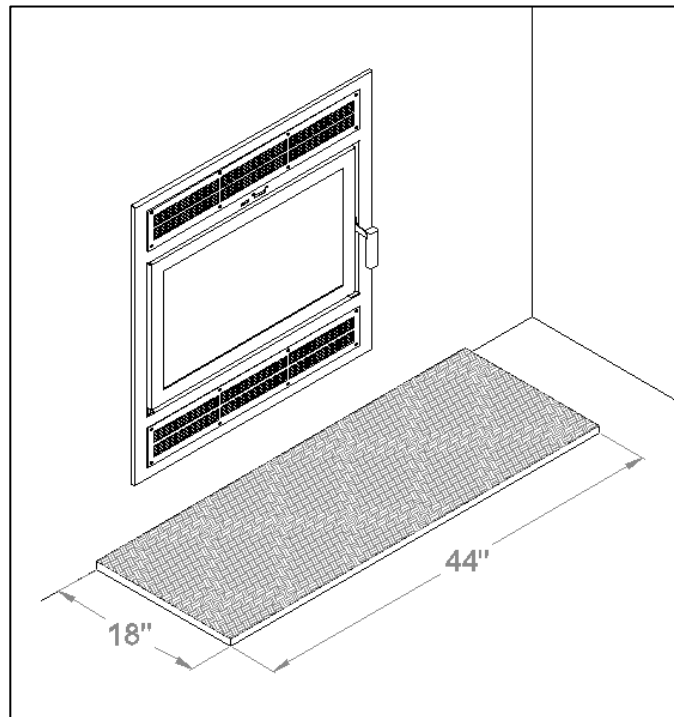


Figure 3-37: Hearth Extension

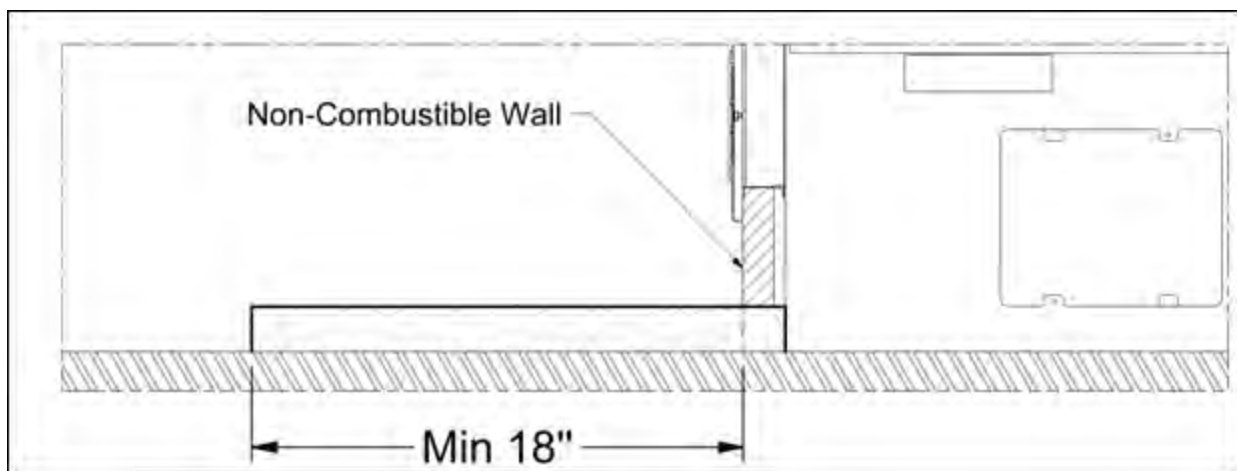


Figure 3-38: Hearth Extension Extended to Unit



### 3.7 Chase Installation

A portion of the front of the chase must be constructed out non-combustible material. Refer to Figure 3-39, 3-40, and 3-41 for dimensions. Note the chase must be properly fastened onto the framing structure.

**WARNING: Do not nail or screw the chase onto the fireplace.**

For the clean face surround option, two intake openings must be constructed onto the chase, as well as two outtake openings or one if installing the linear single louver front (Section 3.5). Refer to Figures 3-39 and 3-41 for minimum clearances.

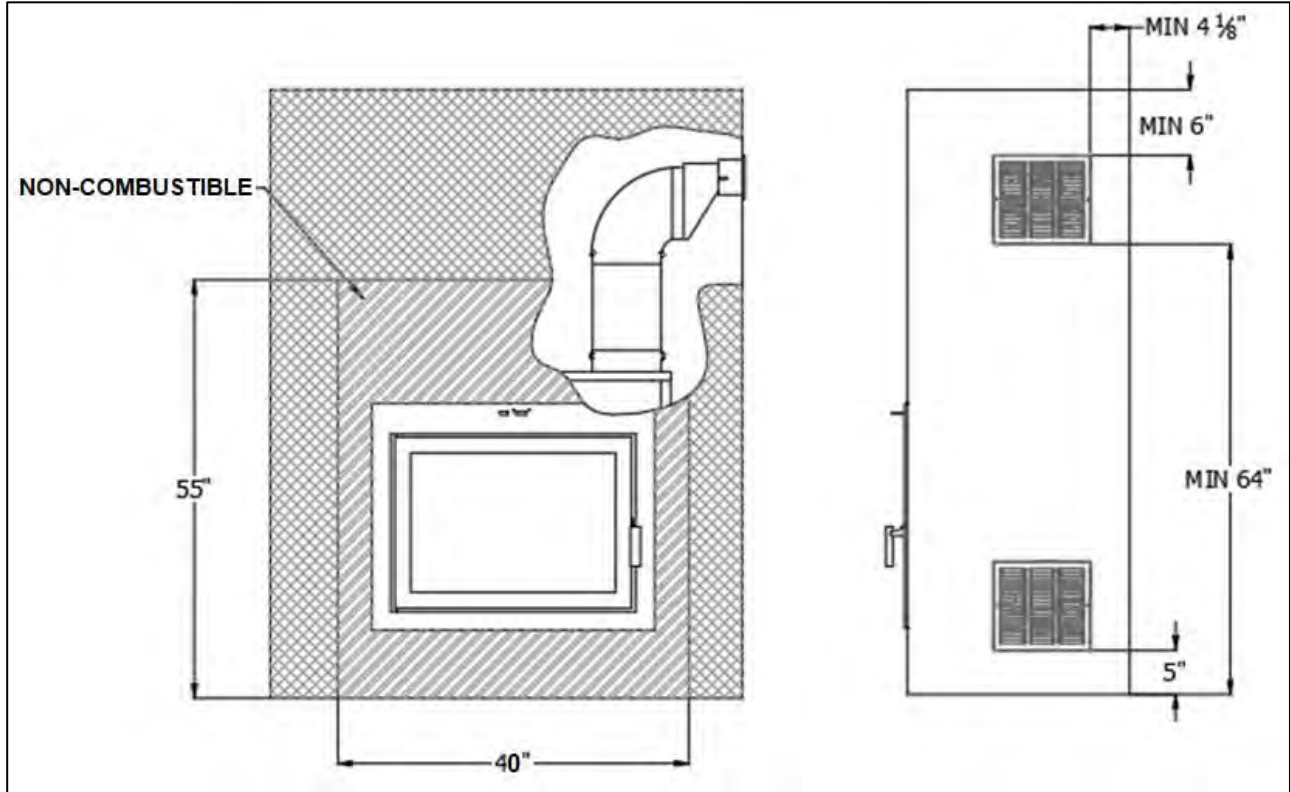


Figure 3-39: Front and Side Chase for Clean Face Dual Louver Configuration

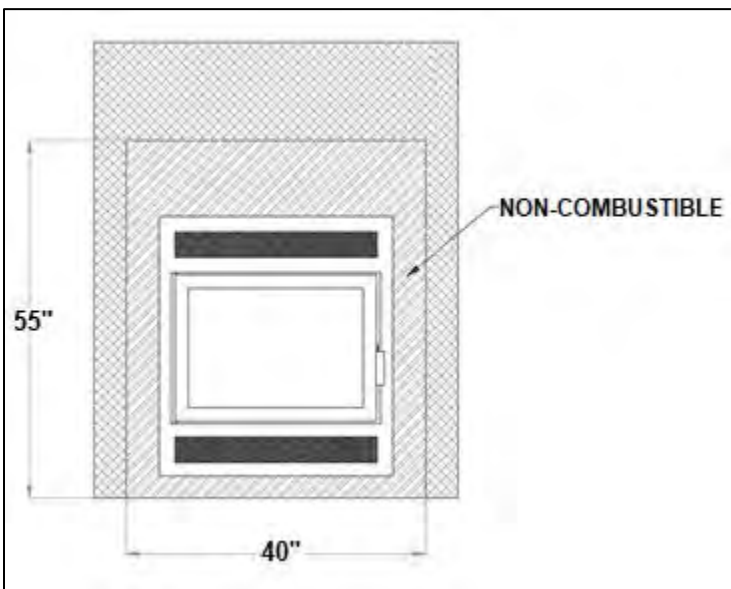


Figure 3-40: Front Chase for Traditional Surround Option

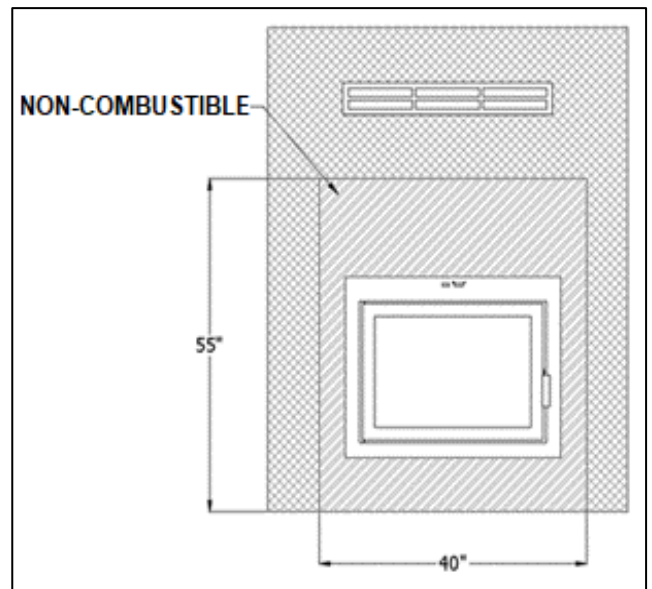


Figure 3-41: Front Chase for Clean face Linear Louver Configuration

### 3.8 Clearances to Combustibles

The clearances below must be respected to ensure safe operation of the unit under normal and extreme conditions. Failure to follow the information below is a safety hazard and may result in property damage.

Table 3-8: Overall Clearances

Combustible	Clearance	Reference
Side Wall	16" (41 mm)	Outer edge of fuel door
Side Trim	4" (10 mm)	Outer edge of fuel door
Ceiling	84" (214 mm)	Base of unit

Table 3-9: Combustible Mantel Clearances

Maximum Mantle Depth	Distance from the Base of the Elegance 42 to the Bottom of the Mantle
3" (7.6 mm)	51.5" (130.8 mm)
5" (12.7 mm)	53.5" (135.9 mm)
7" (17.8 mm)	55.5" (141 mm)

The depth of the mantle is measured from the face of the fireplace door. When the non-combustible wall is recessed, the depth of the mantle can be increased by the amount of the recess (see Figure 3-42). Note that a combustible mantle cannot be installed below the minimum clearance of 51.5" (from the bottom of the mantle to the base of the unit). A non-combustible mantle doesn't require a minimum distance from the fireplace.

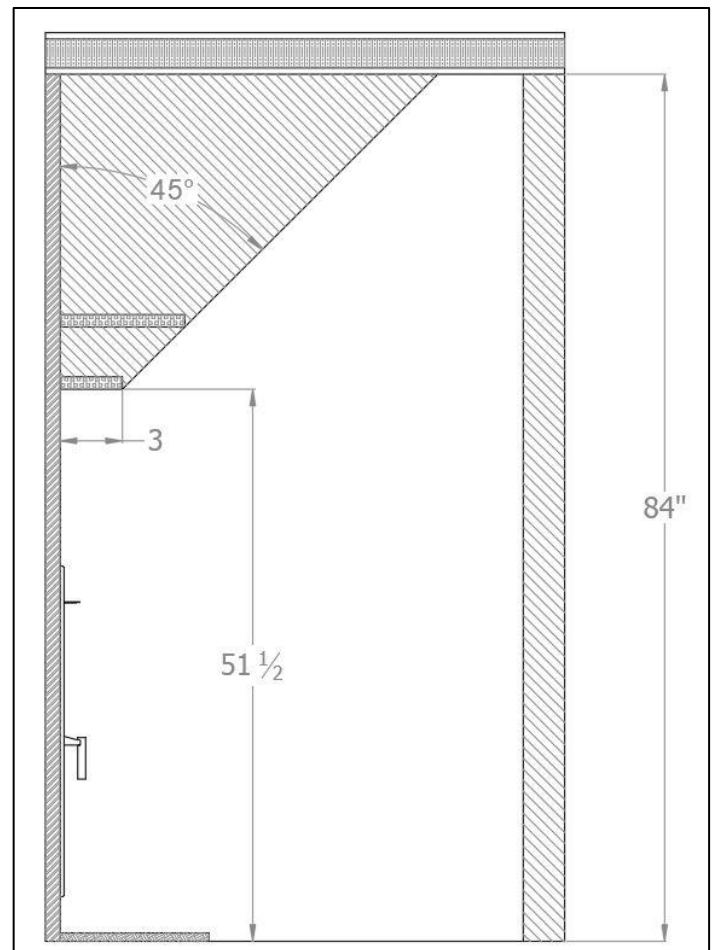


Figure 3-42: Mantel Clearance

### 3.9 Blower Kit

The Elegance 42 blower kit comes with two high performance 130 CFM blowers, which have an electrical rating of 115 V, 60 Hz, and 56 W. A variable speed control (rheostat) and a heat sensor (therm-o-disc) are included with the kit. **WARNING: Only a blower provided by SUPREME FIREPLACES INC. can be installed into the fireplace. Substituting the blower kit may result in overheating, will void the warranty and can be hazardous.**

The electrical connection of the blowers is to be performed by a certified electrician. Note that it is recommended that the wiring of the blowers be done before the installation of the surround kit. The blowers and the electric box are located respectively at the back/bottom and at the front/bottom of the unit (Figure 3-43).

**WARNING: Make certain that the fireplace is not in operation and the blowers are unplugged (breaker off) before accessing the electrical wiring of the blower kit.**

For maintenance or replacement purposes, the blowers and the electrical box are accessible from within the bottom of the firebox (Figure 3-44). 1) Remove the floor plate. 2) Disassemble and remove the stainless steel cover on the bottom of the firebox by unscrewing it. Take caution to the therm-o-disc and wiring assembled onto the stainless steel bracket.

The following are instructions on installing the blower kit into the Elegance 42 (refer to Figure 3-45 for the electrical diagram):

1. Using two screws, install the therm-o-disc onto the L bracket located under the firebox.
2. Connect the black wire of the power supply to the therm-o-disc.
3. Connect the therm-o-disc to the black wire of the rheostat (install/mount the rheostat at a convenient location).
4. Connect the white wire of the rheostat to the blowers.
5. Connect the blowers to the white wire (neutral) of the power supply.
6. Ground the connection with the green wire in the electric box.

Once the electrical connections are completed, the blowers will turn on and turn off automatically during the operation of the unit. As the temperature of the fireplace increases and the therm-o-disc reaches 95°F, the blowers will turn on. Note that the average time it takes for the blowers to activate is between 30 to 45 minutes after starting a fire. The blowers will turn off once the fireplace has cooled down and the therm-o-disc is 85°F. The speed of the blowers can be adjusted with the variable speed control (rheostat) mounted on the wall. It is safe to operate the Elegance 42 in the event of a power failure (blowers not powered).

Note: The blowers sit on a fixture. If a blower needs to be removed for maintenance, the fixture's pin needs to be unbent and the blower can then be removed by lifting it upwards, out of the fixture. See Figure 3-47.

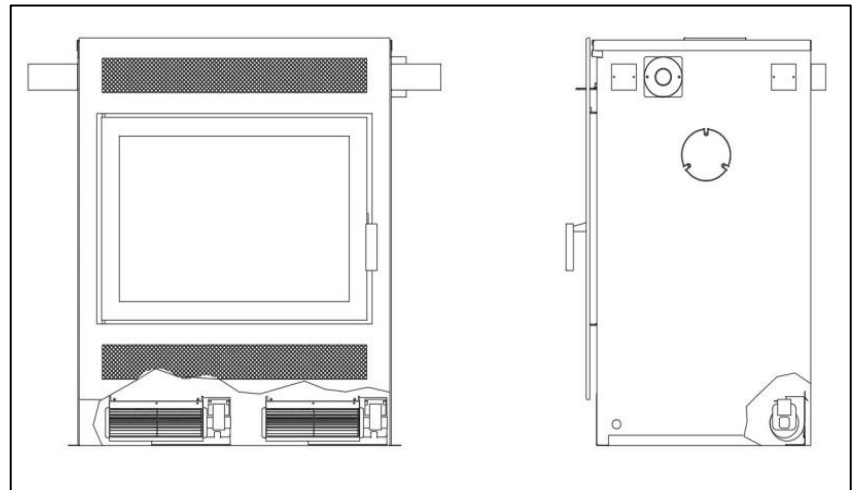


Figure 3-43: Location of Blower

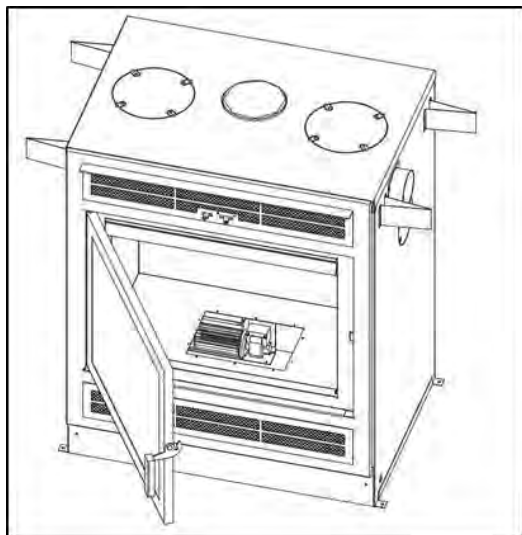


Figure 3-44: Access to Blowers

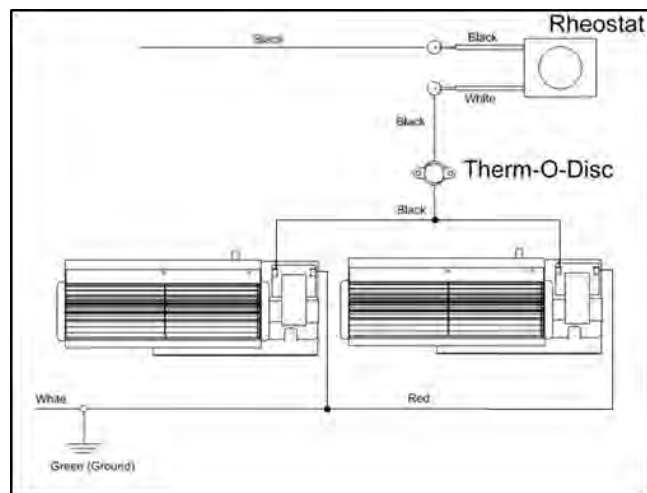


Figure 3-45: Electrical Diagram

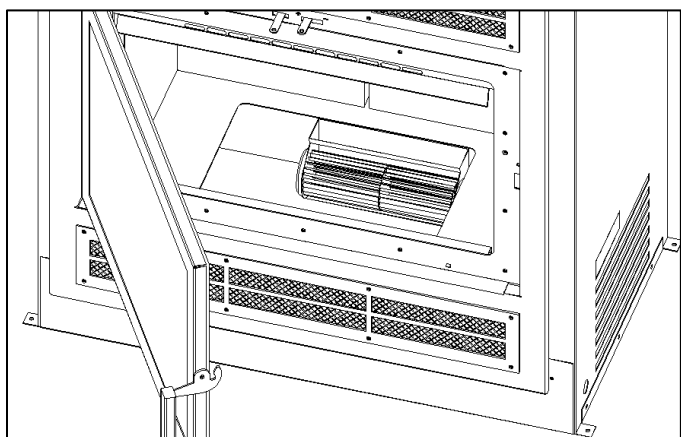


Figure 3-46: Access to Blowers

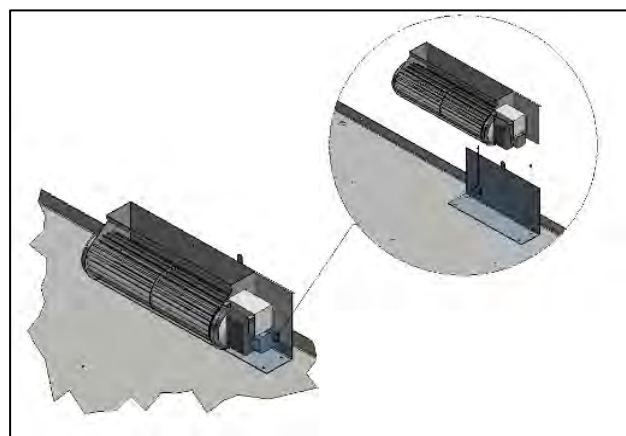


Figure 3-47: Blower and its Fixture

## 4 OPTIONS

### 4.1 Hot Air Kit

The hot air system is an optional kit intended to bring hot air from the fireplace to a remote area using a 250 CFM blower. The system is designed to distribute heat with ducting lengths up to 25 feet. Note that only an insulated flexible duct capable of withstanding a maximum temperature of 210°F can be installed with this kit. Note that a minimum distance of ten inches is required between the side of the unit connecting to the hot air kit and the framing to allow significant space (refer to Figure 3-3). It is possible to install up to three air ducts and to direct the ducts upwards or downwards.

**CAUTION: Only a hot air kit provided by SUPREME FIREPLACES INC. can be installed onto the fireplace. Substituting the hot air kit may result in overheating, will void the warranty and can be hazardous.**

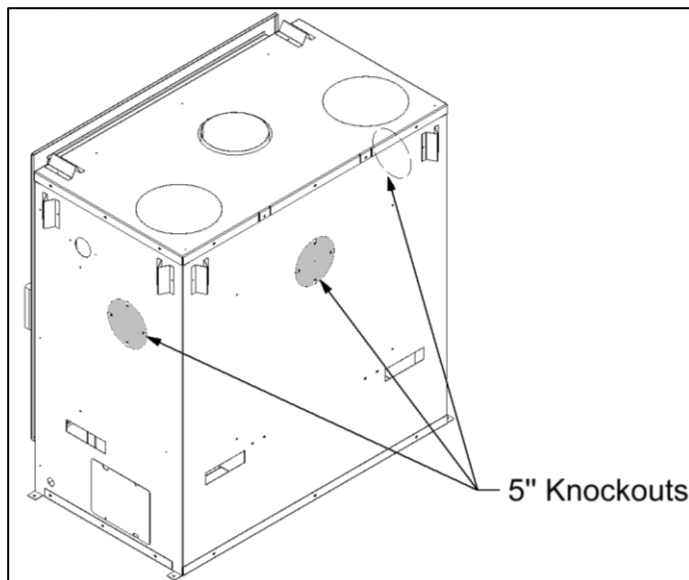


Figure 4-1: Hot Air Kit Knockouts

### WARNINGS

- Do not install the blower within the casing of the fireplace.
- The minimum wall opening to run the duct is 6" x 7.5".
- When the hot air duct passes through the chase of the fireplace, the minimum distances to combustible materials must be respected. The duct must be secured to prevent accidental displacement.
- The minimum distance between the blower and the fireplace is 3 feet.
- The duct must not be in contact with the top of the fireplace.
- Do not use a speed control for the blower.
- The top of the hot air grille must be a minimum of 2 inches away from a flat ceiling.
- The hot air grille must be installed in a location that ensures the effective dispersion of the hot air.
- The hot air grille cannot be installed on a floor.
- If the grille is installed near a wall or ceiling, the grille openings must be positioned in such a way to direct hot air away from the wall or ceiling.

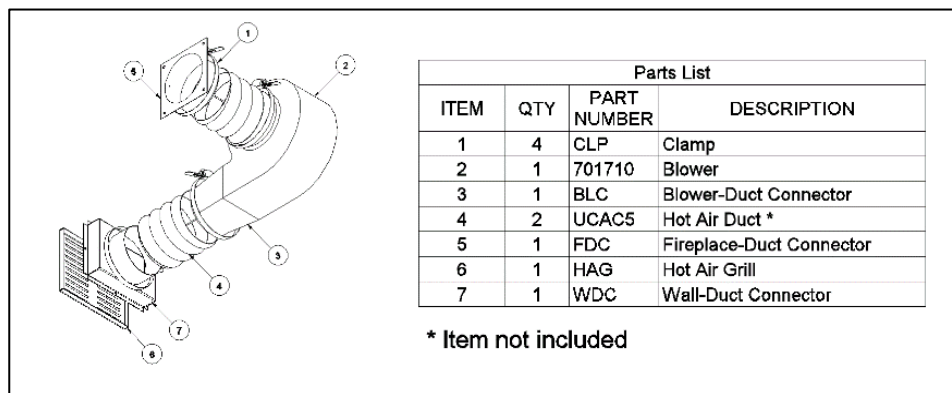


Figure 4-2: Hot Air Kit Parts List



### Installation:

1. Remove the 5" knockout on the exterior casing of the fireplace using a flat head screwdriver (Figure 4-1).  
**WARNING: Only remove the knockouts that will be connected to a hot air kit system.**
2. Install the fireplace duct connector (FDC - #5) on the opening using four screws.
3. In the room where the heat will be distributed, cut an opening of 6" X 7.5".
4. Find a suitable location to install the blower (701710 - #2).
5. Install the wall-duct connector (WDC - #7).
6. Install the air duct (UCAC5 - #4)\* and secure it with a clamp (CLP - #1). The exterior of the insulated duct can be in contact with combustible materials.
7. Install the wall grille (HAG - #6).
8. Make the electrical connections (Figures 4-3 and 4-4). Note that the power supply to the blower is 115V.

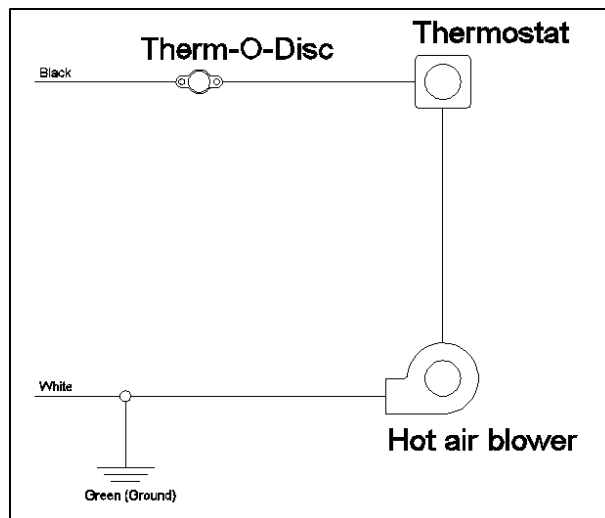


Figure 4-3: Electrical Diagram for Hot Air Kit

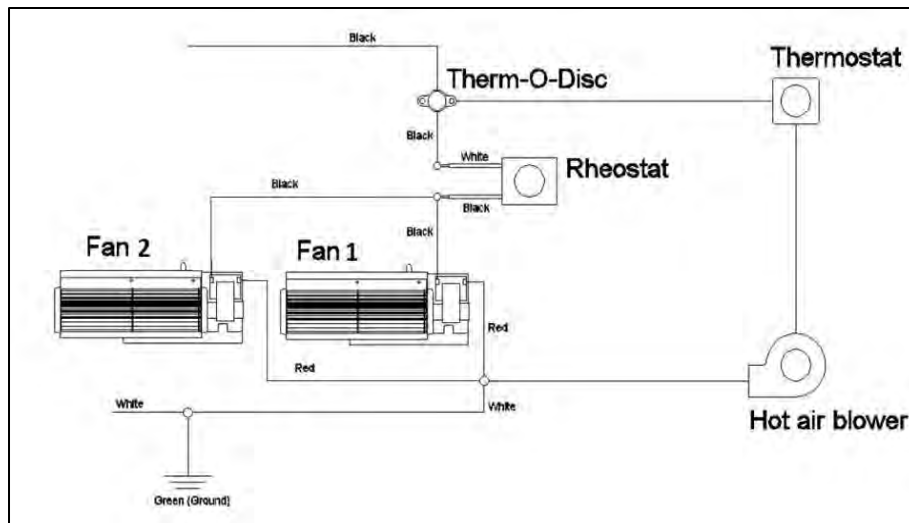


Figure 4-4: Electrical Diagram for Parallel Connection of Hot Air Kit and Blower Kit

## 4.2 Fresh Air Kit

Sufficient air exchange is necessary for the fireplace to operate properly and to maintain a good combustion. In an airtight household, the fireplace may not function as designed due to a lack of air; it is therefore recommended to install the fresh air kit in such cases. The fresh air system is an optional kit intended to bring combustion air into the fireplace from an exterior source. Note that a minimum distance of seven inches is required between the side of the unit connecting to the fresh air kit and the framing to allow significant space (refer to Figure 3-4).

Note that the Elegance 42 is designed to use a minimum amount of air during operation. Using an air exchanger or simply opening a nearby window/door during the ignition of the unit will achieve a similar result as the fresh air kit.

When the fireplace is idle, there is no air escaping from the house through chimney. **Consult a local authority having jurisdiction (such as the fire department, the municipal building department, the fire prevention bureau) to determine if it is mandatory to install a fresh air kit in your area.**

### General Notes:

The outside air kit should be installed according to the following guidelines:

- The air duct must be insulated, wrapped with a vapor barrier, and have an inner diameter of 4 inches.
- The length of the air duct should not exceed 25 feet.
- The duct should not be elevated more than 10 feet from the base of the unit.
- Fresh air must come from the outside and not from another room or the attic.
- The outside register must be away from automobile exhaust fumes, gas meters, or other vents.
- Avoid installing the air register where it will likely be covered by snow or exposed to strong winds.
- The air register can be installed above or below the level of the fireplace.
- Use the SUPREME FIREPLACES INC. Fresh Air Adapter (ADP4) provided with the unit.
- Use the SUPREME FIREPLACES INC. Fresh Air Kit (UPEA4).

### Installation:

1. Cut 4 ½" diameter hole on the exterior wall of an ideal location.
2. Install the air register on the exterior wall.
3. Insert the fresh air adapter (ADP4) into the fireplace from the exterior casing. Make sure that the adapter is properly inserted into the combustion air box on top of the firebox.
4. Secure the fresh air adapter to the side of the fireplace using two screws.
5. Install the air duct and secure it with worm gear clamps.

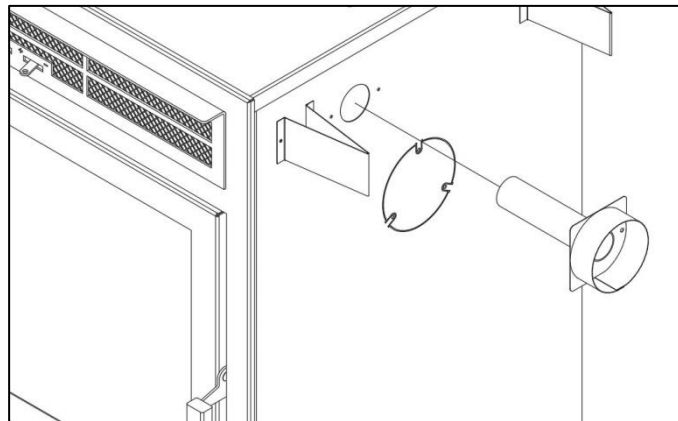


Figure 4-5: ADP4 Installation in Fireplace

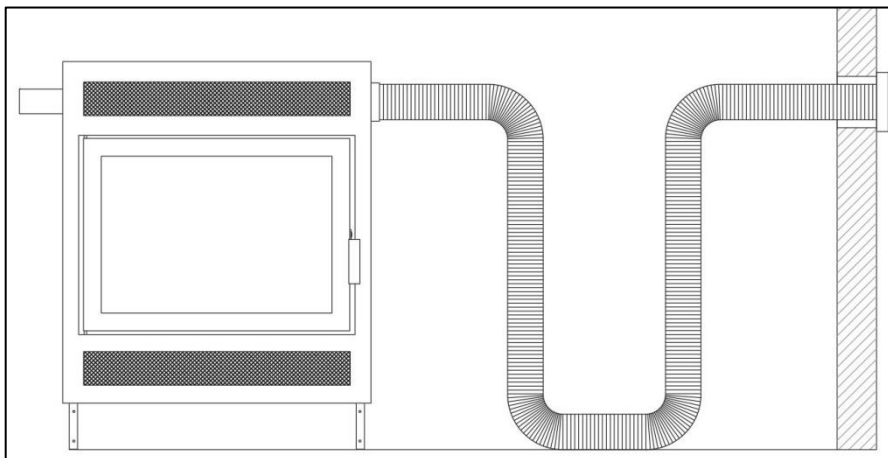


Figure 4-6: Installation of Fresh Air Kit

# 5 OPERATION INSTRUCTIONS

## 5.1 Fuel

The Elegance 42 is designed to burn natural wood only. Higher efficiencies and lower emissions generally result when burning air dried seasoned hardwoods (moisture content below 20%), as compared to softwoods or to green or freshly cut hardwoods. The following are a few signs indicating that firewood is sufficiently dry for use: (a) cracks on the ends and surface of the logs, (b) lighter in weight, and (c) color (yellow/grey). It is recommended to use a moisture meter with pin sensors for determining accurately the moisture content of firewood (read manufacturer's instruction manual before operating). The optimum log length is 18-22 inches, preferably split in halves or quarters and left to dry under a cover or away from external elements for a minimum of one year prior to use. Use good quality dry cordwood only. DO NOT burn garbage, lawn clipping, yard waste, materials containing rubber (including tires), materials containing plastic, waste petroleum products, paints, paint thinners, asphalt products, materials containing asbestos, construction debris, demolition debris, railroad ties, pressure-treated wood, manure, animal remains, coal, salt water driftwood or other previously salt water saturated materials, unseasoned wood, paper products, cardboard, plywood, particle boards, or other foreign materials in this product. The prohibition against burning these materials does not prohibit the use of fire starters made from paper, cardboard, saw dust, wax and similar substances for the purpose of starting a fire in an affected wood heater. Burning these materials may result in release of toxic fumes or render the heater ineffective and cause smoke. Do not over fire the Elegance 42 fireplace. Over firing will damage the fireplace, is hazardous and will void the warranty. NOTE: Gas logs cannot be installed in the Elegance 42 fireplace.

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

Ecological or compressed logs containing chemical additives are not tested and approved to be used with the Elegance 42. Using them will overheat and damage the fireplace and void the warranty. Ecological or compressed logs that are 100% wood and contain no other additives can be safely used in the Elegance 42. Never use more than two of these logs at a time. Using more is not only dangerous, but will damage the fireplace and void the warranty. Follow the ecological log manufacturer's safety guidelines and recommendations and be sure that they are intended for use in fireplaces. Reload only once the previous load of wood has been consumed and only embers remain.

**WARNING: Do not keep the door open while the fireplace is in operation.**

## 5.2 First Fires

For the first three fires, burn a maximum of three logs at the medium to low burn rate (refer to Section 5.3) to allow for proper conditioning of the unit. Newly quarried Soapstone naturally contains moisture that must be slowly expelled by building smaller fires, otherwise the high temperatures can crack the stone.

### CAUTION:

- Never throw wood into the fireplace. The impact can cause the soapstone to crack.
- Only use dry firewood.
- Do not use a fireplace grate in the Elegance 40.

Due to oil residues and the curing of the paint of the fireplace, it is normal to smell an odor for the first fires of the Elegance 40. Open a window or a dr near the fireplace to ventilate the house during the first fires. Oil residues may cause light smoking.

## 5.3 Operating the Combustion Air Control

The burn rate and the heat output are related to the amount of air entering into the firebox. The combustion air control of the Elegance 42 has two components: the Activator and the Burn Rate Selector (see Section 2.3). When starting the fire or when adding a new charge of wood, the fireplace needs additional air in order to establish a good fire. When the wood starts to burn properly, the amount of air can be reduced depending on the heating requirements.

The left combustion control lever is the Activator. When starting a fire or adding a new load of wood, the Activator must be pushed in to allow maximum air to enter the firebox. The right combustion control lever is the Burn Rate Selector. The Burn Rate Selector can slide sideways to achieve different burn rates. When the Burn Rate Selector is positioned to the left, a maximum burn rate is achieved and when it is positioned to the right, a minimum burn rate is set. Keeping the Burn Rate Selector to the right will burn the wood slower. Keeping the Burn Rate Selector to the left will provide a stronger fire and keep the glass of the fireplace cleaner for longer. Adjust the burn rate according to your heating requirements and the quality of your wood. The combustion air control will automatically and gradually close the primary air source to the selected burn rate setting (right lever) with the presence of heat to maximize the burn time.

**NOTE:** The Burn Rate Selector can remain at the same setting at all times if the burn rate is satisfactory. However, the Activator must be pushed in when starting a fire or when adding a new load of wood.

**WARNING:** The combustion air openings should never be obstructed.

**WARNING:** Never manipulate the Combustion Air Control with bare hands as it gets hot when the Elegance 42 is in operation. Use the Cold Hand Key (see Section 2.4) to adjust the Combustion Air Control.

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

## 5.4 Starting a High Efficiency Fire

The Elegance 42 has patented technologies and innovative features that make starting a fire quick and easy. Before starting a fire, assure that all the safety precautions mentioned in the owner's manual are being respected. The following instructions describe starting a fire in Elegance 42 fireplace using a "top-down" approach, which results in a cleaner, more efficient, and longer burn:

- a) Place two logs in the firebox. The logs should sit directly on the hearth from left to right or east to west (parallel with the door). Do not use a fireplace grate.
- b) Place a third and fourth log above the two logs of step a) front to back or north to south.
- c) Depending on the size of the logs, a fifth log can be placed above the logs of step a) and step b). For optimal performance of the unit, leave a minimum 1" space between the logs and the baffle and a 2.5" space between the logs and the door.
- d) Push the left combustion control lever (the Activator) inwards.
- e) Slide the right combustion control lever (the Burn Rate Selector) to the desired burn rate. Positioning the Burn Rate Selector towards the left is for maximum burn rate and towards the right is for minimum burn rate.
- f) Place and ignite a firestarter within the between the logs in step b) or below the log in step c). Make sure that the firestarter is visible from the opening (facing the front)..
- g) Once the firestarter is well lit, close the door. Do not leave the door open for more than 2 minutes.

**CAUTION:** The wood should be placed away from the door to avoid damage to the glass.

**WARNINGS: Over firing the unit may result in overheating and can damage the fireplace and/or result in fire hazards. The maximum firewood load must not exceed four medium sized logs (approximately 30 pounds). This fireplace has been designed to burn with the door closed. When the fireplace is being used, the door should remain closed at all times. Failing to do so is a safety hazard, will damage the fireplace and void the warranty.**

**WARNING: Do not use fire accelerants to rekindle the fire if the first attempt to start the fire failed. Do not open the door. Simply reactivate the Activator by pushing it inwards.**

NOTE: Sufficient air exchange is necessary for the fireplace to operate properly. Air is required in order to maintain the combustion of the fireplace. If the house is airtight, the fireplace may not function properly. If the fireplace is deprived of air, it will be necessary to provide a source of fresh air into the dwelling. This may be done by using an air exchanger unit or simply by opening a window or a door near the fireplace partially for a few minutes. Make sure that other equipment such as the kitchen exhaust fans or oil central heating systems does not affect the fireplace functionality. Large return ducts of central heating systems located in the same room as the fireplace may affect the proper functioning of the unit and may cause smoking.

## 5.5 Adding a New Load of Wood

WARNING: Open the door to reload only when the wood has been reduced to embers, otherwise there is a risk of smoke infiltration into the house.

When the wood has been reduced to embers and there's no visible flame, you may add a new load.

- a) Crack the Elegance 42 door open and wait a few moments before opening the door completely.
- b) Use your fireplace tools to gather the remaining embers at the center of the firebox.
- c) Activate the Activator by pushing it in.
- d) Once the embers begin to glow red, add the new load of wood in the firebox.
- e) Keep the door of the Elegance 42 slightly unlatched until you see a flame in the firebox. Never leave the Elegance 42 door unlatched without constant supervision.
- f) Completely latch the Elegance 42 door.

Assure that a flame is maintained. Avoid wood smoldering on top of embers as this will result in a dirty glass, excessive emissions, chimney creosote buildup and poor heat output. If wood is smoldering, ensure the Activator has been activated and unlatch the door slightly with supervision until a flame has been maintained.

## 5.6 Blower Kit Operation

The blower kit for the Elegance 42 consists of two blowers mounted at the back/bottom of the unit and a heat sensory therm-o-disc; the blowers will start and stop automatically in the presence and absence of heat respectively. A variable speed control allows the adjustment of the speed of the blowers. Do not install a substitute kit as this may result in overheating and risk of fire. Refer to Section 3.9 for the installation instructions of the blower kit.

When the fireplace gets hot and the therm-o-disc reaches 95°F, the blowers will turn on. The average time it takes for the blowers to activate is 30 to 45 minutes after starting a fire as explained in Section 5.4. The blowers will turn off once the insert has cooled down and the therm-o-disc reaches 85°F. The speed of the blowers can be adjusted with the variable speed control.



## 6 TROUBLESHOOTING

### 6.1 Backdraft / Smoking

Draft is the force created by a difference in pressure, which moves air from the appliance up through the chimney. It is important to operate the Elegance 42 with proper draft to ensure optimal performance of the unit. Draft is depended on the length of the chimney, local geography, nearby obstructions and other factors. Proper draft results in an upwards flow through chimney, which prevents smoke infiltrating into the house during operation of the unit. As the temperature of the unit and chimney rises during combustion, the draft consequently increases due to a higher difference in pressure.

In contrast, backdraft is air flow from the chimney into the house, which results in smoke infiltration from the appliance and/or the chimney joints during operation. The unit is experiencing backdraft if air is flowing out from the exhaust of the baffle system (within the firebox). Backdraft is most commonly caused by fans around the house (such as in the kitchen and bathrooms) simultaneously in operation, insufficient length of the chimney (less than 15 feet), or a blocked chimney. Refer to the following suggestions to eliminate backdraft:

- Close any fans operating around the house (specifically for the duration of ignition).
- Clean the chimney of any obtrusions (when the unit is cold).
- Open one window or one door near the Elegance 42.
- Heat the chimney by burning newspaper near the exhaust of the baffle system.

### 6.2 Over Firing

The appearance of a red glow on the exterior of the firebox (top and sides) and/or on the flue is a sign of over firing. Excess air entering the firebox, over fueling, or an abnormal strong draft causes the unit to reach drastic temperatures from an uncontrollable combustion. Over firing is a safety hazard and may result in permanent damage to the unit. In the occurrence of over firing:

- a) Make sure the Elegance 42 door is properly closed.
- b) Manually close the Combustion Air Control by pulling the Activator (left lever).
- c) If possible, turn on the blowers to the maximum speed. The red glow on the exterior of the firebox and/or the flue should gradually disappear.

**WARNING: Do not touch hot surfaces with bare hands. Always wear heat protecting gloves and use fireplace tools.**

Guideline to avoid over firing:

- Always keep the door closed during operation.
- Inspect regularly the door gasket/glass and replace accordingly.
- Always operate the unit with the chimney sweeping cap in position, blocking the hole in the baffle.
- Never load more than 30 lbs of wood at a time.
- Ensure that there is no excess draft.

**WARNING: Failure to follow the above guideline will void the warranty. Over firing is a safety hazard, can cause irreversible damages to the Elegance 42 and will void the warranty.**

# 7 MAINTENANCE

## 7.1 Disposal of Ashes

Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial on soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have been thoroughly cooled. **CAUTION: Always wear heat resistant gloves when removing the ashes from the firebox.**

- a) Let the firebox cool to ambient temperature before removing the ashes. It is recommended to remove the ashes once the bed has exceeded a height of 4 inches.
- b) Slowly open the door to prevent ashes from coming into the room.
- c) Place an ash bucket (metal container) near the fireplace, onto the non-combustible hearth.
- d) Using a shovel and brush, remove the bulk of the ashes from the firebox into the ash bucket. Note that it is not necessary to keep a thin bed of ashes for the next fire.
- e) Store the ash bucket (with the tight-fitting lid) on a non-combustible surface, away from any combustible materials, pending final disposal.

## 7.2 Chimney Maintenance

**Creosote – Formation and Need for Removal:** When wood is burned slowly, it produces tar and other organic vapors, which combine with expelled moisture to form creosote. The creosote vapor condenses in the relatively cool chimney flue of a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited, this creosote makes an extremely hot fire. The chimney connector and chimney burning wood or coal should be inspected at least once every two months during the heating season to determine if creosote buildup has occurred. **Never use chemical cleaners for your chimney.**

**WARNING: In the case of a chimney fire: 1) close the door of the fireplace; 2) set the burn rate of the Combustion Air Control to minimum (Section 5.3); 3) call the local fire department (if assistance is needed); 4) use a dry chemical fire extinguisher (baking soda or sand) to control the fire.**

**CAUTION: Never use water to extinguish a fire as it may result to dangerous steam explosions. Do not use the unit until the chimney is inspected and repaired (if needed) by a qualified technician.**

**NOTE:** Do not clean the chimney when the unit is in operation/hot. Follow the instructions below for sweeping the chimney of an Elegance 42 fireplace:

- a) Open the door of the unit.
- b) From within the firebox, displace the chimney sweeping cap located in the baffle by lifting and moving it to the side.
- c) Close the door of the unit.
- d) Using an appropriate sized chimney sweeping brush, clean the chimney from any creosote buildup and other residues.
- e) Remove all the fallen/loose creosote/residues from the firebox and baffle system (a shop vacuum cleaner can be used for a thorough cleaning).
- f) Place back the chimney sweeping cap.

**CAUTION: Operating the unit without the chimney sweeping cap in position will result in over firing and void the warranty.**

## 7.3 Cleaning of Glass

It is recommended to clean the glass door with a soft cloth, dampened with a non-abrasive solution, such as soap and water.

**CAUTION: Cleaning the glass with an abrasive solution will result in surface scratches, reducing glass transparency and resistance to impacts.**

The glass of the door may be cleaned with commercial products intended for fireplaces and stoves. After cleaning the glass, remove any remaining solutions with a wet cloth to avoid chemical reactions at elevated temperatures (“cloudiness” on the surface of the glass).

**CAUTION: Do not apply commercial cleaners onto any painted surfaces as discoloration/peeling may occur.**

**NOTE: Never clean the glass when the unit is in operation or hot.**

## 7.4 Replacing a Soapstone Panel

Four soapstone panels are assembled along the combustion chamber side walls (left, right, and back) allowing for a longer and a constant heat output. It is recommended to perform a weekly check on the condition of the panels to ensure proper operation of the unit. The soapstone panels need to be replaced when it is gravely chipped and/or cracked. Failure to replace the soapstone panel under the mentioned conditions will alter the performance of the unit. Refer to the following instructions for replacing a soapstone panel:

- a) Order the replacement kit for the Elegance 42 soapstone panel.
- b) Remove the door from the firebox and place it face down on a soft surface. NOTE: Rotate the handle to permit proper placing.
- c) Remove the bottom plate (hearth) by lifting it out of the firebox.
- d) Slide the back wall soapstone panel by tilting the bottom and swivelling them out of the top retainer.
- e) Replace the damaged soapstone panel if it was removed in step d) and position the panels back in place by swiveling them behind the top retainer.
- f) In the case of a damaged panel on the firebox side walls, replace the damaged panel and reposition the back wall panels by swiveling them behind the top retainer.
- g) Insert the bottom plate (hearth) and door to its original position.

**WARNING: Do not operate the unit with any of the soapstone panels missing.**

## 7.5 Replacing the Door Gasket

SUPREME FIREPLACES INC. assembles heat resistant graphite coated gaskets on the doors of all products, allowing for a proper seal of the unit at extreme temperatures (up to 1000°F). It is recommended to perform a weekly visual check on the condition of the ¾” gasket to ensure proper operation of the unit. The ¾” gasket of your door needs to be replaced when 1) the fibers of the gasket are coming loose and 2) the gasket is disintegrating. Failure to replace a gasket under the mentioned conditions can cause irreversible damage to the unit due to over firing. Refer to the following instructions for replacing the ¾” gasket:

- a) Order the replacement kit for the Elegance 42 ¾” door gasket GSK\_31\_7.
- b) Remove the door from the firebox and place it face down on a soft surface. NOTE: Rotate the handle to permit proper placing.
- c) Cover all painted surfaces of the door to avoid damages.
- d) Using a wedging tool or flat head screwdriver, gently remove the old ¾” gasket (along with the old silicone) from the door framing.
- e) Apply a bead of high temperature silicone along the groove of the metal brackets.

- f) Place the new  $\frac{3}{4}$ " gasket around the door framing and cut any excess gasket with scissors. NOTE: It is recommended to tape the extremity of the gasket for a cleaner result.

Give significant amount of time to allow the silicone to cure before reinstalling the door onto the firebox. A slight resistance is expected when closing the door with the new  $\frac{3}{4}$ " gasket; the door will close normally after the gasket has taken proper shape.

## 7.6 Replacing the Glass Panel

SUPREME FIREPLACES INC. uses a high quality 5mm thick Pyroceram III / Keralite ceramic glass that can withstand temperatures up to 1300°F. It is recommended to perform a weekly visual check for any damages or cracks on the glass.

**WARNING: Avoid striking the glass and slamming the door shut. Never operate the unit with a broken or damage glass.**

**CAUTION: Wear protective gloves when handling broken glass.** Refer to the following instructions for replacing the glass:

- Order the replacement kit for the Elegance 42 glass.
- Remove, clean, and dispose any broken glass from the door and the surroundings.
- Remove the door from the firebox and place it face down on a soft surface. NOTE: Rotate the handle to permit proper placing.
- Using a wedging tool or flat head screwdriver, gently remove the  $\frac{3}{4}$ " gasket (along with the silicone) from the door framing.
- Using a wrench, remove the 8 nuts fastened around the door framing.
- Remove the first row of metal brackets (2 small and 2 big) and thin gasket.
- Remove the damage glass and clean thoroughly the door framing from loose glass fragments.
- Place the new glass onto the second row of thin gasket, centered with the door framing.
- Place back the first row of metal brackets (2 small and 2 big) and thin gasket.
- Using a wrench, fasten the 8 nuts around the door framing (do not over-tighten).
- Apply a bead of high temperature silicone along the groove of the metal brackets.
- Place the  $\frac{3}{4}$ " gasket back into position.

Table 7-1: Parts List of Door Assembly

Item	Code	Description	Qty
1	DR2100-*	Door frame assembly	1
2	DR_25.75	Horizontal metallic bracket	4
2	DR_18.125	Vertical metallic bracket	4
3	PYRO_24.25X17	Pyroceram glass	1
4	GSK_19_7	Thin gasket	2
5	GSK_31_7	Thick gasket	1
6	SF0031	Door latch - Elegance	1
7	SF0032	Wood pull handle – Elegance	1

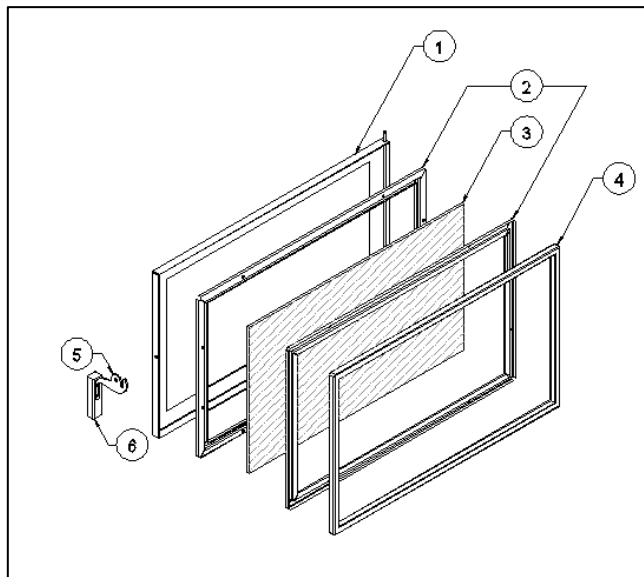


Figure7-1: Door Assembly Exploded View

Give significant amount of time to allow the silicone to cure before reinstalling the door onto the firebox.

## 7.7 Door Latch Maintenance

Lightly lubricate the hook of door latch (CM0031) with grease on a yearly basis to prevent abrasive wear. Occasionally inspect the bushing of the door latch. If required, adjust the tightness of the latch bolt using a 5/32" hex key.

## 7.8 Paint





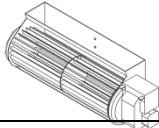
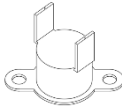
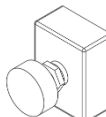
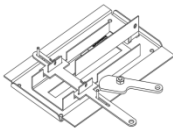


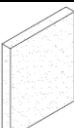
Paint touch-ups can be performed on the unit using a high temperature paint (in aerosol spray can format) by Stove Bright®. Refer to your invoice to determine the precise color of your unit. Contact your local hearth shop for further information on purchasing this paint.

NOTE: Apply the paint in a well ventilated area. If applying paint to the door, properly cover/mask the glass of the door using painters tape and cardboard. Wait for paint to dry before operating the unit. Refer to the instructions on the label of the aerosol spray can for proper paint application. **WARNING: Never apply paint to the unit during operation or when it is hot.**



## 7.9 Replacement Parts

Refer to the codes from the table below for any replacement parts:

Code	Description	Illustration
SF0032	Wood pull handle	
PYRO_24.25_17	Pyroceram III / Keralite 5mm thick glass 24.25" X 17"	
GSK_19_7.5	Graphite coated square gasket, 0.1875" thick, 7.5' length	
GSK_31_7.5	Graphite coated square gasket, 0.75" thick, 7.5' length	
55416.32130_BRK	AC tangential blower <u>Electrical rating:</u> 115VAC, 60Hz, 56W <u>Certification:</u> VDE, CSA, UL, CE	
THE	Therm-o-disc <u>Electrical rating:</u> 120VAC, 15A <u>Certification:</u> UL/CSA	
CV	Speed Control <u>Electrical rating:</u> 2.5 Amps, 115VAC – 50/60Hz <u>Certification:</u> UL, ULC	
PA5000-01	Combustion Air Control	
CM0020	Cold Hand Key	
CPSP0301-01	Removable Ash Lip	
38SF1175	Soapstone Panel 16" X 12.625" X 1.25"	

## 8 WARRANTY

SUPREME FIREPLACES INC. warrants that the factory-built fireplaces, fireplace inserts, and stoves will be free from defects in material and workmanship, under normal use and service, for a period of **twenty-five (25) years** from the date of purchase.

This warranty is only intended for the original retail purchaser, given that the product was purchased from SUPREME FIREPLACES INC. or one of its authorized dealers. This warranty is conditional upon correct installation and intended use of the products and does not cover damages caused by misuse. This warranty shall be void if the fireplace and stove is not installed by an authorized qualified technician in accordance with the installation instructions in the manual provided with this product. The installation must meet local and national building codes.

### WARRANTY LIMITATIONS:

Abuse and improper use of the unit may cause irreversible damage and will void the warranty.

- I. During the first two years of the Limited Warranty, SUPREME FIREPLACES INC. will provide replacement parts at no charge and will also pay for reasonable labor costs, except for the parts listed in the EXCLUSIONS portion of this warranty.
- II. During the third through the fifth year of the limited warranty, SUPREME FIREPLACES INC. will provide replacement parts (if available) at no charge, except for the parts mentioned in the EXCLUSIONS portion of this warranty. Supreme Fireplaces Inc. shall not be responsible for any labor costs.
- III. From the sixth through the twenty-fifth year of the limited lifetime warranty, SUPREME FIREPLACES INC. will provide replacement parts (if available) at 50% of the retail price, except for the parts listed in the EXCLUSIONS portion of this warranty. SUPREME FIREPLACES INC. shall not be responsible for any labor costs.

Transportation, packaging, and other related costs or expenses arising from the replacement or repair of defective parts will not be covered by this warranty, nor will SUPREME FIREPLACES INC. assume responsibility for them.

### EXCLUSIONS:

SUPREME FIREPLACES INC. shall not be responsible for any labor costs for the replacement or repair of any electrical components, painted/plated parts, secondary air burning system, and the combustion air control.

The following parts are guaranteed for 1 year: blowers, painted/plated parts, secondary air burning system, soapstone, and door gasket.

The following parts are guaranteed for 90 days: ceramic glass (**thermal breakage ONLY**).

This warranty applies to normal residential use only. Damages caused by acts nature or natural disasters, accidents, over firing, misuse, abuse, negligence, improper installation, alterations or substitutions of components of the fireplace insert, abrasives, chemical cleaners, and negligence are not covered by this warranty. Burning anything other than natural wood will damage your fireplace and void the warranty.

SUPREME FIREPLACES INC. will not be responsible for environmental conditions such as inadequate vents or ventilation, excessive venting configurations or negative air pressures which may or may not be caused by mechanical systems such as exhaust fans, furnaces, clothes dryers, etc.

The manufacturer at its discretion may decide to repair or replace any part or unit after inspection and investigation of the defect. The manufacturer may, at its discretion, fully discharge all obligations with respect to this warranty by refunding the wholesale price of the defective part(s).

The manufacturer shall in no event be responsible for any consequential damages of any nature, which are in excess of the original purchase price of the product. Any complete fireplace, or part thereof, that is replaced or serviced under this warranty will be warranted for a period not exceeding the remaining term of the original warranty.

This **Limited Lifetime Warranty** is effective on all appliances sold and supersedes any and all warranties currently in existence.

Please register your SUPREME product online at <http://www.supremem.com/warranty.php> to ensure full warranty coverage. Prior to contacting SUPREME FIREPLACES INC., have the following information available for warranty claim processing:

- Customer information (name, telephone number, and address)
- Proof of purchase
- Model name and serial number (see Section 2.7)
- Detailed description of defected component
- Digital pictures (if necessary)

In the case of a return for repair or replacement, it is the responsibility of the customer to adequately package the component/unit to prevent further damage during transport. Items sent to the SUPREME FIREPLACES INC. without an open warranty claim will be returned to the sender.

Warranty claims should be addressed to:

SUPREME FIREPLACES INC.  
3594 Jarry East, Montreal, QC  
H1Z 2G4, Canada  
T: 877-593-4722, F: 514-593-4424  
Website: [www.supremem.com](http://www.supremem.com)  
E-mail: [info@supremem.com](mailto:info@supremem.com)



# Astra 38

## Owner's Manual

Model Number: 38SFC

This product is proudly developed and manufactured in North America by **SUPREME FIREPLACES INC.**

3594 Jarry East, Montreal, QC H1Z 2G4

T: 877-593-4722, F: 514-593-4424

[www.supremem.com](http://www.supremem.com)

Revised: June 2023

**IMPORTANT: Keep the owner's manual for future use.**

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# 1 SAFETY

SUPREME FIREPLACES INC. congratulates you on purchasing an Astra 38 wood burning fireplace. This manual describes the installation and operation of the Astra 38 non-catalytic wood heater. This heater meets the 2020 U.S. Environmental Protection Agency's crib wood emission limits for wood heaters sold after May 15, 2015. Under specific test conditions this heater has been shown to deliver heat at rates ranging from 12,430 to 29,274 Btu/hr. In addition, this fireplace complies with the ULC-S610 and UL-127 standards.

**SAFETY NOTICE: Carefully read this manual before installation and operation of this fireplace. A house fire may result if not properly installed. To reduce the risk of a fire, follow the installation instructions. Failure to follow instructions presented in this manual can lead to property damage, bodily injury or even death. Alterations or modifications made on the unit or the installation is strictly forbidden as it may predispose the user to hazardous risks. Contact your local building or fire officials for restrictions and installation inspection requirements in your area and the need to obtain a permit.**

**WARNING: This unit is hot during operation; keep children, pets, flammable liquids, or combustible materials at a safe distance. Ensure that all clearances to combustible materials are respected. Contact with the unit during operation may cause severe harm. Install a safety screen to keep children and pets away.**

## CAUTION:

- Do not connect this unit to a chimney flue serving another appliance.
- Do not connect to any air distribution duct or system.
- Never use chemicals to ignite the fire.
- Never burn waste or flammable fluids (such as gasoline, naphtha, or engine oil).
- Only burn dry natural cordwood.
- Never leave the unit unattended with the door open or unlatched.
- Only refuel this unit when the wood is reduced to embers.
- Always keep the door closed during operation.
- Do not operate this unit with a fireplace grate.
- Do not install an unvented gas log set into the firebox.
- Do not install this unit in a mobile home.
- Do not clean or service the unit while it is hot.
- Allow proper air flow by keeping the louvers/openings clear of any obstructions.

Note: Failure to respect the above cautions may cause damages to the unit, damages to personal property, bodily harm and will void the warranty. "This wood heater needs periodic inspection and repair for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual."



This product can expose you to chemicals including carbon monoxide, which is known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to [www.P65warnings.ca.gov/](http://www.P65warnings.ca.gov/)

## 2 GENERAL INFORMATION

### 2.1 Overall Dimensions

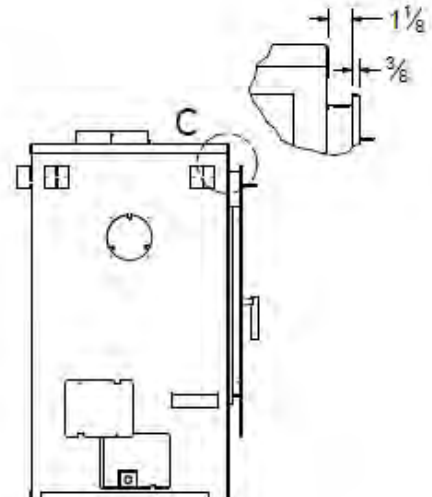
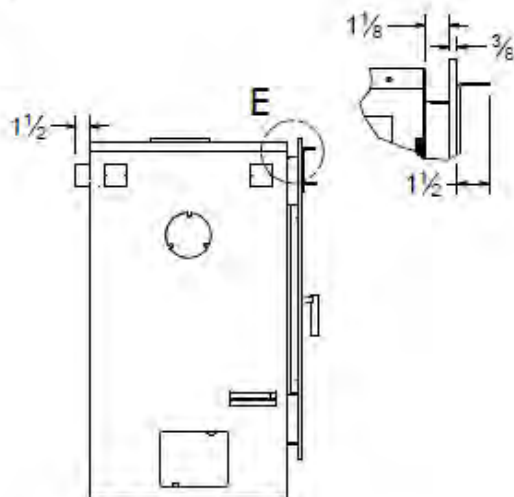
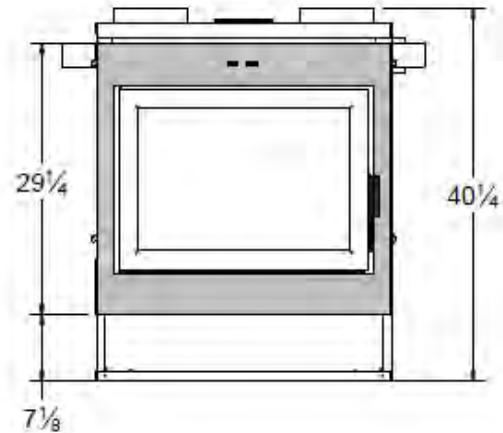
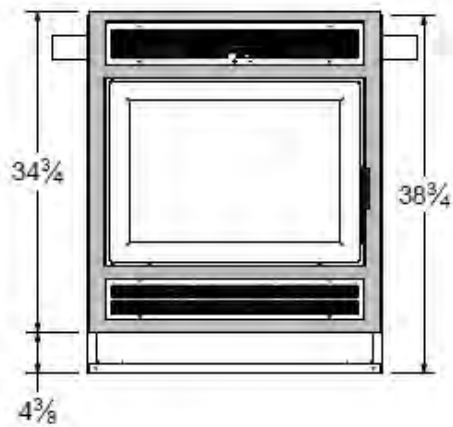
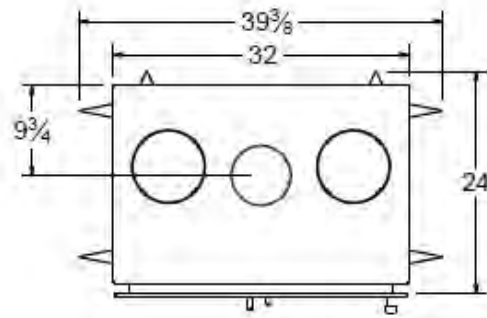
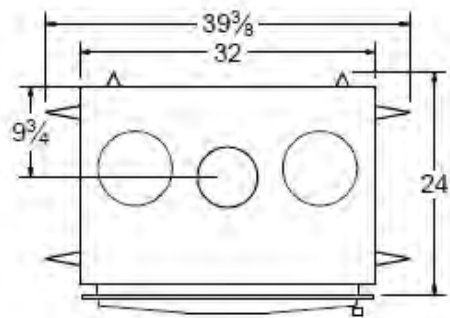


Figure 2-1: Astra 38 Traditional Dimensions

Figure 2-2: Astra 38 Clean Face Dimensions

## 2.2 Specifications

Appliance Type:	Adjustable Burn Rate Wood Heater – Non-Catalytic
Fuel Type:	Dry Cordwood
Maximum Log Length:	24 in (6.09 cm)
Burn Time <sup>1</sup> :	6 to 12 hrs
Firebox Volume:	4.09 ft <sup>3</sup> (0.116 m <sup>3</sup> ) <sup>2</sup>
Heating Area:	1,000 to 2,500 ft <sup>2</sup> (93 to 232 m <sup>2</sup> )
Average Particulate Emissions Rate <sup>3</sup> :	1.8 g/hr
Average CO Emissions Rate <sup>4</sup> :	2.09 g/min
EPA Protocol:	Method 28R, ASTM2780-10, and ASTM2515-11
Efficiency (Crib Wood):	HHV <sup>5</sup> : 67.83%   LHV <sup>6</sup> : 72.9%
Heat Output (Crib Wood):	11,704 to 26,354 BTU/hr (3,431 to 7,724 W)
Optimum Efficiency:	75%
Optimum Heat Output:	125,000 BTU (36.6 kWh)
Efficiency Protocol:	CSA B415.1-10

### WARRANTY REGISTRATION

Please register your SUPREME product online at <http://www.supremem.com/warranty.php> to ensure full warranty coverage. Proof of purchase is required for all warranty claims.

<sup>1</sup> Depending on combustion air control setting (see Section 5.3 for further details).

<sup>2</sup> Usable volume according to ASTM E2780-10 standards calculated at 3.50 ft<sup>3</sup> - figure used in EPA Method 28R testing.

<sup>3</sup> Officially tested and certified by an independent laboratory.

<sup>4</sup> Note that rate is smaller for low to medium/low burn rates.

<sup>5</sup> Higher Heating Value.

<sup>6</sup> Lower Heating Value.

## 2.3 Combustion Air Control

The Combustion Air Control is a patented mechanism (Patent No: US 7,325,541 B2) that regulates the air flow into the firebox based on the temperature of the unit. It is located on the top of the firebox, at the front center of the unit. The combustion air control of the Astra 38 has two components: the Activator and the Burn Rate Selector (see Figure 2-3). The left combustion control lever is the Activator. When starting a fire or adding a new load of wood, the Activator must be pushed in to allow a primary source of air to enter the firebox. The Activator will retract automatically with heat. The right combustion control lever is the Burn Rate Selector. The Burn Rate Selector can slide sideways to achieve different burn rates. When the Burn Rate Selector is positioned to the left, a maximum burn rate is achieved and when it is positioned to the right, a minimum burn rate is set.

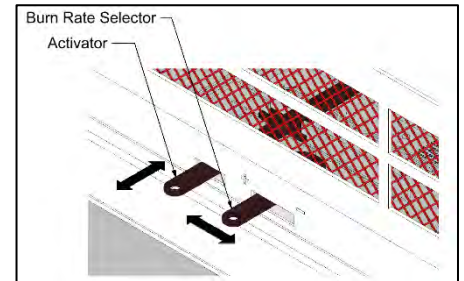


Figure 2-3: Combustion Air Control's Activator and Burn Rate Selector

**WARNING: Never manipulate the Combustion Air Control with bare hands as it gets hot when the Astra 38 is in operation. Use the Cold Hand Key (see Section 2.4) to adjust the Combustion Air Control.**

## 2.4 Cold Hand Key

The Cold Hand Key is an accessory that comes standard with the Astra 38 fireplace (Figure 2-4). The Cold Hand Key is a tool used to manipulate the Combustion Air Control Levers when they are hot.



Figure 2-4: Cold Hand Key

## 2.5 Chimney Sweeping Cap

The chimney sweeping cap found at the baffle of the Astra 38 allows easy access for chimney sweeping without having to remove any components of the firebox (Figure 2-5).

**WARNING: The chimney sweeping cap should be blocking the access to the chimney at all times during combustion. A chimney sweeping cap that is not blocking the baffle hole during combustion is a safety hazard, will overheat the fireplace and void the warranty.**

## 2.6 Door

The Astra 38 wood burning fireplace comes with a Pyroceramic glass panel door. Pyroceramic is the highest grade available for fireplaces and stoves and can withstand temperatures up to 1300°F. To remove the door, open the door, lift it and pull it towards the bottom until the rod exits from the hinge holes.

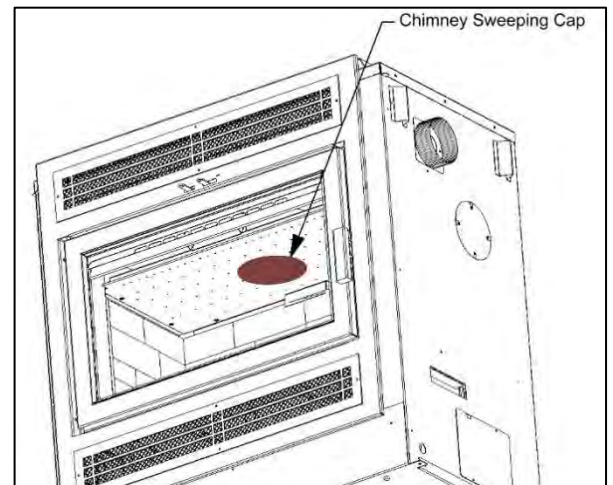


Figure 2-5: Chimney Sweeping Cap



## 2.7 Certification Label

The certification label contains important information regarding the installation and operation of the Astra 38 fireplace. In addition, the serial number of the unit is permanently embossed onto the top right corner. See Figure 2-6 for the location of the certification label.

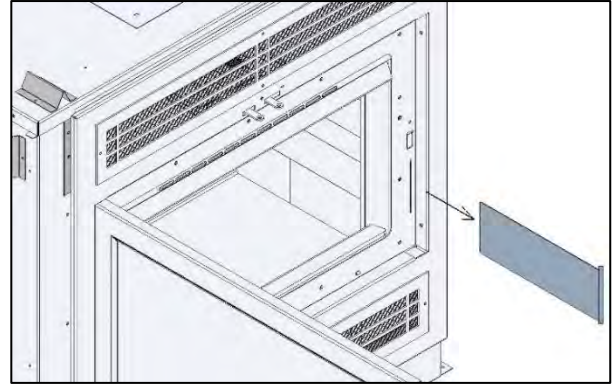


Figure 2-6: Location of Certification Label with Product Serial Number

## 2.8 Removable Ash Lip

The Ash Lip is a removable accessory that comes standard with the Astra 38 fireplace (Figure 2-7). It is installed on the door holder (under the two small angled tags below the door) and prevents ashes from falling onto the front of the hearth. The Ash Lip can be installed with the door open or closed. It is safe to operate the unit without the Ash Lip.

**NOTE: The door of the Astra 38 must remain closed at all times during operation.**

## 2.9 SUPREME Radiation Shield Offset

The SUPREME Radiation Shield Offset is a standard component for the Astra 38 fireplace (Figure 2-8). Prior to installing the chimney manufacturer's radiation shield, the SUPREME Radiation Shield Offset is fastened below the chimney opening within the chase, with the flanges along the component providing a  $\frac{1}{2}$ " offset.

## 2.10 Baffle Secondary Burn Technology

An innovative baffle design comprises of carefully engineered perforations that allow the introduction of secondary air to increase the efficiency and heat output while offering an uncompromising view of the fire (Figure 2-9).

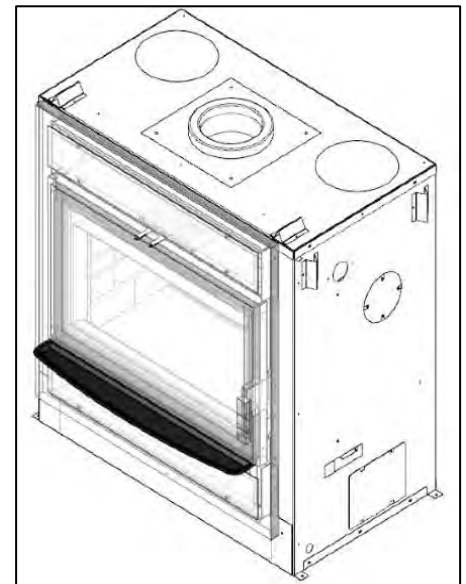


Figure 2-7: Removable Ash Lip

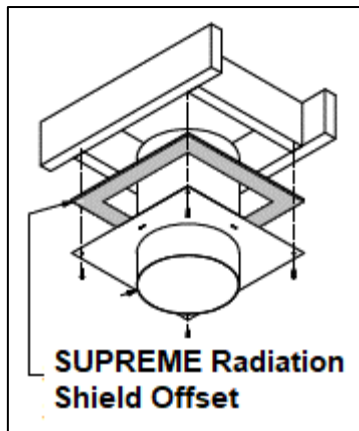


Figure 2-8: SUPREME Radiation Shield Offset

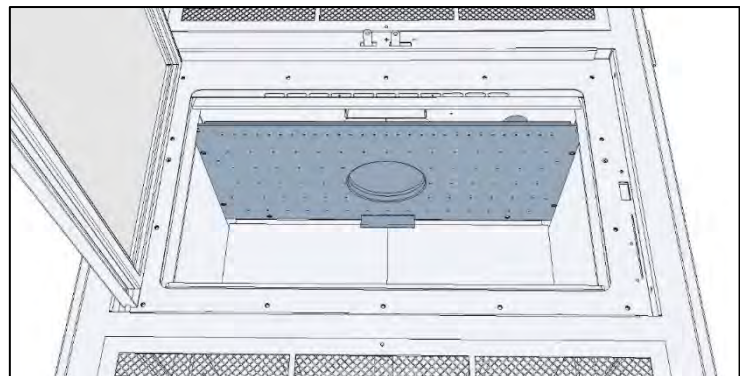


Figure 2-9: Baffle Secondary Burn Technology

## 2.11 Cast Iron Interior

The Astra's stainless steel firebox is lined with cast iron panels for an extra layer of durability and strength. Designed to provide long-lasting heat and thermal protection, these industry-first, decoratively stamped panels also provide the added benefit of the timeless beauty of cast iron. Forged in fire, tempered with time, the Astra offers a lifetime of warmth.

## 2.12 Blower Kit

Two AC tangential blowers (electrical rating: 115V, 60Hz, and 56W) with a variable speed control is installed into the Astra 38 wood burning fireplace to maximize efficiency. Refer to Section 3.9 for installation instructions.

**WARNING: Make certain that the fireplace is not in operation and the blowers are unplugged (breaker off) before accessing the electrical wiring of the blower kit.**

**CAUTION: Only blowers provided by SUPREME FIREPLACES INC. can be installed into the fireplace. Substituting the blower kit may result in overheating, will void the warranty and can be hazardous.**

## 2.13 Optional Hot Air Kit

The Optional Hot Air Kit (kit number SU250) allows heat to be drawn from the unit by a thermostatically controlled blower (electrical rating: 115 V and 60 Hz) and dispersed to different areas of the house. This option is recommended when the fireplace is installed in an area below the maximum heating space. A total of three kits can be installed onto one unit with a maximum distance of 25 feet each. Note that a 5 inch insulated duct (part number UCAC5) is required for the installation (item ordered separately). Refer to Section 4.1 for installation instructions.

**WARNING: Make certain that the fireplace is not in operation and that hot air blower is not powered (breaker off) before accessing the electrical wiring of the hot air kit.**

**CAUTION: Only a hot air kit provided by SUPREME FIREPLACES INC. can be installed onto the fireplace. Substituting the hot air kit may result in overheating, will void the warranty and can be hazardous.**

## 2.14 Optional Fresh Air Kit

The Optional Fresh Air Kit (kit number UPEA4) allows for exterior air (outdoors) to be drawn into the fireplace during operation of the unit. Note that a 4 inch insulated duct is required for the installation (item ordered separately). Refer to Section 4.2 for installation instructions. Contact your local building official regarding mandatory fresh air kit installations within your area.

**CAUTION: Only a fresh air kit provided by SUPREME FIREPLACES INC. can be installed onto the fireplace. Substituting the fresh air kit may result in overheating and will void the warranty.**

## 3 INSTALLATION INSTRUCTIONS

Before installing the unit, consult an authority having jurisdiction (such as your municipal building department, your fire department, your fire prevention department...) for any local codes and whether a permit is required. In the absence of local codes, refer to the CSA B365 Installation Code for Solid Burning Appliances and Equipment (Canada) or the ANSI NFPA 211 Standard for Chimneys, Fireplaces, Vents and Solid Fuel-Burning Appliances (USA). **CAUTION: Modifications/alterations to the unit/installation without written authorization from SUPREME FIREPLACES INC. are strictly forbidden and will void the warranty.** Refer to Section 1 for further safety information. Carefully read the instructions below before installing your Astra 38.

### 3.1 Location

Determine the location of the Astra 38 by taking into consideration the following criteria:

- The size of the room with respect to the heat output of the fireplace.
- The proximity of windows, doors, and traffic flow.
- The necessary amount of space in front of the unit for the hearth extension and mantel (Refer to Sections 3.6 and 3.8).
- The clearances to combustible materials.
- The passage of the chimney.

If possible, select a location for the fireplace that will minimize the number of offsets in the chimney course. Offsets will reduce the draft, complicate the chimney sweeper's work, and increase installation costs. Do not install an offset directly onto the unit/anchor plate. Technical drawings outlining the chimney route should be prepared prior to the installation. NOTE: The cutting of joists and rafters for floor, ceiling, and roof chimney penetrations will affect the load bearing capacities of the dwelling structure. To determine whether additional support is required, consult your local building codes. Improper cutting of chimney openings in the attic and roof will affect the bearing and thermal insulating capacity, as well as the weather tightness of the dwelling. Avoid incorrect workmanship by consulting a professional engineer or a certified installer.

Through examination of the floor construction, ensure that the fireplace and chimney system is resting on a surface capable of withstanding its weight. Consult your building codes to see whether additional structural supports are required (applicable for rare and isolated cases).

Avoid having the chimney outlet near any obstructions (such as trees and roof offsets) as the draft of the chimney may be affected by wind turbulence. Ideally position the outlet of the chimney at the highest area of the roof.

**NOTE: It is strongly recommended to install a carbon monoxide (CO) and smoke detector near the location of the unit.**

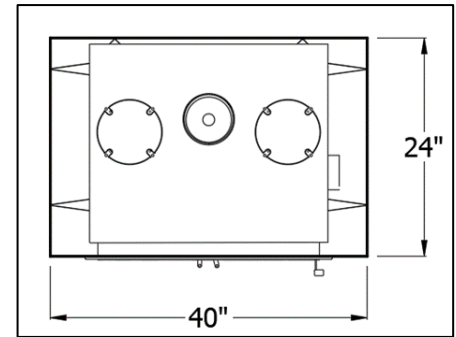


Figure 3-1: Straight Wall Installation

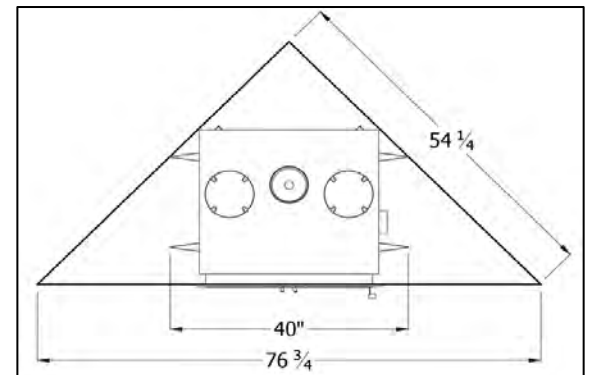


Figure 3-2: Corner Installation

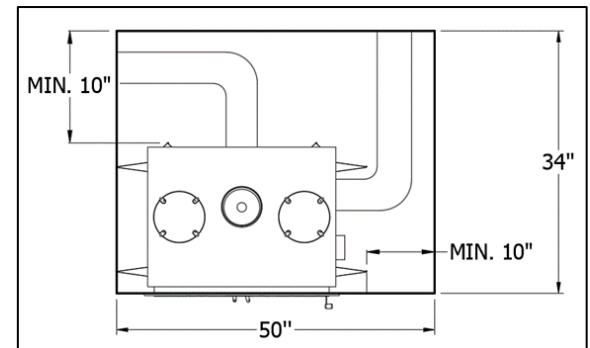


Figure 3-3: Space Required for Forced Hot Air System Installations

Refer to Sections 4.1 and 4.2

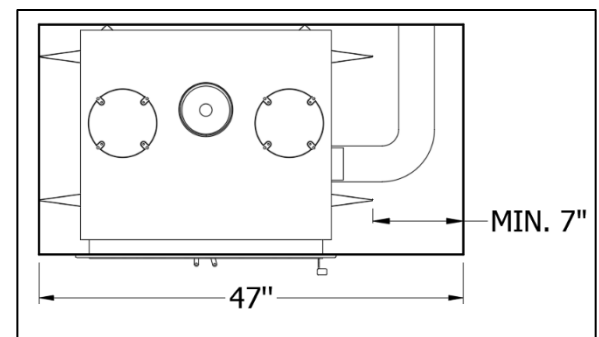


Figure 3-4: Space Required for Fresh Air Kit Installations

Refer to Sections 4.1 and 4.2

## 3.2 Chimney Installation

The Astra 38 is approved with a 6" chimney that is listed under the UL 103 / ULC S629 standards (refer to Table 3-1). **WARNING: Mixing chimney components from different brands is a safety hazard and will void the warranty on the unit.** When connecting the unit to an existing chimney, thoroughly inspect the condition of the chimney and that the installation conforms to the requirements of the chimney manufacturer and the building codes. **Note that to avoid any unnecessary risk, it is often recommended to replace the chimney system.** Always respect the clearances to combustibles from the chimney manufacturers; a minimum clearance of 2 inches is usually required for prefabricated chimneys.

### 3.2.1 General Rules and Guidelines

1. Carefully read the instructions from the chimney manufacturer prior to installation (manuals can be obtained from the chimney manufacturer's website or from the vendor). Unless specified, follow the chimney manufacturer's instructions for proper installation.
2. For optimal performance of the unit, it is recommended to install the chimney system in an interior setting. To prevent drafting issues and creosote buildups, avoid exterior installations of the chimney system in regions that experience extreme cold conditions.
3. The minimum and the maximum height of the chimney from the base of the unit are 15 and 35 feet respectively.
4. A minimum length of 12 inches of straight chimney is required from the top of the unit before having an offset.
5. Only chimneys approved under the UL 103 / ULC S629 standards can be installed onto the unit (refer to Table 3-1 in Section 3.2.2).
6. A 6 inch anchor plate is required to connect the fireplace to the chimney system. The anchor plate can be secured onto the unit with 4 self-tapping screws.
7. The chimney installed onto the unit cannot be connected to another appliance.
8. Enclose any portion of the chimney that extends to accessible spaces.
9. The clearance of the chimney to any combustible material cannot be less than 2 inches; the 2 inch clearance cannot be filled with insulation or any non-combustible material.
10. At least one support is to be incorporated in any chimney installation.
11. A firestop is required in the joists/frames where the chimney goes through (ceilings, floors, walls, and attic).
12. A roof and a vented flashing is required in the installation of the Astra 38.
13. To prevent drafting issues, avoid deviations wherever possible.
14. The chimney shall extend at least 3 feet above its point of contact with the roof and at least 2 feet higher than any wall, roof, or adjacent building within a 10 foot radius.
15. A secure brace is to be installed if the chimney extends a minimum of 5 feet above the contact point with the roof.
16. A rain cap must be installed on top of the chimney to avoid internal damage and/or corrosion.
17. Consult the chimney manufacturer for clearances to combustibles when installing a combustible chimney enclosure above the roof.

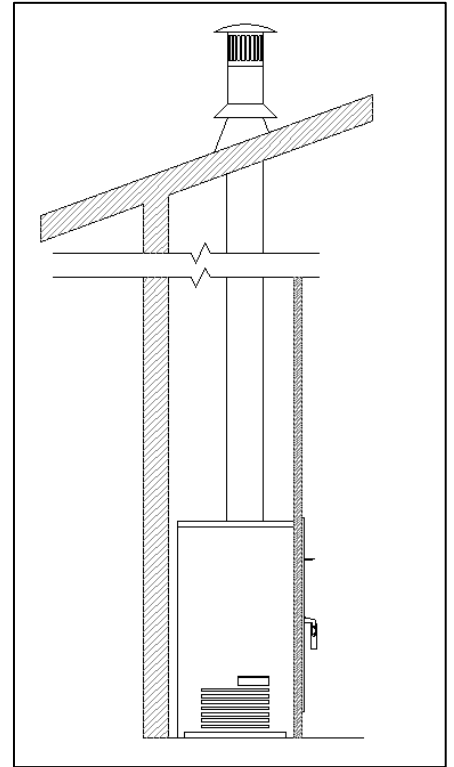


Figure 3-5: Straight Interior Installation

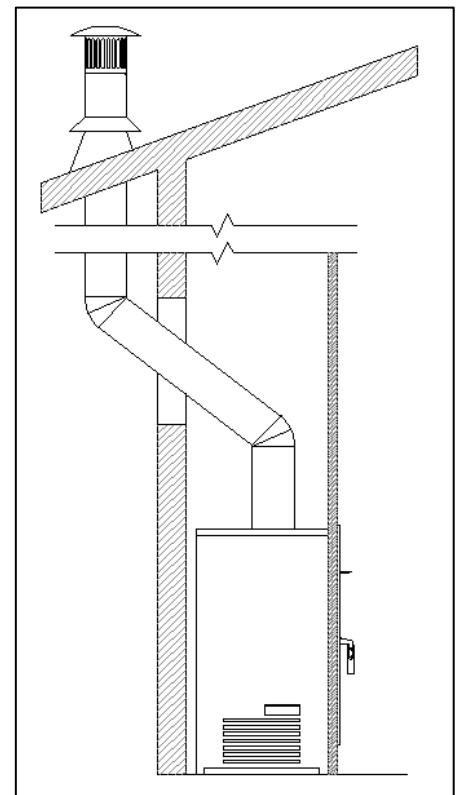


Figure 3-6: Exterior Installation

### 3.2.2 Listed UL 103 / ULC S629 Approved Chimney Models (Reference Table)

Note that only chimney models listed in Table 3-1 can be installed for the Astra 38.

Table 3-1: List of Approved Chimney Models

<u>Manufacturer</u>	<u>Models</u>
American Metal	<ul style="list-style-type: none"> <li>• HS, AC Triple Wall, 6" inner diameter</li> <li>• HSS, AC Triple Wall, 6" inner diameter</li> </ul>
FMI (US only)	<ul style="list-style-type: none"> <li>• AC, AC Triple Wall, 6" inner diameter</li> </ul>
ICC	<ul style="list-style-type: none"> <li>• Excel 2100, 1" Solid Pack, 6" inner diameter</li> </ul>
Metal Fab	<ul style="list-style-type: none"> <li>• Temp Guard, 1" Solid Pack, 6" inner diameter</li> </ul>
Olympia Chimney	<ul style="list-style-type: none"> <li>• Ventis, 1" Solid Pack, 6" inner diameter</li> </ul>
Security Chimney	<ul style="list-style-type: none"> <li>• ASHT+, 1" Solid Pack, 6" inner diameter</li> <li>• S-2100+, 2" Solid Pack, 6" inner diameter</li> </ul>
Selkirk	<ul style="list-style-type: none"> <li>• Super Pro (SPR), 1" Solid Pack, 6" inner diameter</li> <li>• Super Pro 2100 (ALT), 2" Solid Pack, 6" inner diameter</li> <li>• Hart &amp; Cooley (TLC), 1" Solid Pack, 6" inner diameter</li> <li>• Sure-Temp (ST), 1" Solid Pack, 6" inner diameter</li> <li>• Super Vent (JSC), 1" Solid Pack, 6" inner diameter</li> <li>• Super Vent 2100 (JM), 2" Solid Pack, 6" inner diameter</li> <li>• Ultra-Temp (UT), 1" Solid Pack, 6" inner diameter</li> <li>• UltimateOne, 1" Solid Pack, 6" inner diameter</li> <li>• CF Sentinel (CF), 2" Solid Pack, 6" inner diameter</li> </ul>
Simpson Dura-Vent	<ul style="list-style-type: none"> <li>• Dura Tech, 1" Solid Pack, 6" inner diameter</li> <li>• Dura Plus HTC, 2" Solid Pack, 6" inner diameter</li> <li>• Dura Plus, AC Triple Wall, 6" inner diameter</li> </ul>

### 3.2.3 Chimney Installation Instructions

1. Cut and frame square openings in the floors, ceilings, and roof where the chimney will pass through while taking into consideration the minimum clearance to combustibles.
2. For an installation with the chimney running through the ceiling, install the SUPREME Radiation Shield Offset below the chimney opening prior to installing the radiation shield (refer to Figures 2-8 and 3-7).
3. In the ceiling/floor openings, install a chimney manufacturer's firestop from below. Install the chimney manufacturer's attic radiation shield from above in the chimney opening to the attic. Install the chimney manufacturer's roof radiation shield in the opening of the roof – adjust the shield so that it is extruding approximately 1" above the roof surface. Ensure to install the appropriate firestop for ceilings and walls.
4. Install the chimney manufacturer's anchor plate onto the unit.
5. Install the chimney lengths according to the manufacturer's instructions and ensure proper fastening/locking of the joints.
6. Install the roof support once the desired height has been reached.
7. Position the vented roof flashing. Note that for sloping roofs, position the upper portion of the vented flashing under the shingles and position the lower portion of the vented flashing above the shingles. Seal the joint between the roof and the vented flashing with roofing cement or silicone. Secure the vented flashing to the roof with roofing nails.
8. Install the storm collar over the vented flashing by tightening the supplied bolt or through the flange mechanism (depends on chimney brand). Seal the joint between the storm collar and the chimney using a silicone caulking. **WARNING: Do not seal, caulk, or obstruct the ventilation openings.**
9. Install the chimney rain cap.

Refer to Figures 3-5 and 3-6 for typical chimney installations.



### 3.2.4 Offset Installation

An offset installation (Figure 3-7) consists of the use of elbows to deviate from unavoidable obstacles or to extend the chimney outside. The following list is a few general rules to take note when installing offsets:

- A maximum of 2 offsets (2 elbows per offset) is permitted per installation.
- A minimum length of 12 inches of straight chimney is required from the top of the unit before having an offset.
- The maximum deviation is 45° in Canada and 30° in the US.
- Secure the elbows and the chimney components according the instructions from the chimney manufacturer.
- A support strap, a wall support, or a roof support must be installed above each offset to allow adequate support to the vertical chimney lengths.
- **Never install an elbow in an opening of a floor, wall, ceiling, or roof.** In addition, only vertical chimney sections can be installed within ceiling/floor openings.
- A minimum length of 12 inches of straight chimney is required from the top of the unit before having an offset.
- Install a support for the first 15 feet of chimney.

The following are instructions for offset installations:

1. Rotate the elbow in the required direction and secure it to the adjacent chimney section according to the chimney manufacturer's instructions.
2. Follow the chimney manufacturer's instructions to install the chimney length(s) necessary for the offset.
3. Once the desired offset length has been achieved, install the second elbow to redirect the venting to the vertical position.
4. Cut an opening in the floor/ceiling to allow the chimney to pass through.
5. Install the appropriate firestop.

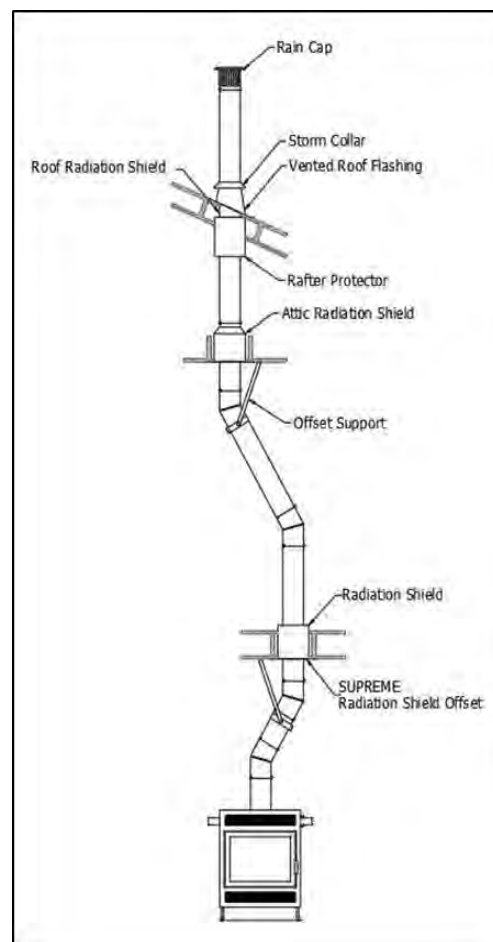


Figure 3-7: Offset Installation

**CAUTION: For offset installations, always install a ventilated flashing and a roof firestop unless otherwise specified by the chimney manufacturer. Never install an elbow directly onto the unit.**

### 3.2.5 Angled Wall Radiation Shield

For chimney installations requiring to pass through a combustible wall at a 30° (Canada) or 45° (Canada and US) angle, an angled firestop or an angled wall radiation shield from the chimney manufacturer must be installed within the wall opening. Install the angled firestop and angled wall radiation shield according to the manufacturer's instructions. It is recommended to use an insulated angled wall radiation shield in areas that experience cold climates.

### 3.2.6 Connecting to a Masonry Chimney

The Astra 38 fireplace can be connected to a masonry chimney that complies with current national and municipal building codes. A 6 inch chimney liner that complies with ULC S635 M2000 (Canada) or UL 1777 (US) standards must be installed within the existing masonry chimney. Note that the 6CON connector (manufactured by SUPREME FIREPLACES INC.) must be installed to connect the prefabricated chimney to the liner (6CON sold separately). Refer to figure 3-8.

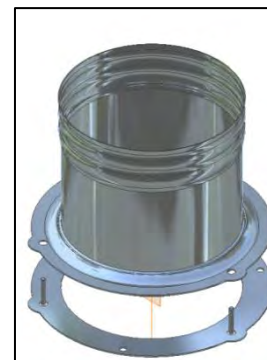


Figure 3-8: 6CON Liner Connector

Note that prior to installation, an inspection from an authority having jurisdiction is required to determine whether the masonry chimney:

- Is constructed in accordance with national and municipal building codes.
- Is in good condition. Note that repairs must be performed on any cracked or missing bricks.
- Is thoroughly cleaned of any soot or creosote.
- Is not connected to another appliance such as a furnace, hot water heater, or another fireplace.
- Has a flue of adequate size for proper installation of the venting.
- Respects minimum clearances to combustibles.

It is recommended to position the fireplace as close as possible to the masonry chimney to ensure proper venting. The prefabricated chimney must penetrate at least 3 inches within the masonry chimney before connecting the liner. Elbows can be used within the masonry chimney, with a maximum deviation of 30° in US and 45° in the Canada. **Note: A minimum length of 12 inches of straight chimney is required from the top of the unit before having an offset.**

The installation of the prefabricated chimney and the liner must comply with the manufacturer's instructions. The following are instructions in installing the venting of the Astra 38 running through a masonry chimney:

1. Install the anchor plate onto the unit.
2. Position the fireplace to the recommended location.
3. Install the initial prefabricated chimney lengths and elbows.
4. Mark the area where the prefabricated chimney will penetrate the masonry chimney.
5. Remove the fireplace to allow for sufficient space to work.
6. Make a hole to the required size to allow for the prefabricated chimney to be inserted freely in the masonry chimney. Note that the appropriate firestops need to be installed if running the prefabricated chimney through a combustible wall.
7. Install the remaining prefabricated chimney components center with the masonry chimney.
8. Align the flange holder of the 6CON connector with the studs facing upwards to the center of the prefabricated chimney section (elbow or tee) and secure it with three self-tapping screws.
9. Reposition the fireplace to its initial position.
10. Overlap by 1 inch the lower end of the liner in the expanded portion of the 6CON connector and secure the joint with 3 #8 stainless steel self-tapping screws.
11. From the roof, slide the liner down the masonry chimney until it reaches the upper end of the prefabricated chimney.
12. Install the upper portion of the 6CON liner connector to the flange holder by aligning the threaded studs to the holes and complete the connection by tightening the wing nuts.
13. Seal any openings around the prefabricated chimney and the 6CON connector with refractory cement resistant to high temperatures.

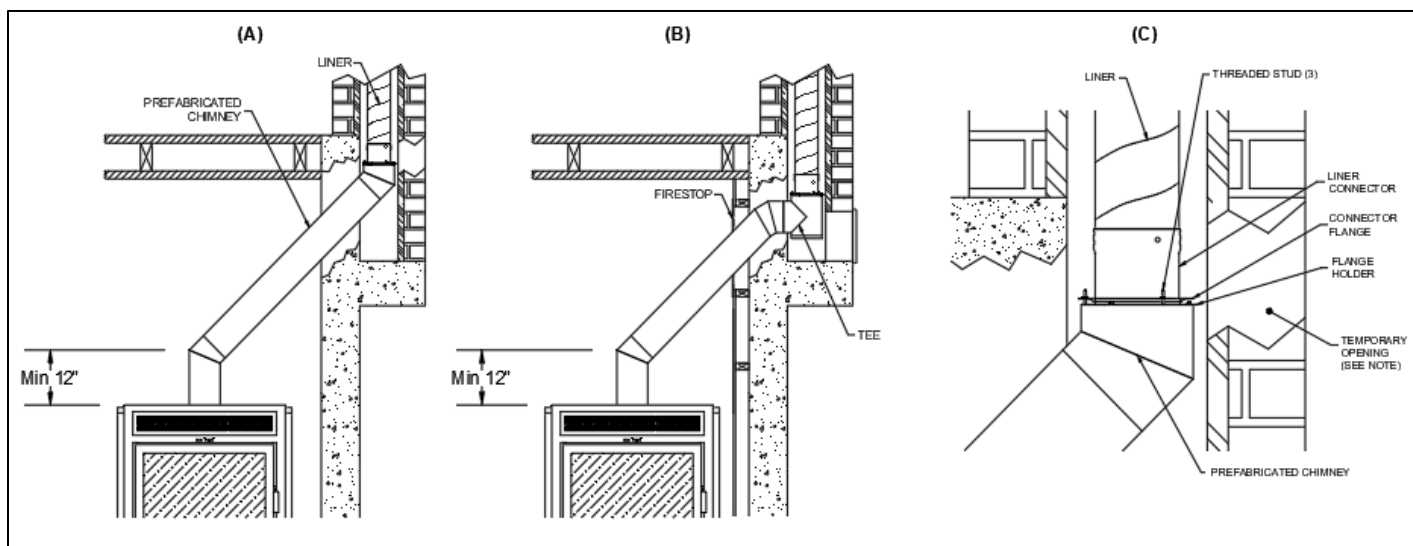


Figure 3-9: (A) Connection into a masonry chimney through an elbow/liner; (B) connection into a masonry chimney through a tee/liner; (C) detailed drawing of masonry chimney connection.

### 3.3 Framing

The Astra 38 can be placed directly onto or against normal, combustible construction materials such as lumber, plywood, millboard, particleboard, drywall and decorative wood paneling. The fireplace should NOT be placed directly against or be in contact with an insulation material. A portion of the framing on the face of the chase must be constructed with nominal 2" x 3" or 2" x 4" metal studs and the remainder can be constructed with nominal 2" x 3" or 2" x 4" lumber. Refer to Figure 3-10 for an example of a framing design and Figure 3-11 for the framing for installations of the single linear front louver gravity kit. The framing must be nailed or screwed onto the floor and to the ceiling.

The recommended framing dimensions of the single linear front louver is 40" x 7.5". A minimum distance from the ceiling to the top of the louver is 5.5". The base of the louver must be at least 64" from the base of the unit.

**CAUTION:** Respect the framing design outlined in Figure 3-11 as well as the chimney manufacturer's clearances to combustibles.

**WARNING:** Do not nail or screw framing components onto the fireplace.

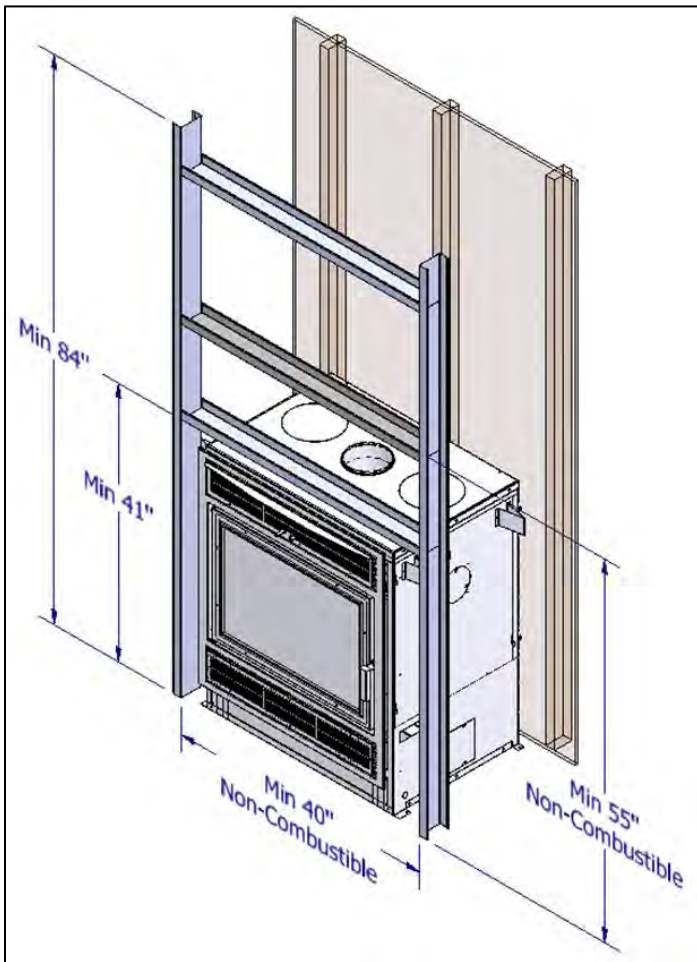


Figure 3-10: Minimum Astra 38 Framing Dimensions

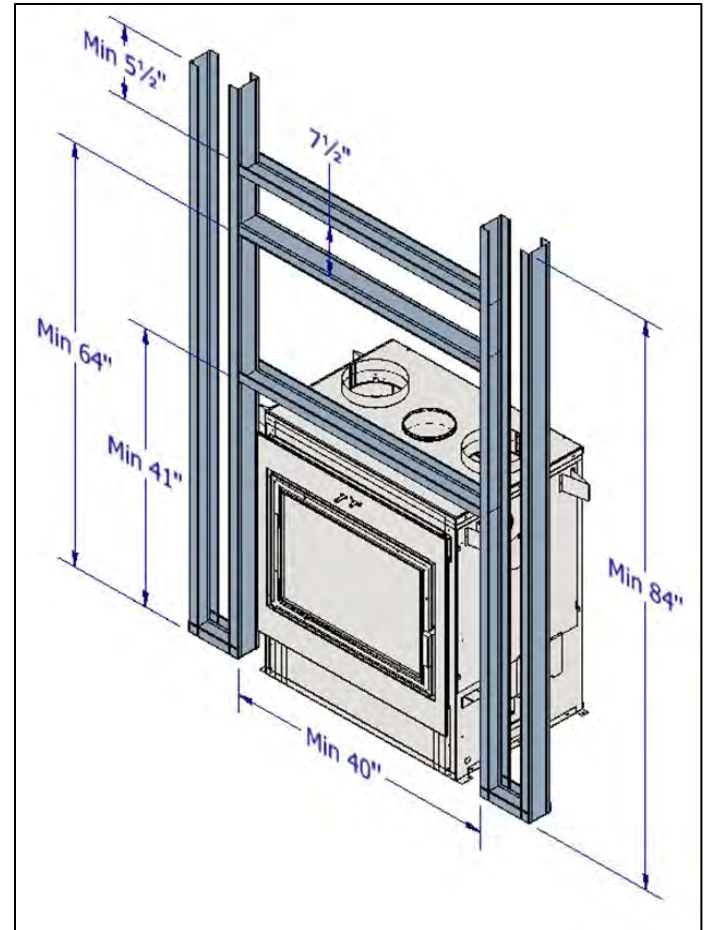


Figure 3-11: Minimum Framing Dimensions for Single Linear Front Louver Gravity Kit Installations

Refer to Figure 3-10 for minimum non-combustible framing dimensions

## 3.4 Surround Installation

The Astra 38 can be installed with either the traditional surround or the clean face surround.

### 3.4.1 Traditional Surround

The traditional surround comprises louvers below (intake) and above (outtake) the door. All components and fasteners are included in the surround kit. Refer to Figure 3-14 and Table 3-2 for the instructions below.

1. Remove the door of the unit and place it on a soft surface, such as a carpet or cardboard, to avoid any scratches or damages.
2. Align the lower support bracket (Item 6) to the intake opening and fasten it in place (Figure 3-13).
3. Bend the ends of the upper support bracket (Item 7), align it to the outtake opening and fasten it in place (Figure 3-13).
4. Place the surround (Item 1 in Figure 3-14) within the door holder and secure it in place with four black screws (one on each corner). Make sure that the handles of the Combustion Air Control pass through the slots of the surround.
5. Reinstall the door onto the unit.
6. Secure the Intake Swivel Covers on the bottom sides of the unit to the closed position (Figure 3-12).

**WARNING: For traditional surround installations only.**

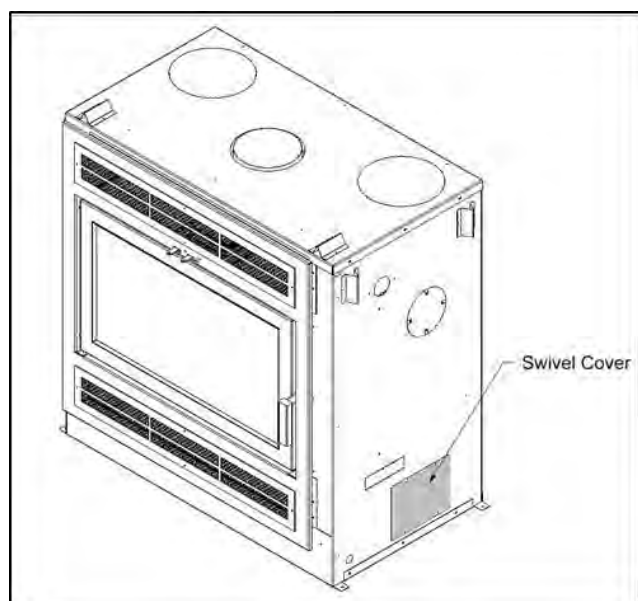


Figure 3-12: Intake Swivel Cover Closed

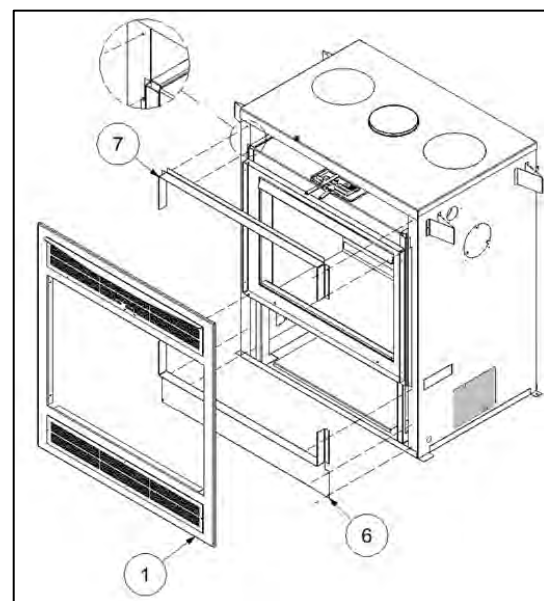


Figure 3-13: Traditional Surround Installation

**WARNING: For Traditional Surround Installations Only**

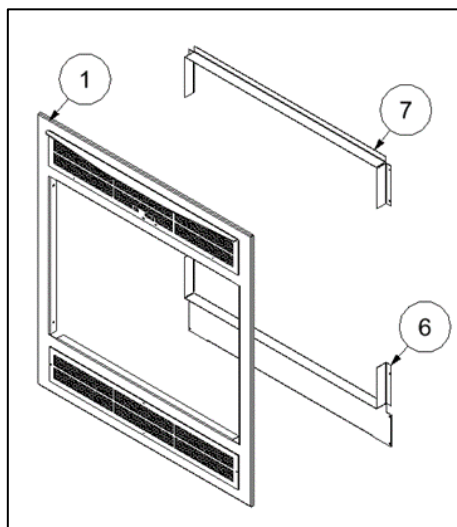


Figure 3-14: Traditional Surround Components

Table 3-2: 3238ATFA-11 Components

TRADITIONAL		
ITEM	DESCRIPTION	QTY
1	Traditional Surround	1
6	Lower Support Bracket	1
7	Upper Support Bracket	1

### 3.4.2 Clean face Surround

The Clean Face surround comprises no louvers; however, an intake into the chase and an outtake through gravity ducts is required for this configuration. The instructions below describe the installation of the Clean Face surround. Refer to Figure 3-17 and Table 3-3 for the instructions below. Refer to Section 3.5 for Gravity Kit installation instructions.

1. Remove the door of the unit and place it on a soft surface, such as a carpet or cardboard, to avoid any scratches or damages.
2. Align the Clean Face lower cover (Item 8) and fasten it in place (Figure 3-16).
3. Bend the ends of the Clean Face upper cover (Item 7), align it and fasten it in place (Figure 3-16).
4. Place the surround (Item 4 in Figure 3-16) within the door holder and secure it in place with 4 black screws (one on each corner). Make sure that the handles of the Combustion Air Control pass through the slots of the surround.
5. Reinstall the door onto the unit.
6. Secure the Intake Swivel Covers on the bottom sides of the unit to the **open** position (Figure 3-15).
7. Remove the two 8" knockouts at the top of the unit using a flat head screwdriver (Figure 3-18).
8. Through the openings of the knockouts, cut the exposed insulation. Make sure to remove any pieces of insulation that has fallen into the unit.
9. Bend the tabs inside the 8 inch knockouts (Figure 3-19) upwards.
10. Install the 8 inch duct adapters (Item 9 in Figure 3-16) through the newly cut knockouts and screw them to the bent tabs (Figure 3-20).



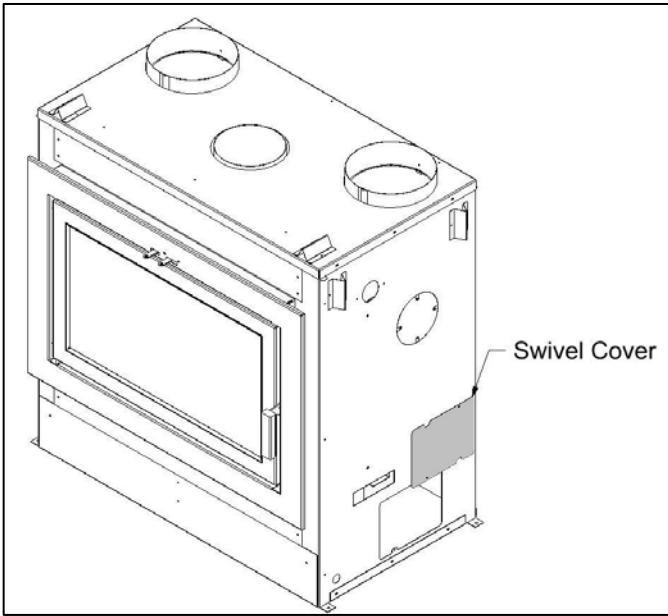


Figure 3-15: Intake Swivel Cover Kept Open for Clean Face Installations

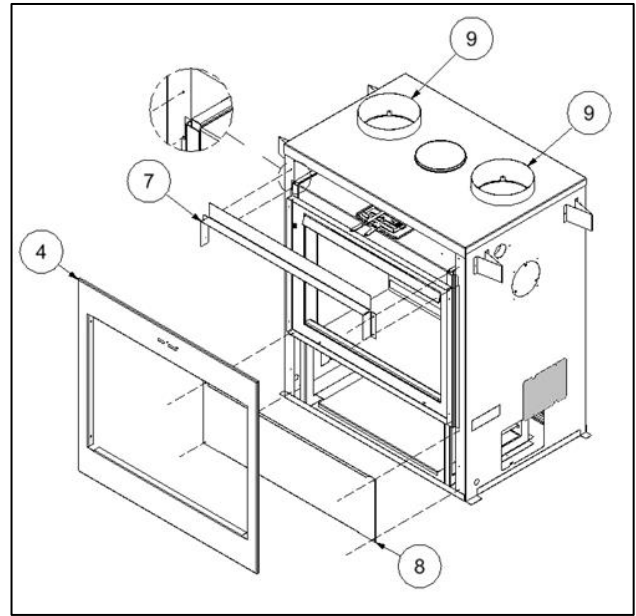


Figure 3-16: Clean Face Surround Installation

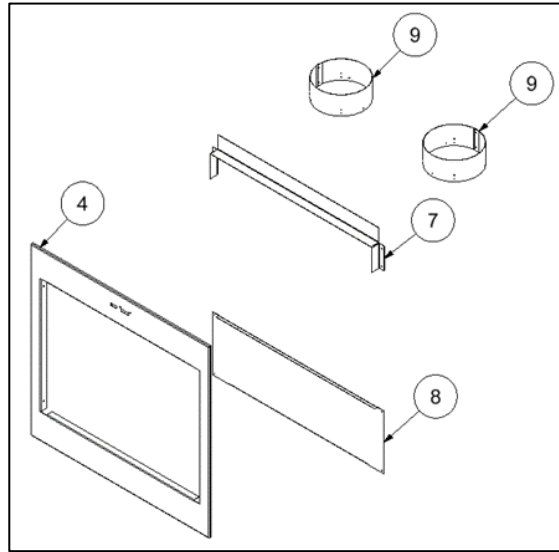


Figure 3-17: Clean Face Surround Components

Table 3-3: 3238ATFA-12 Components

CLEAN FACE		
ITEM	DESCRIPTION	QTY
4	Clean Face Surround	1
7	Clean Face Upper Cover	1
8	Clean Face Lower Cover	1
9	Duct Adapter	2

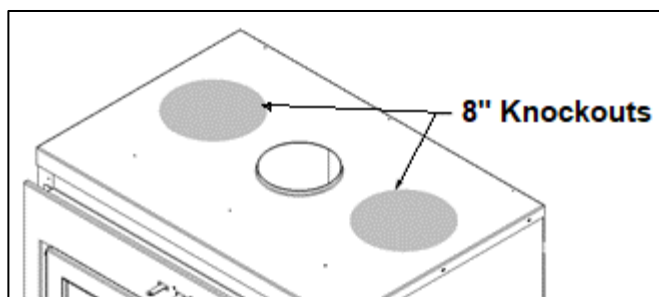


Figure 3-18: 8 Inch Knockouts for Gravity Kit

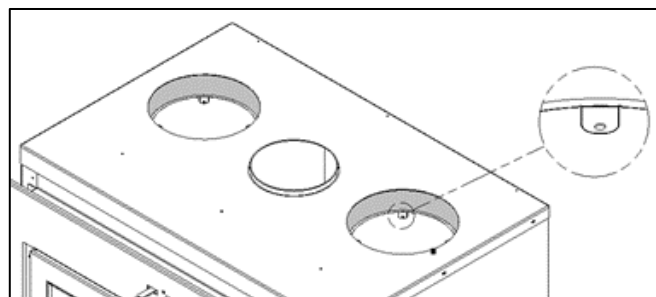


Figure 3-19: Tabs Inside the 8 Inch Knockouts

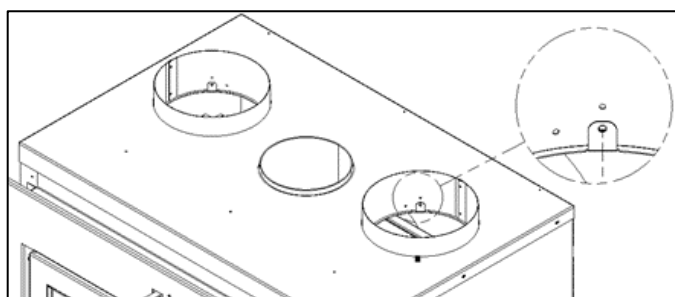


Figure 3-20: Installation of 8 Inch Duct Adapters

## 3.5 Gravity Kit Installation

The Clean Face surround comprises no louvers; however, an intake into the chase and an outtake through gravity ducts is required for this configuration. The instructions below describe the installation of the intake openings, and the gravity ducts/outtakes. Note that in order to connect the gravity ducts to the sides of the chase, the sides of the chase need to be constructed and the front of the chase needs to remain open; to connect the gravity ducts to the front of the chase, the sides need to remain open and the front of the chase needs to be constructed (Figure 3-22). Please note that the SUPREME KG540 kit and the UCAC8 semi-rigid insulated ducts are required for the Gravity Kit installation (Figure 3-21).

### 3.5.1 Dual Louver Gravity Ducts

1. Determine the two locations of the air intakes on the chase and cut a rectangular opening 10.5" (W) X 9.5" (H). Note that a distance of 5" is required from the floor.
2. Determine the two locations of the air outtakes on the chase and cut a rectangular opening 10.5" (W) X 9.5" (H). Note that a minimum distance of 64" is required from the floor and a minimum of 6" is required from the ceiling (Figure 3-37). Please note that the air outtake grilles can be installed in the same room or in different rooms from each other. If the grilles are installed at different heights, more heat will be distributed to the highest one.
3. From the exterior of the chase, place the duct/louver adapter into the air outtake hole and secure it onto the wall with screws. Repeat for the other outtake.
4. Within the chase, place the grooved end of the adjustable 45° elbow into the flange of the duct/louver adapter and secure it using aluminum tape. Repeat for the other outtake.
5. Measure the distance between the duct adapter on top of the unit and the flange of the duct/louver adapter and cut the 8" semi-rigid insulated duct (SUPREME part number UCAC8) to the necessary length. Repeat for the other outtake.
6. Complete the connections by sliding the ducts over the duct adapters and the flanges of the duct/louver adapters and tighten both ends with the worm gear clamps.
7. From the exterior of the chase, fasten the grilles over the intake and outtake openings with the beige screws.

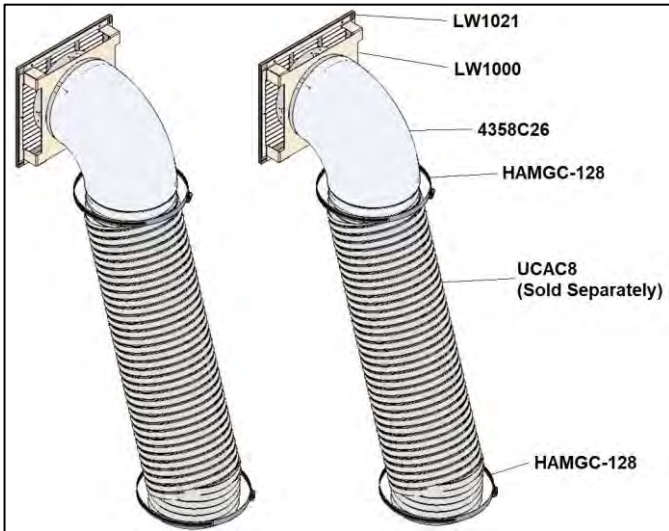


Figure 3-21: KG540 Assembly Diagram

Table 3-4: KG540 Components

ITEM	DESCRIPTION	QTY	ILLUSTRATION
LW1021	11"x 12" grille for intakes and outtakes	4	
LW1000	Duct/louver adapter	2	
4358C26	45° elbow, 8" diameter	2	
HAMGC-128	8" worm gear clamp	4	

**WARNINGS:**

- The gravity ducts must extend upwards from the top of the unit and cannot exceed 10 feet.
- The ducts should never extend downwards; only upwards.
- The air outtakes must be installed at a minimum of 64 inches from the floor.
- The gravity ducts must not be connected to a central heating system.
- A clearance must be maintained between the gravity ducts and the chimney.
- The intake swivel covers at the bottom sides must remain open for all Clean Face installations. Refer to Figure 3-15.

**Refer to Figure 3-37 for clearances to combustibles.**

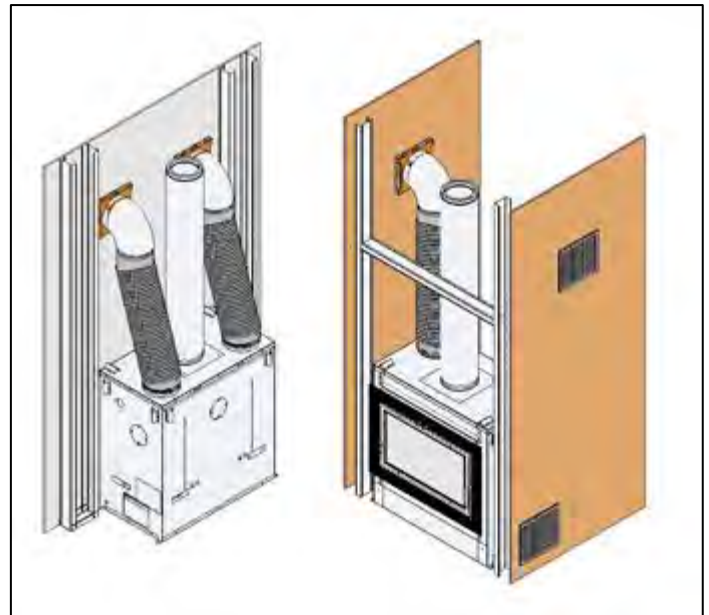


Figure 3-22: Gravity Kit Installation

### 3.5.2 Single Linear Front Louver

The clean face surround comprises no louvers; however, an intake into the chase and outtake through gravity ducts is required for this surround configuration. The instructions below describe the installation of the intake openings and the single linear front gravity ducts/outtakes. Please note that the SUPREME LV32 kit is required for the Gravity Kit installation with a single linear front louver (Figure 3-23).

**ATTENTION:** The single linear front louver requires framing for installation. The recommended framing dimensions of the single linear front louver are 40" x 7.5". A minimum distance from the ceiling to the top of the louver is 5.5". The base of the louver must be at least 64" from the base of the unit.

Refer to Figure 3-11 in Section 3.3 for framing requirements of single linear front louver installations.

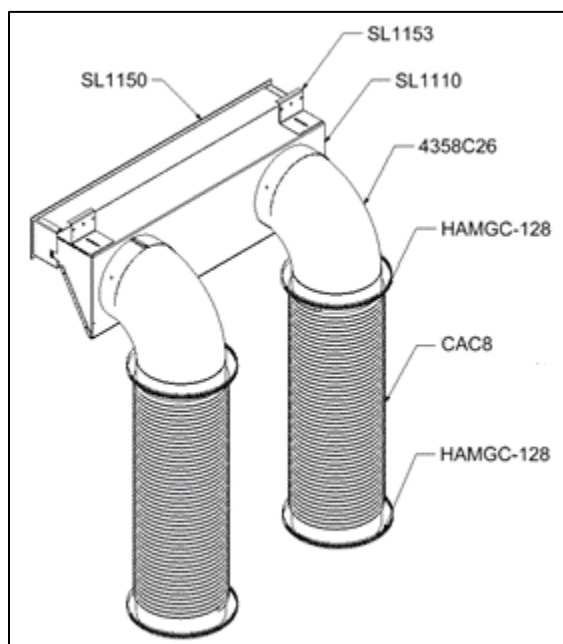




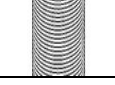


Figure 3-23: LV32 Assembly Diagram

Table 3-5: LV32 Components

ITEM	DESCRIPTION	QTY	ILLUSTRATION
SL1150	Linear front outtake louver	1	
SL1110	Linear duct/louver adapter	1	
4358C26	90° elbow, 8" diameter	2	
HAMGC-128	8" worm gear clamp	4	
CAC8	8" duct 5' long	2	

#### WARNINGS:

- A minimum clearance of 1 inch is required from the CAC8 ducts to combustible materials.
- The gravity ducts must extend upwards from the top of the unit and cannot exceed 10 feet.
- The ducts should never extend downwards; only upwards.
- The gravity ducts must not be connected to a central heating system.
- The intake swivel covers at the bottom sides must remain open for all Clean Face installations. Refer to Figure 3-15.

Refer to Figure 3-39 for clearances to combustibles.

**INSTALLATION:**

1. Install the linear duct/louver adapter (item SL1110 of Figure 3-23 and Table 3-5) onto the framing of the single linear front louver (Figure 3-24). The brackets of the SL1110 (SL1153 of Figure 3-23) are adjustable to accommodate different wall finishing materials (Figure 3-25).
2. Temporarily install one of the 90° elbows (4358C26 of Figure 3-23 and Table 3-5) on the linear duct/louver adapter (Figure 3-26) and measure the distance L indicated in Figure 3-27.

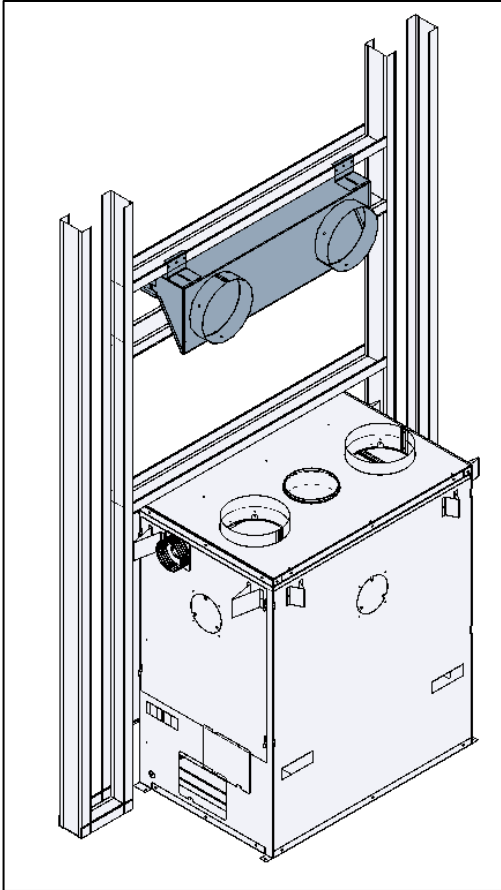


Figure 3-24: Linear Duct/Louver Adapter Installation

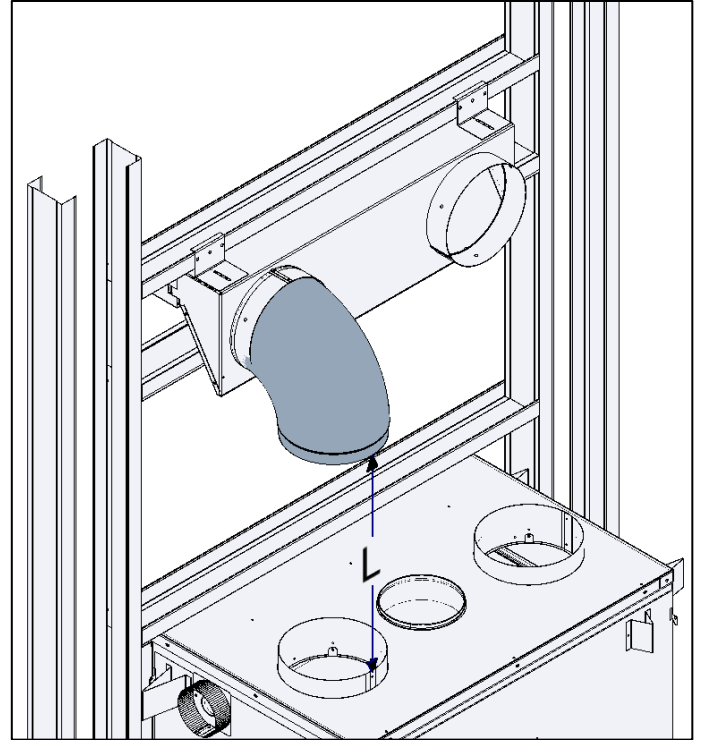


Figure 3-26: Elbow Temporarily Installed on Linear Duct/Louver Adapter

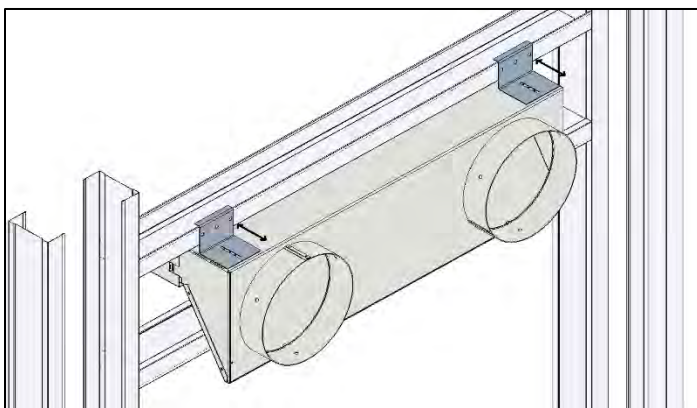


Figure 3-25: Adjustable Brackets of Linear Duct/Louver Adapter

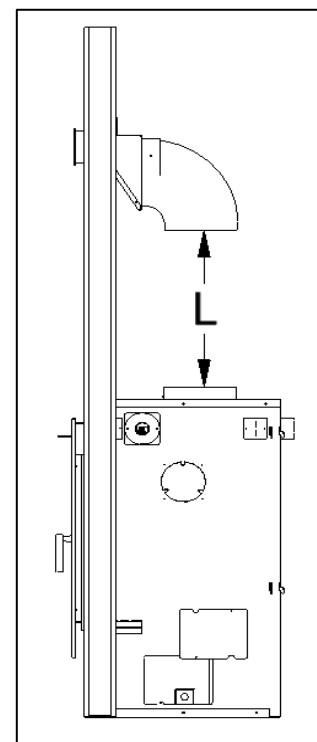
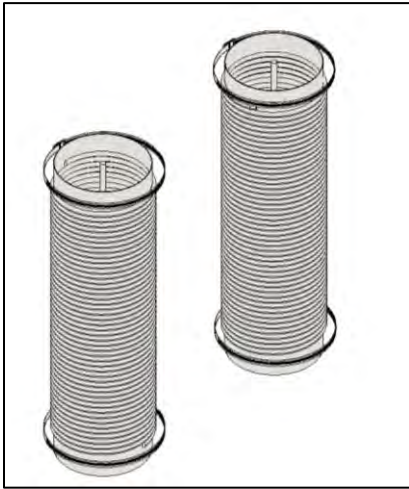


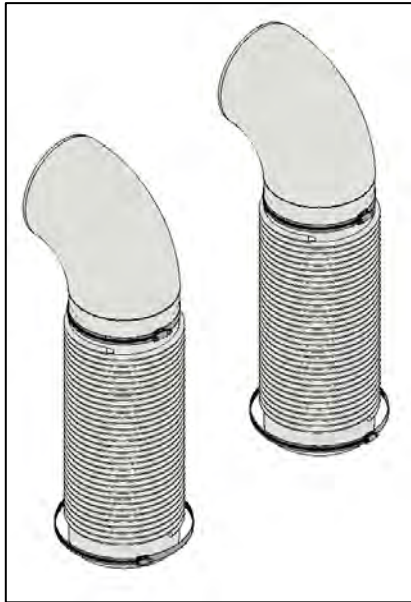
Figure 3-27: Distance L



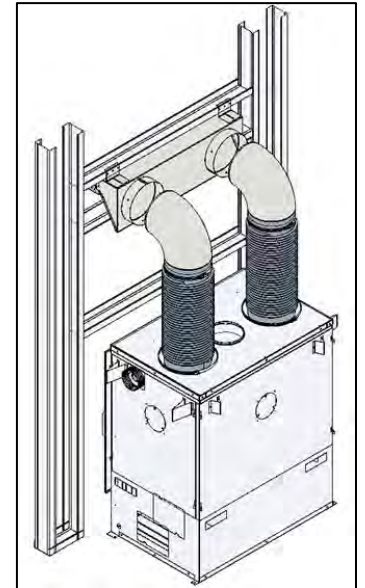
3. Uninstall the 90° elbow from the linear duct/louver adapter.
4. Add 3 inches to the distance L and cut the two CAC8 ducts (Figure 3-23 and Table 3-5) to that length.
5. Insert a worm gear clamp on each end of the ducts (Figure 3-28).
6. Install the 90° elbows on one end of the ducts and secure them with the worm gear clamps (Figure 3-29).
7. Insert the other ends of the ducts on the 8 inch duct adapters on top of the fireplace (Figure 3-30).



**Figure 3-28: CAC8 Ducts with Worm Gear Clamps**

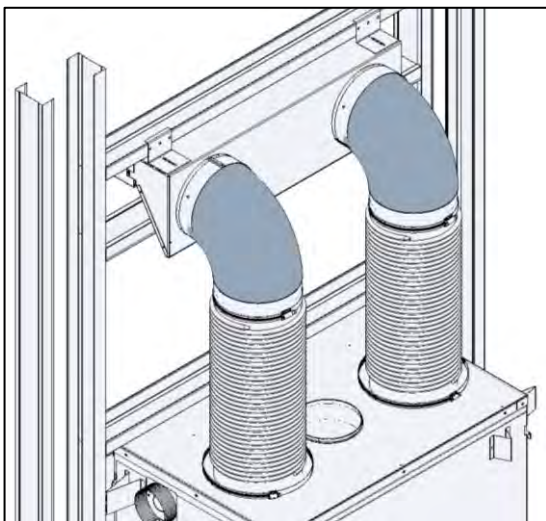


**Figure 3-29: Installation of 90° Elbows on CAC8 Ducts**

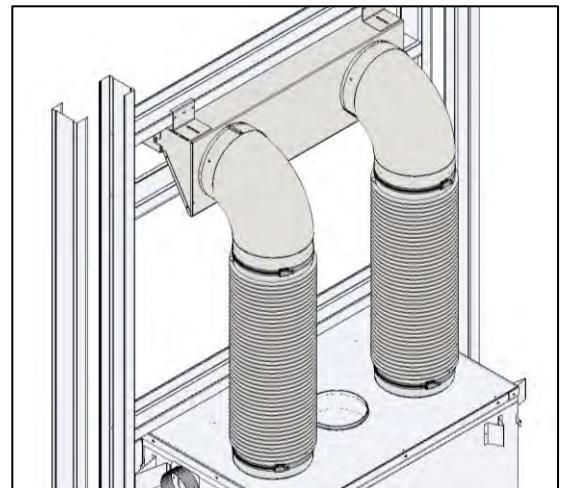


**Figure 3-30: CAC8 Duct Installation**

8. Connect the elbows to the linear duct/louver adapter and secure them with sheet metal screws (Figure 3-31).
9. Tighten the worm gear clamps to secure the assembly on top of the fireplace (Figure 3-32).



**Figure 3-31: Installation of 90° Elbows onto Linear Duct/Louver Adapter**



**Figure 3-32: The Two Bottom Worm Gear Clamps Tightened**

10. Once the chase has been built, locate the linear duct/louver adapter outlet and cut an opening on the chase finishing material of 30.75" (W) X 4.5" (H) centered with the outlet (Figure 3-33).

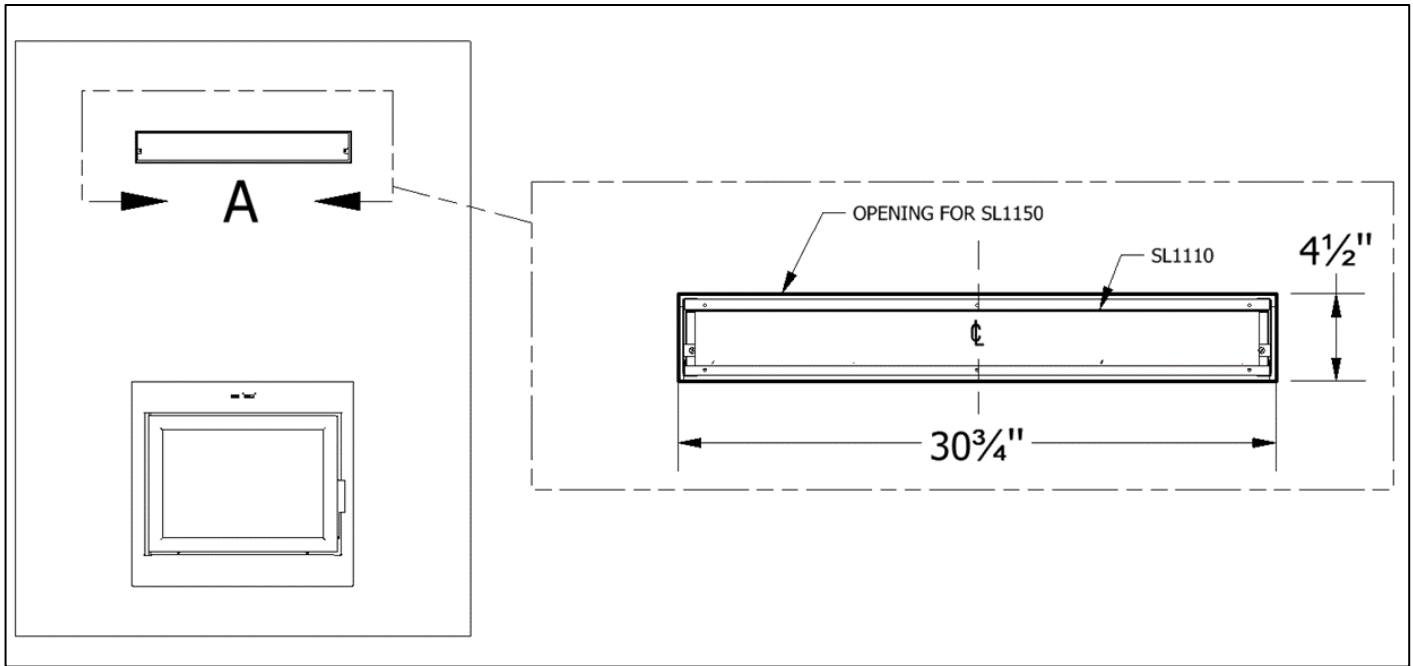


Figure 3-33: Opening for Air Outtake

11. Determine the two locations of the air intakes on the chase and cut the rectangular openings of 10.5" (W) X 9.5" (H) (Figure 3-34).  
 Note: A distance of 5 inches is required from the floor.
12. From the exterior of the chase, fasten the SL1150 linear front outtake louver and the two LW1021 intake grilles (Refer to Table 3-5).

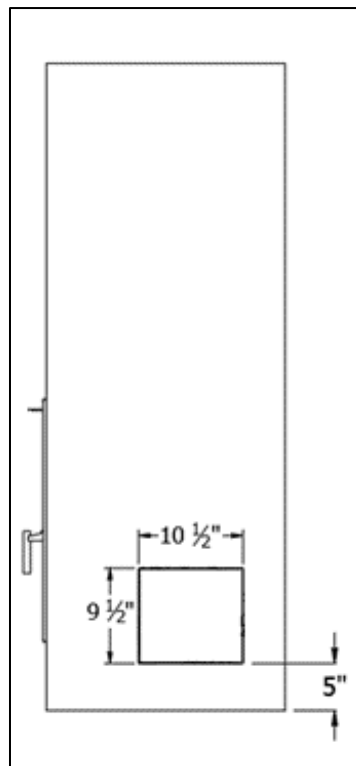


Figure 3-34 Opening for Air Intake  
Two Required

### 3.6 Hearth Extension

The hearth extension of the Astra 38 must comprise of a non-combustible material, such as steel, cement or mortar, bricks, or ceramic tiles. Note that unidentified materials may be combustible; verify product specifications prior to installation. The hearth extension must extend a minimum of 18" from the front of the door, 8" from side of the outer frame of the door and extended all the way to the unit (see Figure 3-35 for dimensions and Figure 3-36).

**CAUTION: Make sure to remove any carpet or fabric under the hearth extension.**

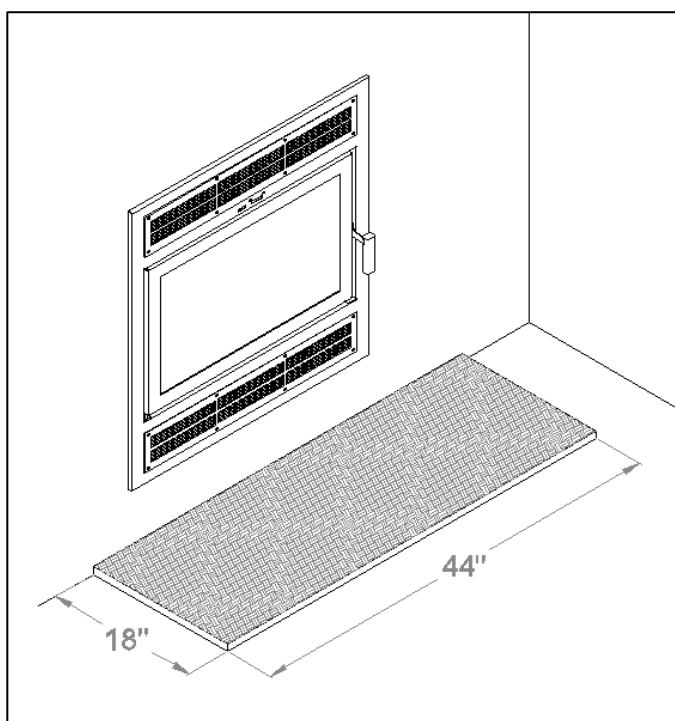


Figure 3-35: Hearth Extension

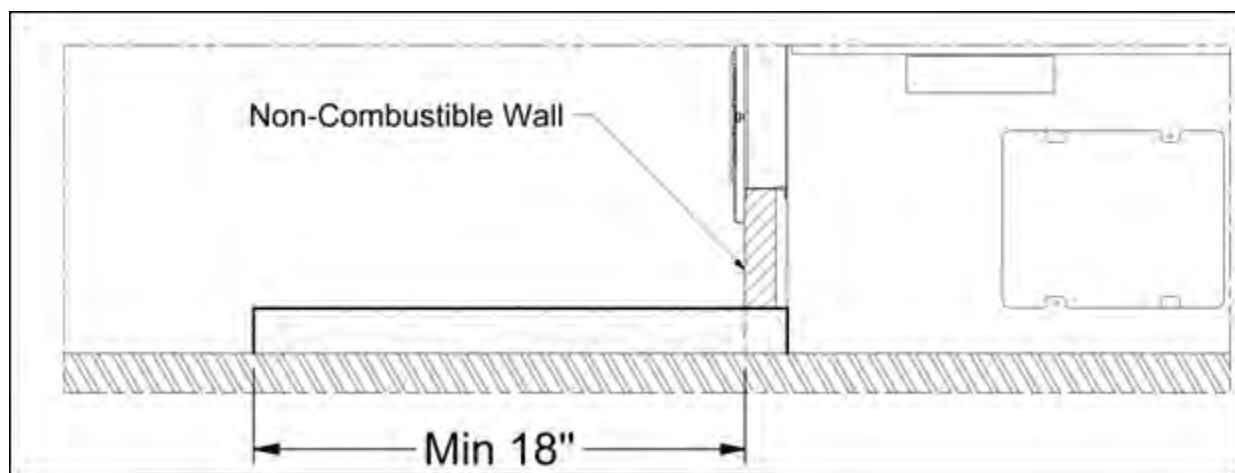


Figure 3-36: Hearth Extension Extended to Unit

## 3.7 Chase Installation

A portion of the front of the chase must be constructed out non-combustible material. Refer to Figure 3-37, 3-38, and 3-39 for dimensions. Note the chase must be properly fastened onto the framing structure.

**WARNING: Do not nail or screw the chase onto the fireplace.**

For the clean face surround option, two intake openings must be constructed onto the chase, as well as two outtake openings or one if installing the linear single louver front (Section 3.5). Refer to Figures 3-37 and 3-39 for minimum clearances.

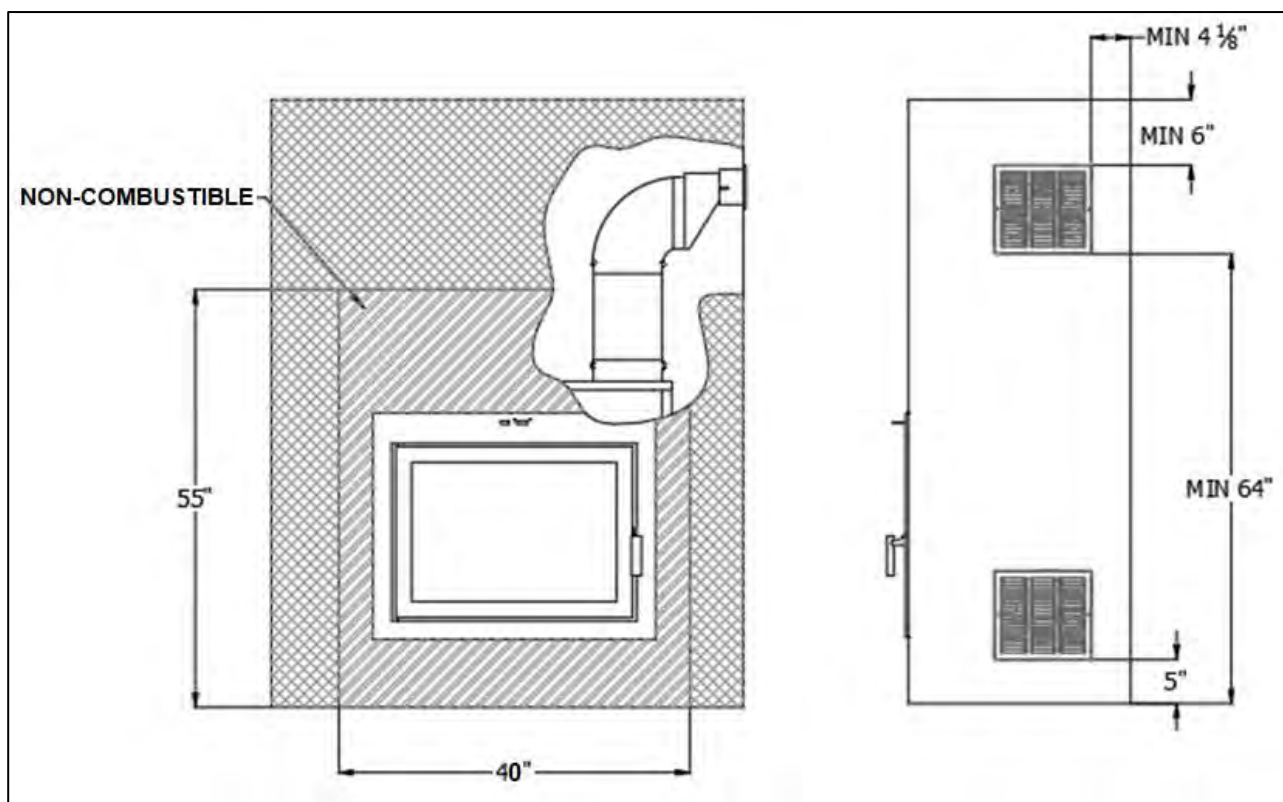


Figure 3-37: Front and Side Chase for Clean Face Dual Louver Configuration

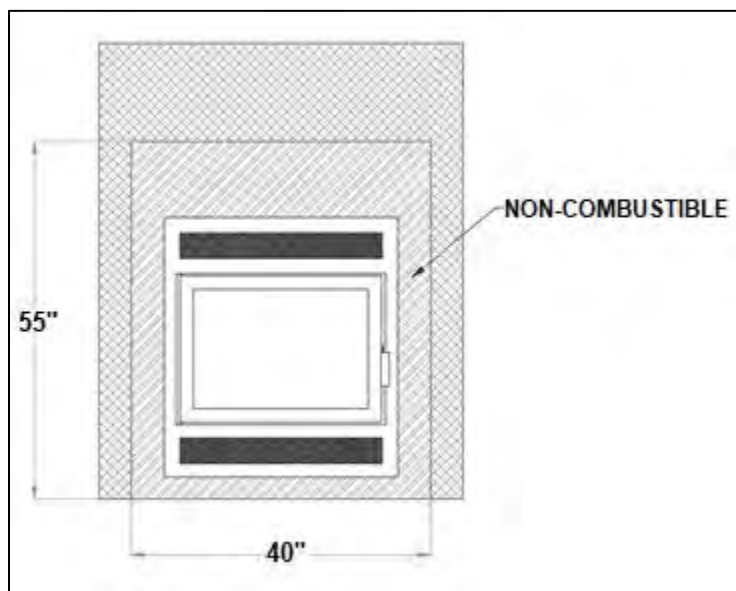


Figure 3-38: Front Chase for Traditional Surround Option

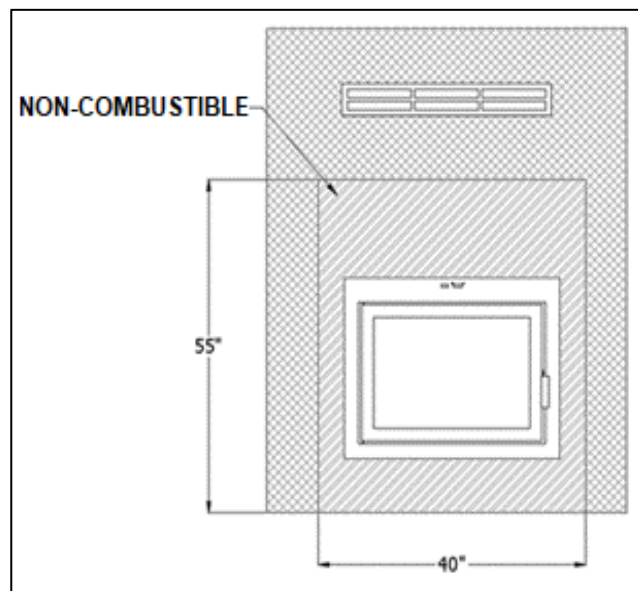


Figure 3-39: Front Chase for Clean face Linear Louver Configuration

### 3.8 Clearances to Combustibles

The clearances below must be respected to ensure safe operation of the unit under normal and extreme conditions. Failure to follow the information below is a safety hazard and may result in property damage.

Table 3-6: Overall Clearances

Combustible	Clearance	Reference
Side Wall	16" (41 mm)	Outer edge of fuel door
Side Trim	4" (10 mm)	Outer edge of fuel door
Ceiling	84" (214 mm)	Base of unit

Table 3-7: Combustible Mantel Clearances

Maximum Mantle Depth	Distance from the Base of the Astra 38 to the Bottom of the Mantle
3" (7.6 mm)	51.5" (130.8 mm)
5" (12.7 mm)	53.5" (135.9 mm)
7" (17.8 mm)	55.5" (141 mm)

The depth of the mantle is measured from the face of the fireplace door. When the non-combustible wall is recessed, the depth of the mantle can be increased by the amount of the recess (see Figure 3-40). Note that a combustible mantle cannot be installed below the minimum clearance of 51.5" (from the bottom of the mantle to the base of the unit). A non-combustible mantle doesn't require a minimum distance from the fireplace.

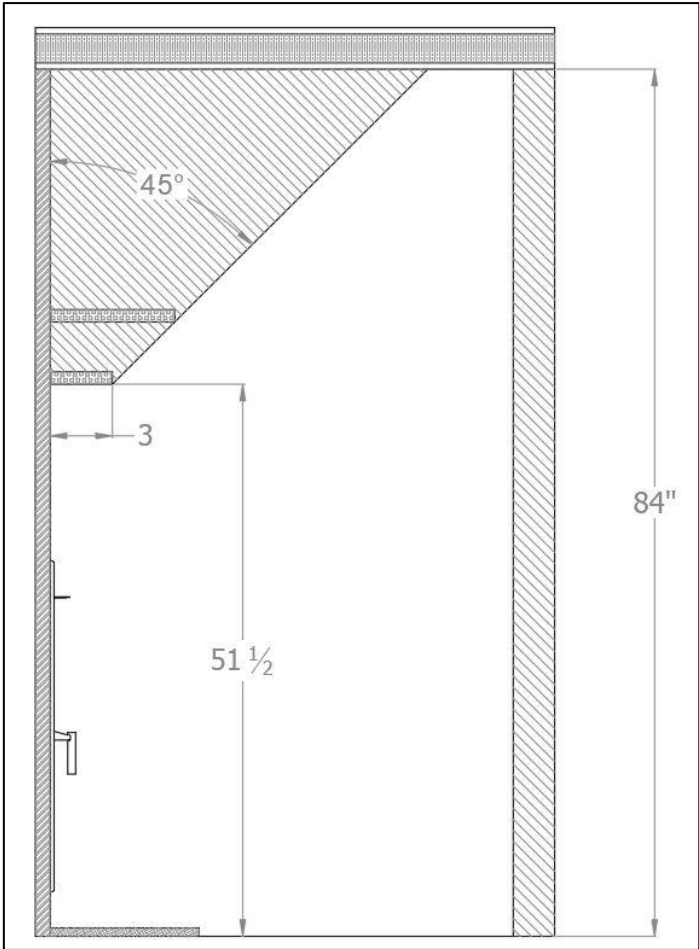


Figure 3-40: Mantel Clearance



### 3.9 Blower Kit

The Astra 38 comes with two high performance 130 CFM blower kit, which has an electrical rating of 115 V, 60 Hz, and 56 W. A variable speed control (rheostat) and a heat sensor (therm-o-disc) are included with the kit. **WARNING: Only blowers provided by SUPREME FIREPLACES INC. can be installed into the fireplace. Substituting the blower kit may result in overheating, will void the warranty and can be hazardous.**

The electrical connection of the blowers is to be performed by a certified electrician. Note that it is recommended that the wiring of the blowers be done before the installation of the surround kit. The blowers and the electric box are located respectively at the back/bottom and at the front/bottom of the unit (Figure 3-41).

**WARNING: Make certain that the fireplace is not in operation and the blowers are unplugged (breaker off) before accessing the electrical wiring of the blower kit.**

For maintenance or replacement purposes, the blowers and the electrical box are accessible from within the bottom of the firebox (Figure 3-42). 1) Remove the floor plate. 2) Disassemble and remove the stainless steel cover on the bottom of the firebox by unscrewing it. Take caution to the therm-o-disc and wiring assembled onto the stainless steel bracket.

The following are instructions on installing the blower kit into the Astra 38 (refer to Figure 3-43 for the electrical diagram):

1. Using two screws, install the therm-o-disc onto the L bracket located under the firebox.
2. Connect the black wire of the power supply to the therm-o-disc.
3. Connect the therm-o-disc to the black wire of the rheostat (install/mount the rheostat at a convenient location).
4. Connect the white wire of the rheostat to the blowers.
5. Connect the blowers to the white wire (neutral) of the power supply.
6. Ground the connection with the green wire in the electric box.

Once the electrical connections are completed, the blowers will turn on and turn off automatically during the operation of the unit. As the temperature of the fireplace increases and the therm-o-disc reaches 95°F, the blowers will turn on. Note that the average time it takes for the blowers to activate is between 30 to 45 minutes after starting a fire. The blowers will turn off once the fireplace has cooled down and the therm-o-disc is 85°F. The speed of the blowers can be adjusted with the variable speed control (rheostat) mounted on the wall. It is safe to operate the Astra 38 in the event of a power failure (blowers not powered).

Note: The blowers sit on a fixture. If the blowers need to be removed for maintenance, the fixture's pin needs to be unbent and the blowers can then be removed by lifting them upwards, out of the fixture. See Figure 3-45.

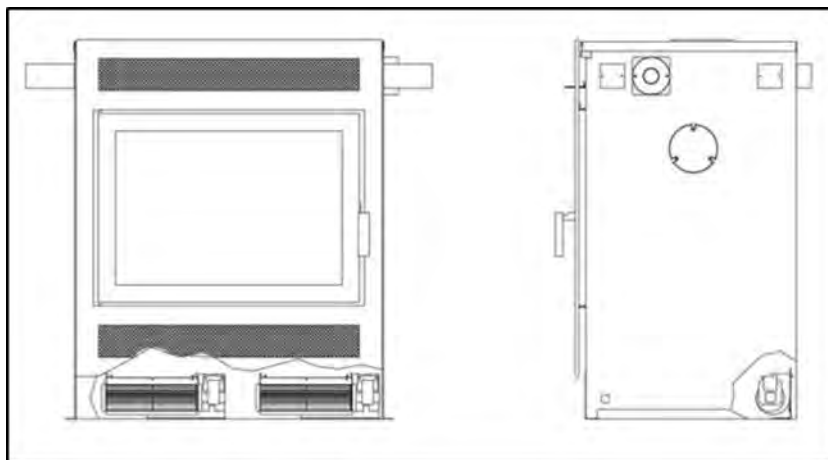


Figure 3-41: Location of the Blowers

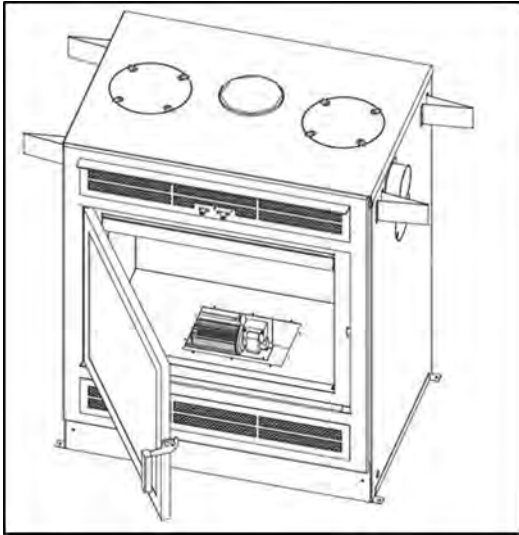


Figure 3-42: Access to Blowers

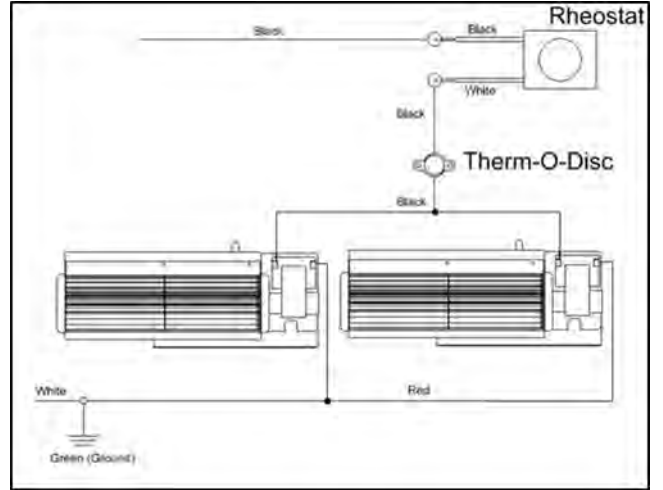


Figure 3-43: Electrical Diagram

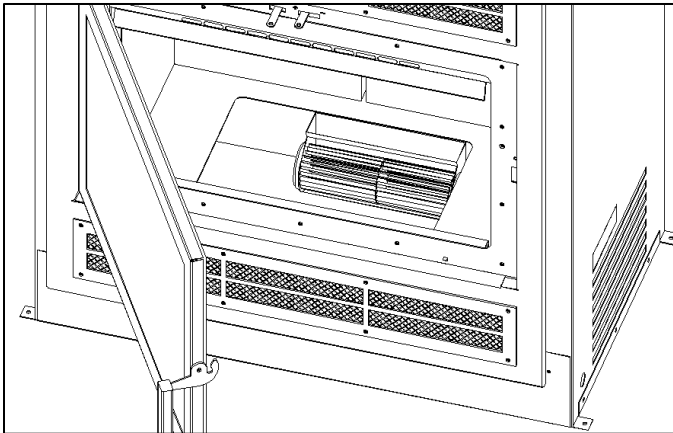


Figure 3-44: Access to Blowers

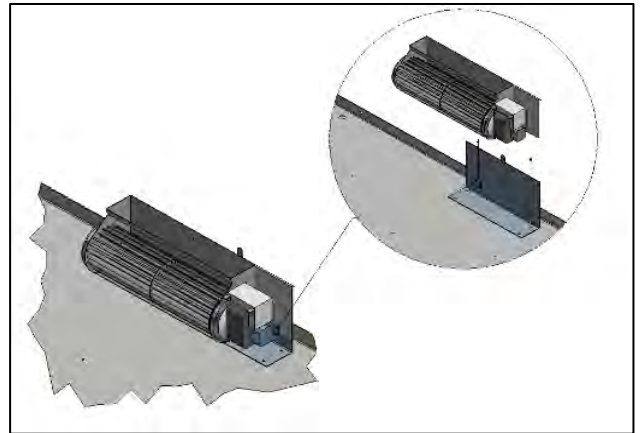


Figure 3-45: Blower and its Fixture

# 4 OPTIONS

## 4.1 Hot Air Kit

The hot air system is an optional kit intended to bring hot air from the fireplace to a remote area using a 250 CFM blower. The system is designed to distribute heat with ducting lengths up to 25 feet. Note that only an insulated flexible duct capable of withstanding a maximum temperature of 210°F can be installed with this kit. Note that a minimum distance of ten inches is required between the side of the unit connecting to the hot air kit and the framing to allow significant space (refer to Figure 3-3). It is possible to install up to three air ducts and to direct the ducts upwards or downwards.

**CAUTION: Only a hot air kit provided by SUPREME FIREPLACES INC. can be installed onto the fireplace. Substituting the hot air kit may result in overheating, will void the warranty and can be hazardous.**

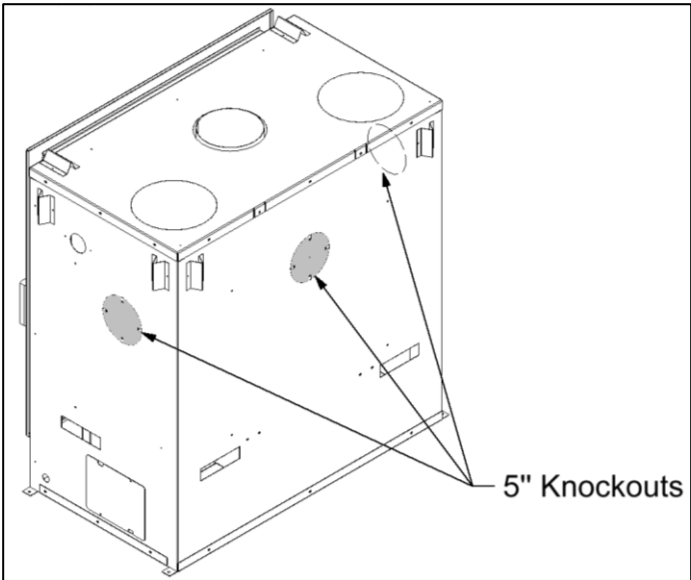


Figure 4-1: Hot Air Kit Knockouts

### WARNINGS

- Do not install the blower within the casing of the fireplace.
- The minimum wall opening to run the duct is 6" x 7.5".
- When the hot air duct passes through the chase of the fireplace, the minimum distances to combustible materials must be respected. The duct must be secured to prevent accidental displacement.
- The minimum distance between the blower and the fireplace is 3 feet.
- The duct must not be in contact with the top of the fireplace.
- Do not use a speed control for the blower.
- The top of the hot air grille must be a minimum of 2 inches away from a flat ceiling.
- The hot air grille must be installed in a location that ensures the effective dispersion of the hot air.
- The hot air grille cannot be installed on a floor.
- If the grille is installed near a wall or ceiling, the grille openings must be positioned in such a way to direct hot air away from the wall or ceiling.

Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	4	CLP	Clamp
2	1	701710	Blower
3	1	BLC	Blower-Duct Connector
4	2	UCAC5	Hot Air Duct *
5	1	FDC	Fireplace-Duct Connector
6	1	HAG	Hot Air Grille
7	1	WDC	Wall-Duct Connector

\* Item not included

Figure 4-2: Hot Air Kit Parts List

**Installation:**

1. Remove the 5" knockout on the exterior casing of the fireplace using a flat head screwdriver (Figure 4-1).  
**WARNING: Only remove the knockouts that will be connected to a hot air kit system.**
2. Install the fireplace duct connector (FDC - #5) on the opening using four screws.
3. In the room where the heat will be distributed, cut an opening of 6" X 7.5".
4. Find a suitable location to install the blower (701710 - #2).
5. Install the wall-duct connector (WDC - #7).
6. Install the air duct (UCAC5 - #4)\* and secure it with a clamp (CLP - #1). The exterior of the insulated duct can be in contact with combustible materials.
7. Install the wall grille (HAG - #6).
8. Make the electrical connections (Figures 4-3 and 4-4). Note that the power supply to the blower is 115V.

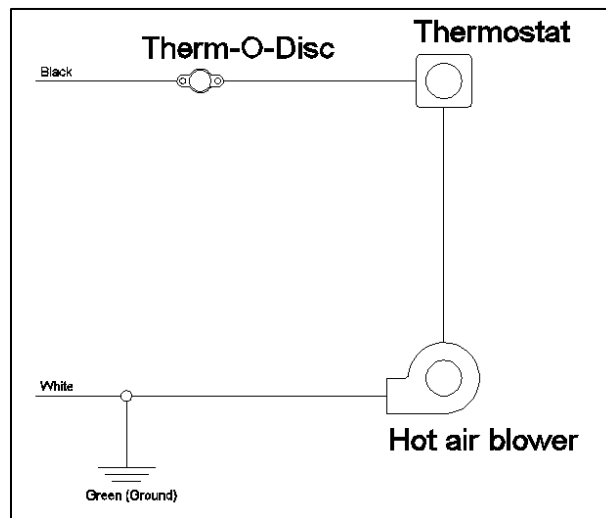


Figure 4-3: Electrical Diagram for Hot Air Kit

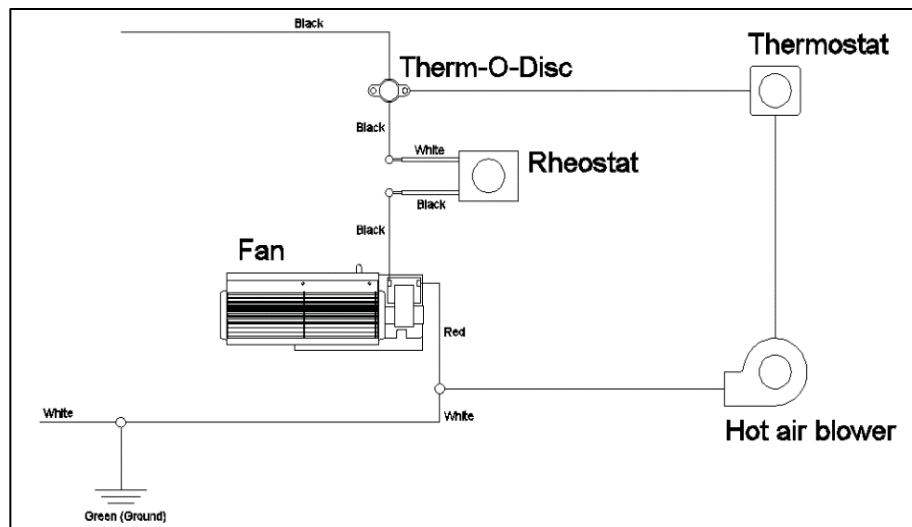


Figure 4-4: Electrical Diagram for Parallel Connection of Hot Air Kit and Blower Kit

## 4.2 Fresh Air Kit

Sufficient air exchange is necessary for the fireplace to operate properly and to maintain a good combustion. In an airtight household, the fireplace may not function as designed due to a lack of air; it is therefore recommended to install the fresh air kit in such cases. The fresh air system is an optional kit intended to bring combustion air into the fireplace from an exterior source. Note that a minimum distance of seven inches is required between the side of the unit connecting to the fresh air kit and the framing to allow significant space (refer to Figure 3-4).

Note that the Astra 38 is designed to use a minimum amount of air during operation. Using an air exchanger or simply opening a nearby window/door during the ignition of the unit will achieve a similar result as the fresh air kit. When the fireplace is idle, there is no air escaping from the house through chimney. **Consult a local authority having jurisdiction (such as the fire department, the municipal building department, the fire prevention bureau) to determine if it is mandatory to install a fresh air kit in your area.**

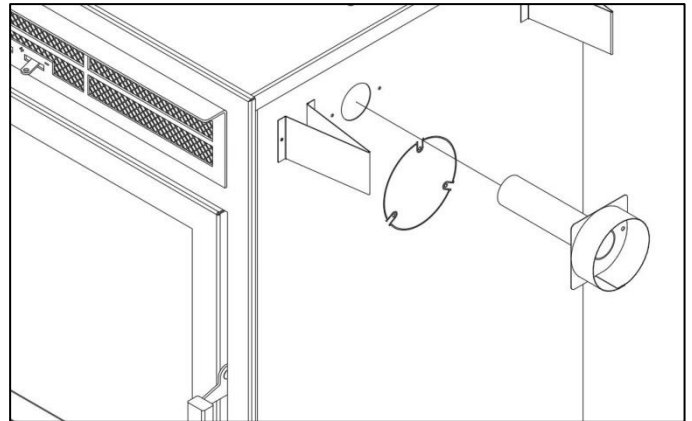


Figure 4-5: ADP4 Installation in Fireplace

### General Notes:

The outside air kit should be installed according to the following guidelines:

- The air duct must be insulated, wrapped with a vapor barrier, and have an inner diameter of 4 inches.
- The length of the air duct should not exceed 25 feet.
- The duct should not be elevated more than 10 feet from the base of the unit.
- Fresh air must come from the outside and not from another room or the attic.
- The outside register must be away from automobile exhaust fumes, gas meters, or other vents.
- Avoid installing the air register where it will likely be covered by snow or exposed to strong winds.
- The air register can be installed above or below the level of the fireplace.
- Use the SUPREME FIREPLACES INC. Fresh Air Adapter (ADP4) provided with the unit.
- Use the SUPREME FIREPLACES INC. Fresh Air Kit (UPEA4).

### Installation:

1. Cut 4 ½" diameter hole on the exterior wall of an ideal location.
2. Install the air register on the exterior wall.
3. Insert the fresh air adapter (ADP4) into the fireplace from the exterior casing. Make sure that the adapter is properly inserted into the combustion air box on top of the firebox.
4. Secure the fresh air adapter to the side of the fireplace using two screws.
5. Install the air duct and secure it with worm gear clamps.

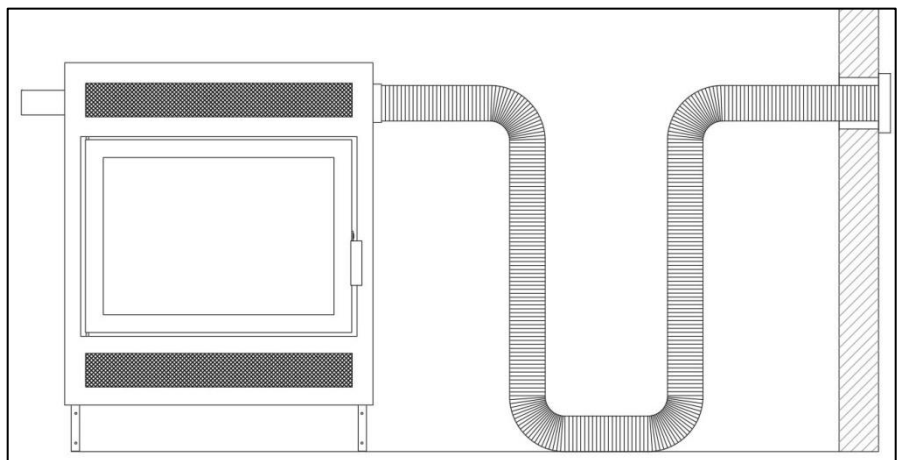


Figure 4-6: Installation of Fresh Air Kit



# 5 OPERATION INSTRUCTIONS

## 5.1 Fuel

The Astra 38 is designed to burn natural wood only. Higher efficiencies and lower emissions generally result when burning air dried seasoned hardwoods (moisture content below 20%), as compared to softwoods or to green or freshly cut hardwoods. The following are a few signs indicating that firewood is sufficiently dry for use: (a) cracks on the ends and surface of the logs, (b) lighter in weight, and (c) color (yellow/grey). It is recommended to use a moisture meter with pin sensors for determining accurately the moisture content of firewood (read manufacturer's instruction manual before operating). The optimum log length is 18-22 inches, preferably split in halves or quarters and left to dry under a cover or away from external elements for a minimum of one year prior to use. Use good quality dry cordwood only. DO NOT burn garbage, lawn clipping, yard waste, materials containing rubber (including tires), materials containing plastic, waste petroleum products, paints, paint thinners, asphalt products, materials containing asbestos, construction debris, demolition debris, railroad ties, pressure-treated wood, manure, animal remains, coal, salt water driftwood or other previously salt water saturated materials, unseasoned wood, paper products, cardboard, plywood, particle boards, or other foreign materials in this product. The prohibition against burning these materials does not prohibit the use of fire starters made from paper, cardboard, saw dust, wax and similar substances for the purpose of starting a fire in an affected wood heater. Burning these materials may result in release of toxic fumes or render the heater ineffective and cause smoke. Do not over fire the Astra 38 fireplace. Over firing will damage the fireplace, is hazardous and will void the warranty. NOTE: Gas logs cannot be installed in the Astra 38 fireplace.

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

Ecological or compressed logs containing chemical additives are not tested and approved to be used with the Astra 38. Using them will overheat and damage the fireplace and void the warranty. Ecological or compressed logs that are 100% wood and contain no other additives can be safely used in the Astra 38. Never use more than two of these logs at a time. Using more is not only dangerous, but will damage the fireplace and void the warranty. Follow the ecological log manufacturer's safety guidelines and recommendations and be sure that they are intended for use in fireplaces. Reload only once the previous load of wood has been consumed and only embers remain.

**WARNING: Do not keep the door open while the fireplace is in operation.**

## 5.2 First Fires

For the first three fires, burn a maximum of three logs at the medium to low burn rate (refer to Section 5.3) to allow for proper conditioning of the unit. Due to oil residues and the curing of the paint of the fireplace, it is normal to smell an odor for the first fires of the Astra 38. Open a window or a door near the fireplace to ventilate the house during the first fires. Oil residues may cause light smoking.

## 5.3 Operating the Combustion Air Control

The burn rate and the heat output are related to the amount of air entering into the firebox. The combustion air control of the Astra 38 has two components: the Activator and the Burn Rate Selector (see Section 2.3). When starting the fire or when adding a new charge of wood, the fireplace needs additional air in order to establish a good fire. When the wood starts to burn properly, the amount of air can be reduced depending on the heating requirements.

The left combustion control lever is the Activator. When starting a fire or adding a new load of wood, the Activator must be pushed in to allow maximum air to enter the firebox. The right combustion control lever is the Burn Rate Selector. The Burn Rate Selector can slide sideways to achieve different burn rates. When the Burn Rate Selector is positioned to the left, a maximum burn rate is achieved and when it is positioned to the right, a minimum burn rate is set. Keeping the Burn Rate Selector to the right will burn the wood slower. Keeping the Burn Rate Selector to the left will provide a stronger fire and keep the glass of the fireplace cleaner for longer. Adjust the burn rate according to your heating requirements and the quality of your wood. The combustion air control will automatically and gradually close the primary air source to the selected burn rate setting (right lever) with the presence of heat to maximize the burn time.

**NOTE:** The Burn Rate Selector can remain at the same setting at all times if the burn rate is satisfactory. However, the Activator must be pushed in when starting a fire or when adding a new load of wood.

**WARNING:** The combustion air openings should never be obstructed.

**WARNING:** Never manipulate the Combustion Air Control with bare hands as it gets hot when the Astra 38 is in operation. Use the Cold Hand Key (see Section 2.4) to adjust the Combustion Air Control.

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

## 5.4 Starting a High Efficiency Fire

The Astra 38 has patented technologies and innovative features that make starting a fire quick and easy. Before starting a fire, assure that all the safety precautions mentioned in the owner's manual are being respected. The following instructions describe starting a fire in Astra 38 fireplace using a "top-down" approach, which results in a cleaner, more efficient, and longer burn:

- a) Place two logs in the firebox. The logs should sit directly on the hearth from left to right or east to west (parallel with the door). Do not use a fireplace grate.
- b) Place a third and fourth log above the two logs of step a) front to back or north to south.
- c) Depending on the size of the logs, a fifth log can be placed above the logs of step a) and step b). For optimal performance of the unit, leave a minimum 1" space between the logs and the baffle and a 2.5" space between the logs and the door.
- d) Push the left combustion control lever (the Activator) inwards.
- e) Slide the right combustion control lever (the Burn Rate Selector) to the desired burn rate. Positioning the Burn Rate Selector towards the left is for maximum burn rate and towards the right is for minimum burn rate.
- f) Place and ignite a firestarter within the between the logs in step b) or below the log in step c). Make sure that the firestarter is visible from the opening (facing the front).
- g) Once the firestarter is well lit, close the door. Do not leave the door open for more than 2 minutes.

**CAUTION:** The wood should be placed away from the door to avoid damage to the glass.

**WARNINGS:** Over firing the unit may result in overheating and can damage the fireplace and/or result in fire hazards. The maximum firewood load must not exceed four medium sized logs (approximately 30 pounds). This fireplace has been designed to burn with the door closed. When the fireplace is being used, the door should remain closed at all times. Failing to do so is a safety hazard, will damage the fireplace and void the warranty.

**WARNING:** Do not use fire accelerants to rekindle the fire if the first attempt to start the fire failed. Do not open the door. Simply reactivate the Activator by pushing it inwards.

NOTE: Sufficient air exchange is necessary for the fireplace to operate properly. Air is required in order to maintain the combustion of the fireplace. If the house is airtight, the fireplace may not function properly. If the fireplace is deprived of air, it will be necessary to provide a source of fresh air into the dwelling. This may be done by using an air exchanger unit or simply by opening a window or a door near the fireplace partially for a few minutes. Make sure that other equipment such as the kitchen exhaust fans or oil central heating systems does not affect the fireplace functionality. Large return ducts of central heating systems located in the same room as the fireplace may affect the proper functioning of the unit and may cause smoking.

## 5.5 Adding a New Load of Wood

WARNING: Open the door to reload only when the wood has been reduced to embers, otherwise there is a risk of smoke infiltration into the house.

When the wood has been reduced to embers and there's no visible flame, you may add a new load.

- a) Crack the Astra 38 door open and wait a few moments before opening the door completely.
- b) Use your fireplace tools to gather the remaining embers at the center of the firebox.
- c) Activate the Activator by pushing it in.
- d) Once the embers begin to glow red, add the new load of wood in the firebox.
- e) Keep the door of the Astra 38 slightly unlatched until you see a flame in the firebox. Never leave the Astra 38 door unlatched without constant supervision.
- f) Completely latch the Astra 38 door.

Assure that a flame is maintained. Avoid wood smoldering on top of embers as this will result in a dirty glass, excessive emissions, chimney creosote buildup and poor heat output. If wood is smoldering, ensure the Activator has been activated and unlatch the door slightly with supervision until a flame has been maintained.

## 5.6 Blower Kit Operation

The blower kit for the Astra 38 consists of two blowers mounted at the back/bottom of the unit and a heat sensory therm-o-disc; the blowers will start and stop automatically in the presence and absence of heat respectively. A variable speed control allows the adjustment of the speed of the blowers. Do not install a substitute kit as this may result in overheating and risk of fire. Refer to Section 3.9 for the installation instructions of the blower kit.

When the fireplace gets hot and the therm-o-disc reaches 95°F, the blowers will turn on. The average time it takes for the blowers to activate is 30 to 45 minutes after starting a fire as explained in Section 5.4. The blowers will turn off once the insert has cooled down and the therm-o-disc reaches 85°F. The speed of the blowers can be adjusted with the variable speed control.

## 6 TROUBLESHOOTING

### 6.1 Backdraft / Smoking

Draft is the force created by a difference in pressure, which moves air from the appliance up through the chimney. It is important to operate the Astra 38 with proper draft to ensure optimal performance of the unit. Draft is depended on the length of the chimney, local geography, nearby obstructions and other factors. Proper draft results in an upwards flow through chimney, which prevents smoke infiltrating into the house during operation of the unit. As the temperature of the unit and chimney rises during combustion, the draft consequently increases due to a higher difference in pressure.

In contrast, backdraft is air flow from the chimney into the house, which results in smoke infiltration from the appliance and/or the chimney joints during operation. The unit is experiencing backdraft if air is flowing out from the exhaust of the baffle system (within the firebox). Backdraft is most commonly caused by fans around the house (such as in the kitchen and bathrooms) simultaneously in operation, insufficient length of the chimney (less than 15 feet), or a blocked chimney. Refer to the following suggestions to eliminate backdraft:

- Close any fans operating around the house (specifically for the duration of ignition).
- Clean the chimney of any obtrusions (when the unit is cold).
- Open one window or one door near the Astra 38.
- Heat the chimney by burning newspaper near the exhaust of the baffle system.

### 6.2 Over Firing

The appearance of a red glow on the exterior of the firebox (top and sides) and/or on the flue is a sign of over firing. Excess air entering the firebox, over fueling, or an abnormal strong draft causes the unit to reach drastic temperatures from an uncontrollable combustion. Over firing is a safety hazard and may result in permanent damage to the unit. In the occurrence of over firing:

- a) Make sure the Astra 38 door is properly closed.
- b) Manually close the Combustion Air Control by pulling the Activator (left lever).
- c) If possible, turn on the blowers to the maximum speed. The red glow on the exterior of the firebox and/or the flue should gradually disappear.

**WARNING: Do not touch hot surfaces with bare hands. Always wear heat protecting gloves and use fireplace tools.**

Guideline to avoid over firing:

- Always keep the door closed during operation.
- Inspect regularly the door gasket/glass and replace accordingly.
- Always operate the unit with the chimney sweeping cap in position, blocking the hole in the baffle.
- Never load more than 30 lbs of wood at a time.
- Ensure that there is no excess draft.

**WARNING: Failure to follow the above guideline will void the warranty. Over firing is a safety hazard, can cause irreversible damages to the Astra 38 and will void the warranty.**

# 7 MAINTENANCE

## 7.1 Disposal of Ashes

Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial on soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have been thoroughly cooled. **CAUTION: Always wear heat resistant gloves when removing the ashes from the firebox.**

- a) Let the firebox cool to ambient temperature before removing the ashes. It is recommended to remove the ashes once the bed has exceeded a height of 4 inches.
- b) Slowly open the door to prevent ashes from coming into the room.
- c) Place an ash bucket (metal container) near the fireplace, onto the non-combustible hearth.
- d) Using a shovel and brush, remove the bulk of the ashes from the firebox into the ash bucket. Note that it is not necessary to keep a thin bed of ashes for the next fire.
- e) Store the ash bucket (with the tight-fitting lid) on a non-combustible surface, away from any combustible materials, pending final disposal.

## 7.2 Chimney Maintenance

**Creosote – Formation and Need for Removal:** When wood is burned slowly, it produces tar and other organic vapors, which combine with expelled moisture to form creosote. The creosote vapor condenses in the relatively cool chimney flue of a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited, this creosote makes an extremely hot fire. The chimney connector and chimney burning wood or coal should be inspected at least once every two months during the heating season to determine if creosote buildup has occurred. **Never use chemical cleaners for your chimney.**

**WARNING: In the case of a chimney fire: 1) close the door of the fireplace; 2) set the burn rate of the Combustion Air Control to minimum (Section 5.3); 3) call the local fire department (if assistance is needed); 4) use a dry chemical fire extinguisher (baking soda or sand) to control the fire.**

**CAUTION: Never use water to extinguish a fire as it may result to dangerous steam explosions. Do not use the unit until the chimney is inspected and repaired (if needed) by a qualified technician.**

**NOTE:** Do not clean the chimney when the unit is in operation/hot. Follow the instructions below for sweeping the chimney of an Astra 38 fireplace:

- a) Open the door of the unit.
- b) From within the firebox, displace the chimney sweeping cap located in the baffle by lifting and moving it to the side.
- c) Close the door of the unit.
- d) Using an appropriate sized chimney sweeping brush, clean the chimney from any creosote buildup and other residues.
- e) Remove all the fallen/loose creosote/residues from the firebox and baffle system (a shop vacuum cleaner can be used for a thorough cleaning).
- f) Place back the chimney sweeping cap.

**CAUTION: Operating the unit without the chimney sweeping cap in position will result in over firing and void the warranty.**



## 7.3 Cleaning of Glass

It is recommended to clean the glass door with a soft cloth, dampened with a non-abrasive solution, such as soap and water.

**CAUTION: Cleaning the glass with an abrasive solution will result in surface scratches, reducing glass transparency and resistance to impacts.**

The glass of the door may be cleaned with commercial products intended for fireplaces and stoves. After cleaning the glass, remove any remaining solutions with a wet cloth to avoid chemical reactions at elevated temperatures ("cloudiness" on the surface of the glass).

**CAUTION: Do not apply commercial cleaners onto any painted surfaces as discoloration/peeling may occur.**

**NOTE: Never clean the glass when the unit is in operation or hot.**

## 7.4 Replacing a Cast Iron Panel

Four cast iron panels are assembled along the combustion chamber side walls (left, right, and back) allowing for a longer and a constant heat output. It is recommended to perform a weekly check on the condition of the panels to ensure proper operation of the unit. The cast iron panels need to be replaced when it is gravely chipped and/or cracked. Failure to replace the cast iron panel under the mentioned conditions will alter the performance of the unit. Refer to the following instructions for replacing a cast iron panel:

- a) Order the replacement kit for the Astra 38 cast iron panel.
- b) Remove the door from the firebox and place it face down on a soft surface. NOTE: Rotate the handle to permit proper placing.
- c) Remove the bottom plate (hearth) by lifting it out of the firebox.
- d) Slide the back wall cast iron panel by tilting the bottom and swivelling them out of the top retainer.
- e) Replace the damaged cast iron panel if it was removed in step d) and position the panels back in place by swiveling them behind the top retainer.
- f) In the case of a damaged panel on the firebox side walls, replace the damaged panel and reposition the back wall panels by swiveling them behind the top retainer.
- g) Insert the bottom plate (hearth) and door to its original position.

**WARNING: Do not operate the unit with any of the cast iron panels missing.**

## 7.5 Replacing the Door Gasket

SUPREME FIREPLACES INC. assembles heat resistant graphite coated gaskets on the doors of all products, allowing for a proper seal of the unit at extreme temperatures (up to 1000°F). It is recommended to perform a weekly visual check on the condition of the  $\frac{3}{4}$ " gasket to ensure proper operation of the unit. The  $\frac{3}{4}$ " gasket of your door needs to be replaced when 1) the fibers of the gasket are coming loose and 2) the gasket is disintegrating. Failure to replace a gasket under the mentioned conditions can cause irreversible damage to the unit due to over firing. Refer to the following instructions for replacing the  $\frac{3}{4}$ " gasket:

- a) Order the replacement kit for the Astra 38  $\frac{3}{4}$ " door gasket GSK\_31\_7.
- b) Remove the door from the firebox and place it face down on a soft surface. NOTE: Rotate the handle to permit proper placing.
- c) Cover all painted surfaces of the door to avoid damages.
- d) Using a wedging tool or flat head screwdriver, gently remove the old  $\frac{3}{4}$ " gasket (along with the old silicone) from the door framing.
- e) Apply a bead of high temperature silicone along the groove of the metal brackets.

- f) Place the new  $\frac{3}{4}$ " gasket around the door framing and cut any excess gasket with scissors. NOTE: It is recommended to tape the extremity of the gasket for a cleaner result.

Give significant amount of time to allow the silicone to cure before reinstalling the door onto the firebox. A slight resistance is expected when closing the door with the new  $\frac{3}{4}$ " gasket; the door will close normally after the gasket has taken proper shape.

## 7.6 Replacing the Glass Panel

SUPREME FIREPLACES INC. uses a high quality 5mm thick Pyroceram III / Keralite ceramic glass that can withstand temperatures up to 1300°F. It is recommended to perform a weekly visual check for any damages or cracks on the glass.

**WARNING: Avoid striking the glass and slamming the door shut. Never operate the unit with a broken or damage glass.**

**CAUTION: Wear protective gloves when handling broken glass.** Refer to the following instructions for replacing the glass:

- a) Order the replacement kit for the Astra 38 glass.
- b) Remove, clean, and dispose any broken glass from the door and the surroundings.
- c) Remove the door from the firebox and place it face down on a soft surface. NOTE: Rotate the handle to permit proper placing.
- d) Using a wedging tool or flat head screwdriver, gently remove the  $\frac{3}{4}$ " gasket (along with the silicone) from the door framing.
- e) Using a wrench, remove the 8 nuts fastened around the door framing.
- f) Remove the first row of metal brackets (2 small and 2 big) and thin gasket.
- g) Remove the damage glass and clean thoroughly the door framing from loose glass fragments.
- h) Place the new glass onto the second row of thin gasket, centered with the door framing.
- i) Place back the first row of metal brackets (2 small and 2 big) and thin gasket.
- j) Using a wrench, fasten the 8 nuts around the door framing (do not over-tighten).
- k) Apply a bead of high temperature silicone along the groove of the metal brackets.
- l) Place the  $\frac{3}{4}$ " gasket back into position.

Table 7-1: Parts List of Door Assembly

Item	Code	Description	Qty
1	DR2100-*	Door frame assembly	1
2	DR_25.75	Horizontal metallic bracket	4
2	DR_18.125	Vertical metallic bracket	4
3	PYRO_24.25X17	Pyroceram glass	1
4	GSK_19_7	Thin gasket	2
5	GSK_31_7	Thick gasket	1
6	SFC0031	Door latch - Astra	1
7	SFC0032	Wood pull handle – Astra	1

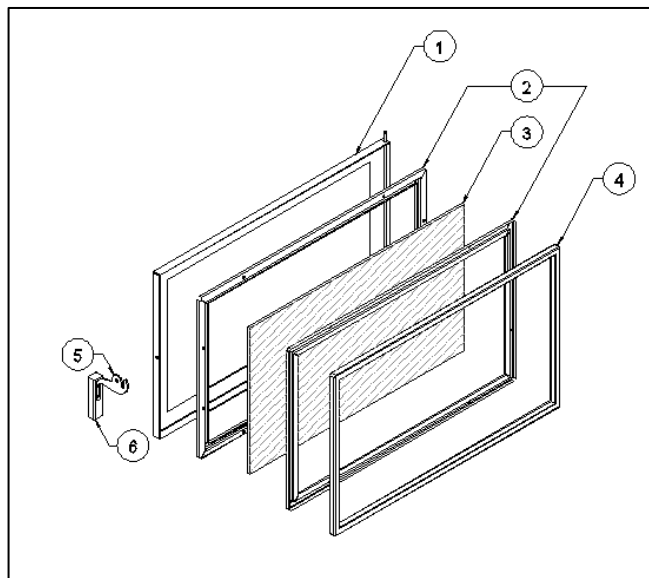


Figure7-1: Door Assembly Exploded View

Give significant amount of time to allow the silicone to cure before reinstalling the door onto the firebox.

## 7.7 Door Latch Maintenance

Lightly lubricate the hook of door latch (CM0031) with grease on a yearly basis to prevent abrasive wear. Occasionally inspect the bushing of the door latch. If required, adjust the tightness of the latch bolt using a 5/32" hex key.


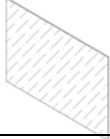


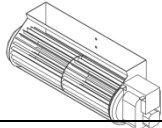
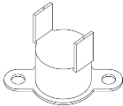
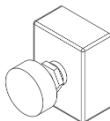
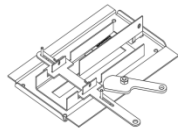



## 7.8 Paint

Paint touch-ups can be performed on the unit using a high temperature paint (in aerosol spray can format) by Stove Bright®. Refer to your invoice to determine the precise color of your unit. Contact your local hearth shop for further information on purchasing this paint.

NOTE: Apply the paint in a well ventilated area. If applying paint to the door, properly cover/mask the glass of the door using painters tape and cardboard. Wait for paint to dry before operating the unit. Refer to the instructions on the label of the aerosol spray can for proper paint application. **WARNING: Never apply paint to the unit during operation or when it is hot.**

## 7.9 Replacement Parts

Refer to the codes from the table below for any replacement parts:

Code	Description	Illustration
SFC0032	Wood pull handle	
PYRO_24.25_17	Pyroceram III / Keralite 5mm thick glass 24.25" X 17"	
GSK_19_7.5	Graphite coated square gasket, 0.1875" thick, 7.5' length	
GSK_31_7.5	Graphite coated square gasket, 0.75" thick, 7.5' length	
55416.32130_BRK	AC tangential blower <u>Electrical rating:</u> 115VAC, 60Hz, 56W <u>Certification:</u> VDE, CSA, UL, CE	
THE	Therm-o-disc <u>Electrical rating:</u> 120VAC, 15A <u>Certification:</u> UL/CSA	
KB13	Speed Control <u>Electrical rating:</u> 2.5 Amps, 115VAC – 50/60Hz <u>Certification:</u> UL, ULC	
PA5000-01	Combustion Air Control	
CM0020	Cold Hand Key	
CPSP0301-01	Removable Ash Lip	
38SFC1175	Cast iron Panel 16" X 12.625" X 1.25"	

## 8 WARRANTY

SUPREME FIREPLACES INC. warrants that the factory-built fireplaces, fireplace inserts, and stoves will be free from defects in material and workmanship, under normal use and service, for a period of **ten (10) years** from the date of purchase.

This warranty is only intended for the original retail purchaser and is non-transferable, given that the product was purchased from SUPREME FIREPLACES INC. or one of its authorized dealers. This warranty is conditional upon correct installation and intended use of the products and does not cover damages caused by misuse. This warranty shall be void if the fireplace, fireplace insert or wood stove is not installed by an authorized qualified technician in accordance with the installation instructions in the manual provided with this product. The installation must meet local and national building codes.

Description	Coverage	Labour
Patented combustion air control, chimney sweeping cap, door handle (breakage only), door latch assembly, podium structure of wood stove series, legs of wood stove series, circulating chamber of fireplace insert series, bimetallic strip of combustion air control, removable ash lip, surround structure, cold hand key, wall intake and outtake grilles of gravity kit	10 years	2 years
Baffle (excluding bypass mechanism), bottom plate, stainless steel components, cast iron panel, firebox soapstone slab, exterior door frame, liner adaptor of Fusion series	5 years	2 years
Painted and plated parts, door gasket	2 years	1 year
Electrical components	2 years	90 days
Glass panel (thermal breakage only)	90 days	90 days

### 8.1 Warranty Limitations

Abuse and improper use of the unit may cause irreversible damage and will void the warranty.

Transportation, packaging, and other related costs or expenses arising from the replacement or repair of defective parts will not be covered by this warranty, nor will SUPREME FIREPLACES INC. assume responsibility for them.

Freight related damages of products that are shipped directly from the SUPREME INC. warehouse are covered under warranty if they were indicated on the Bill of Lading from the carrier and SUPREME FIREPLACES INC. is notified within 48 hours.

This warranty is void for any fireplace, wood stove or fireplace insert that wasn't purchased from an authorized SUPREME FIREPLACES INC. dealer.

The warranty does not cover any physical or esthetic damages that were caused by glass cleaners, soap, or any other cleaning products.

Soapstone is a natural material. Normal wear and tear of the soapstone may result in surface fractures or small hairline cracks. Since these do not affect the functionality nor the integrity of the product, the warranty only covers fractures that are over 3 mm thick and spread across one extremity of the slab to the other.

Deformations, discoloration, corrosion and scratches are not covered under warranty.

All parts are limited to one replacement per warranty term.

This warranty does not cover the labor or other related costs for the removal of a product already installed, the installation of a replacement product and the shipping and handling for the return of a product or for the replacement part.



This warranty applies to normal residential use only. Damages caused by acts nature or natural disasters, accidents, over firing, misuse, abuse, negligence, improper installation, alterations or substitutions of components of the fireplace, abrasives, chemical cleaners, and negligence are not covered by this warranty. Burning anything other than natural wood will damage your fireplace and void the warranty.

This warranty is void for any product that has been moved from its original installation location.

SUPREME FIREPLACES INC. will not be responsible for environmental conditions and drafting issues such as inadequate vents or ventilation, excessive venting configurations or negative air pressures which may or may not be caused by geographic elements, exterior elements and/or mechanical systems such as exhaust fans, furnaces, clothes dryers, etc.

The noise generated by the expansion and contraction of the metallic components is normal as they heat up and cool down and are not covered under the warranty.

Labour covered under the warranty must not exceed the retail price of the part being replaced, are based on a predetermined rate amount found in the dealer program, exclude dealer travel costs and are disbursed to the dealer.

The manufacturer at its discretion may decide to repair or replace any part or unit after inspection and investigation of the defect. The manufacturer may, at its discretion, fully discharge all obligations with respect to this warranty by refunding the wholesale price of the defective part(s).

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

Repairs and/or replacements of parts and labor covered under warranty must be preauthorized by SUPREME FIREPLACES INC.

**A proof of purchase (copy of the invoice) is required for all warranty claims, as well as the completed warranty claim form and pictures/videos of the issue.**

This **Limited Warranty** is effective on all appliances sold after May 31<sup>st</sup>, 2022, and supersedes any and all warranties currently in existence.

**Please register your SUPREME product online at <https://supremem.com/warranty.php> to ensure full warranty coverage. Prior to contacting your dealer, have the following information available for warranty claim processing:**

- **Customer information (name, telephone number, and address)**
- **Proof of purchase**
- **Model name and serial number (see Section 2.17)**
- **Detailed description of defected component**
- **Pictures (minimum of three)**
- **Videos of the issues**

**In the case of a return for repair or replacement, it is the responsibility of the customer to adequately package the component/unit to prevent further damage during transport. Items sent to SUPREME FIREPLACES INC. without an open warranty claim will be returned to the sender.**



# Novo 18

# Novo 24

# Novo 38

## Owner's Manual

This product is proudly developed and manufactured in North America by **SUPREME FIREPLACES INC.**

3594 Jarry East, Montreal, QC H1Z 2G4

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[www.supremem.com](http://www.supremem.com)

Revised: June 2023

**IMPORTANT: Keep the owner's manual for future use.**

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# 1 SAFETY

SUPREME FIREPLACES INC. congratulates you on purchasing a Novo wood burning stove. This manual describes the installation and operation of the Novo non-catalytic wood heater. This heater meets the 2020 U.S. Environmental Protection Agency's crib wood emission limits for wood heaters sold after May 15, 2015. Under specific test conditions this heater has been shown to deliver heat at rates ranging from 9,756 to 18,805 Btu/hr for the Novo 18, from 10,125 to 25,944 Btu/hr for the Novo 24, and from 11,704 to 26,354 Btu/hr for the Novo 38. In addition, this stove complies with the ULC-S627, UL-1482, and UL-737 standards.

**SAFETY NOTICE:** Carefully read this manual before installation and operation of this stove. A house fire may result if not properly installed. To reduce the risk of a fire, follow the installation instructions. Failure to follow instructions presented in this manual can lead to property damage, bodily injury or even death. Alterations or modifications made on the unit or the installation is strictly forbidden as it may predispose the user to hazardous risks. Contact your local building or fire officials for restrictions and installation inspection requirements in your area and the need to obtain a permit.

**WARNING:** This unit is hot during operation; keep children, pets, flammable liquids, or combustible materials at a safe distance. Ensure that all clearances to combustible materials are respected. Contact with the unit during operation may cause severe harm. Install a safety screen to keep children and pets away.

## CAUTION:

- Do not connect this unit to a chimney flue serving another appliance.
- Do not connect to any air distribution duct or system.
- Never use chemicals to ignite the fire.
- Never burn waste or flammable fluids (such as gasoline, naphtha, or engine oil).
- Only burn dry natural cordwood.
- Never leave the unit unattended with the door open or unlatched.
- Only refuel this unit when the wood is reduced to embers.
- Always keep the door closed during operation.
- Do not operate this unit with a fireplace grate.
- Do not install an unvented gas log set into the firebox.
- Do not install this unit in a mobile home.
- Do not clean or service the unit while it is hot.
- Allow proper air flow by keeping the louvers/openings clear of any obstructions.

Note: Failure to respect the above cautions may cause damages to the unit, damages to personal property, bodily harm and will void the warranty. "This wood heater needs periodic inspection and repair for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual."

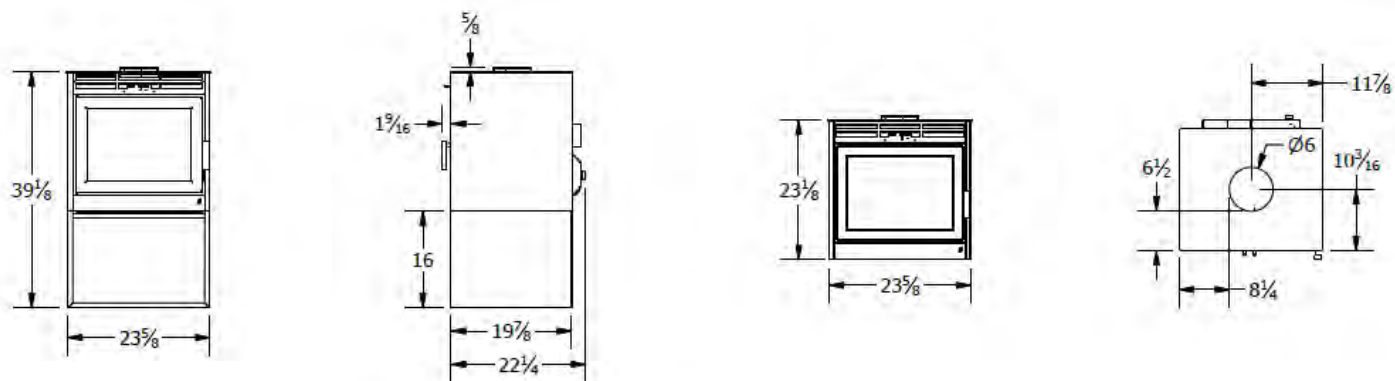


This product can expose you to chemicals including carbon monoxide, which is known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to [www.P65warnings.ca.gov/](http://www.P65warnings.ca.gov/)

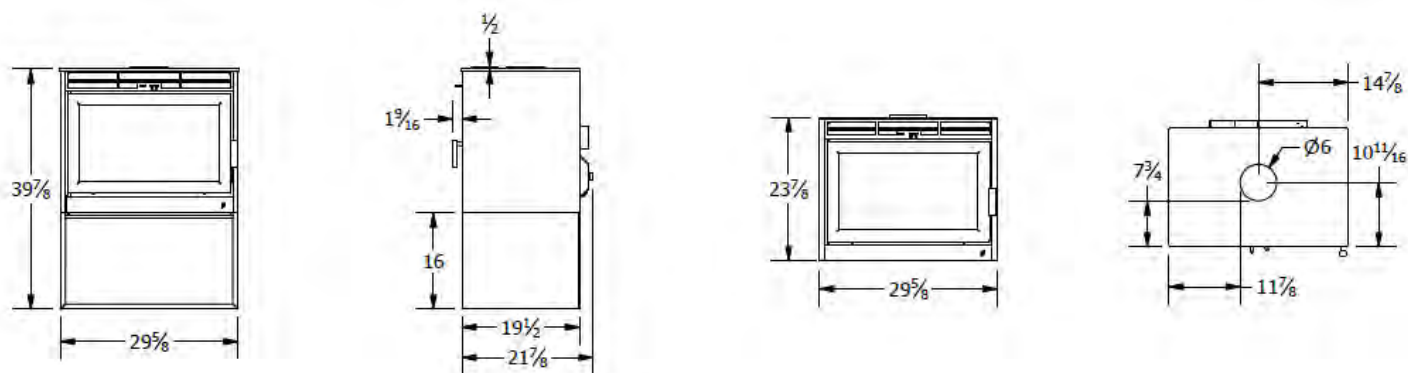
## 2 GENERAL INFORMATION

### 2.1 Overall Dimensions

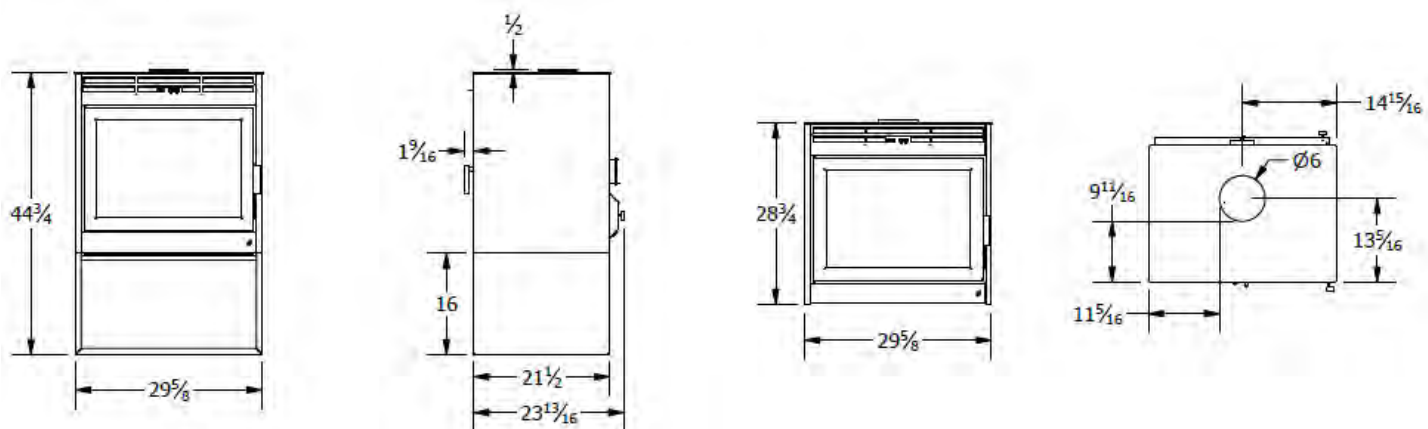
#### 2.1.1 Novo 18



#### 2.1.2 Novo 24



#### 2.1.3 Novo 38





## 2.2 Specifications

Model:	Novo 18	Novo 24	Novo 38
<b>Appliance Type:</b>	Adjustable Burn Rate Wood Heater – Non-Catalytic	Adjustable Burn Rate Wood Heater – Non-Catalytic	Adjustable Burn Rate Wood Heater – Non-Catalytic
<b>Fuel Type:</b>	Dry Cordwood	Dry Cordwood	Dry Cordwood
<b>Maximum Log Length:</b>	18 in (45.7 cm)	24 in (6.09 cm)	24 in (6.09 cm)
<b>Burn Time<sup>1</sup>:</b>	4 to 8 hrs	6 to 10 hrs	6 to 12 hrs
<b>Firebox Volume:</b>	1.77 ft <sup>3</sup> (0.050 m <sup>3</sup> ) <sup>2</sup>	2.61 ft <sup>3</sup> (0.074 m <sup>3</sup> ) <sup>3</sup>	4.09 ft <sup>3</sup> (0.116 m <sup>3</sup> ) <sup>4</sup>
<b>Heating Area:</b>	500 to 1,500 ft <sup>2</sup> (46 to 139 m <sup>2</sup> )	500 to 2,000 ft <sup>2</sup> (45 to 185 m <sup>2</sup> )	1,000 to 2,500 ft <sup>2</sup> (93 to 232 m <sup>2</sup> )
<b>Average Particulate Emissions Rate<sup>5</sup>:</b>	1.2 g/hr	1.0 g/hr	1.8 g/hr
<b>Average CO Emissions Rate<sup>6</sup>:</b>	1.8 g/min	1.5 g/min	2.09 g/min
<b>EPA Protocol:</b>	Method 28R, ASTM2780-10, and ASTM2515-11	Method 28R, ASTM2780-10, and ASTM2515-11	Method 28R, ASTM2780-10, and ASTM2515-11
<b>Efficiency (Crib Wood):</b>	HHV <sup>7</sup> : 70% LHV <sup>8</sup> : N/A	HHV : 71% LHV : N/A	HHV : 67.83% LHV : 72.93%
<b>Heat Output (Crib Wood):</b>	11,152 to 19,821 BTU/hr (3,268 to 5,809 W)	11,131 to 24,090 BTU/hr (3,262 to 7,060 W)	11,704 to 26,354 BTU/hr (3,431 to 7,724 W)
<b>Optimum Efficiency:</b>	75%	75%	75%
<b>Optimum Heat Output:</b>	60,000 BTU (17.6 kWh)	75,000 BTU (21.9 kWh)	125,000 BTU (36.6 kWh)
<b>Efficiency Protocol:</b>	CSA B415.1-10	CSA B415.1-10	CSA B415.1-10

### WARRANTY REGISTRATION

Please register your SUPREME product online at <http://www.supremem.com/registration.php> to ensure full warranty coverage. Proof of purchase is required for all warranty claims.

<sup>1</sup> Depending on combustion air control setting (see Section 5.3 for further details).

<sup>2</sup> Usable volume according to ASTM E2780-10 standards calculated at 1.54 ft<sup>3</sup> - figure used in EPA Method 28R testing.

<sup>3</sup> Usable volume according to ASTM E2780-10 standards calculated at 2.25 ft<sup>3</sup> - figure used in EPA Method 28R testing.

<sup>4</sup> Usable volume according to ASTM E2780-10 standards calculated at 3.50 ft<sup>3</sup> - figure used in EPA Method 28R testing.

<sup>5</sup> Officially tested and certified by an independent laboratory.

<sup>6</sup> Note that rate is smaller for low to medium/low burn rates.

<sup>7</sup> Higher Heating Value.

<sup>8</sup> Lower Heating Value.

## 2.3 Combustion Air Control

The Combustion Air Control is a patented mechanism (Patent No: US 7,325,541 B2) that regulates the air flow into the firebox based on the temperature of the unit. It is located on the top of the firebox, at the front center of the unit. The combustion air control of the Novo has two components: the Activator and the Burn Rate Selector. The left combustion control lever is the Activator. When starting a fire or adding a new load of wood, the Activator must be pushed in to allow a primary source of air to enter the firebox. The Activator will retract automatically with heat. The right combustion control lever is the Burn Rate Selector. The Burn Rate Selector can slide sideways to achieve different burn rates. When the Burn Rate Selector is positioned to the left, a maximum burn rate is achieved and when it is positioned to the right, a minimum burn rate is set. For optimum efficiency, it is recommended to operate the unit with the Burn Rate Selector set at the low to medium/low position.

**WARNING: Never manipulate the Combustion Air Control with bare hands as it gets hot when the Novo is in operation. Use the Cold Hand Key (see Section 2.4) to adjust the Combustion Air Control.**

## 2.4 Cold Hand Key

The Cold Hand Key is an accessory that comes standard with the Novo stove. The Cold Hand Key is a tool used to manipulate the Combustion Air Control Levers when it is hot.

## 2.5 Chimney Sweeping Cap

The chimney sweeping cap found at the baffle of the Novo allows easy access for chimney sweeping without having to remove any components of the firebox.

**WARNING: The chimney sweeping cap should be blocking the access to the chimney at all times during combustion. A chimney sweeping cap that is not blocking the baffle hole during combustion is a safety hazard, will overheat the stove and void the warranty.**

## 2.6 Door

The Novo wood burning stove comes with a Pyroceramic glass panel door. Pyroceramic is the highest grade available for stoves and stoves and can withstand temperatures up to 1300°F. To remove the door, open the door, lift it and pull it towards the bottom until the rod exits from the hinge holes.

## 2.7 Certification Label

The certification label contains important information regarding the installation and operation of the Novo stove. In addition, the serial number of the unit is permanently embossed onto the top right corner. See Figure 2-1 for the location of the certification label.

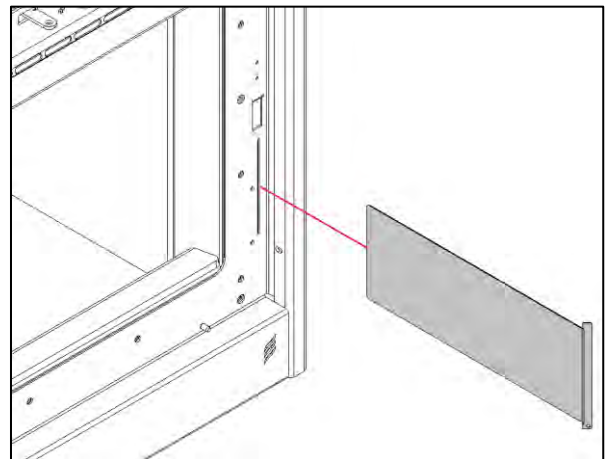


Figure 2-1: Serial Number Location

## 2.8 Blower Kit

An AC tangential blower (electrical rating: 115V, 60Hz, and 56W for the Novo 18 & Novo 24 and 112W for the Novo 38) with a variable speed control is installed into the Novo wood burning stove to maximize efficiency. Refer to Section 3.8 for installation instructions.

**WARNING: Make certain that the stove is not in operation and the blower is unplugged (breaker off) before accessing the electrical wiring of the blower kit.**

**CAUTION: Only a blower provided by SUPREME FIREPLACES INC. can be installed into the stove. Substituting the blower kit may result in overheating and will void the warranty.**

## 2.9 Optional Fresh Air Kit

The Optional Fresh Air Kit allows for exterior air (outdoors) to be drawn into the stove during operation of the unit. Note that a 4 inch insulated duct is required for the installation (item ordered separately). Refer to Section 4.2 for installation instructions. Contact your local building official regarding mandatory fresh air kit installations within your area.

**CAUTION: Only a fresh air kit provided by SUPREME FIREPLACES INC. can be installed onto the stove. Substituting the fresh air kit may result in overheating and will void the warranty.**

## 3 INSTALLATION INSTRUCTIONS

Before installing the unit, consult an authority having jurisdiction (such as your municipal building department, your fire department, your fire prevention department...) for any local codes and whether a permit is required. In the absence of local codes, refer to the CSA B365 Installation Code for Solid Burning Appliances and Equipment (Canada) or the ANSI NFPA 211 Standard for Chimneys, Fireplaces, Vents and Solid Fuel-Burning Appliances (USA). **CAUTION: Modifications/alterations to the unit/installation without written authorization from SUPREME FIREPLACES INC. are strictly forbidden and will void the warranty.** Refer to Section 1 for further safety information. Carefully read the instructions below before installing your Novo stove.

### 3.1 Location

Determine the location of the Novo by taking into consideration the following criteria:

- The size of the room with respect to the heat output of the stove.
- The proximity of windows, doors, and traffic flow.
- The necessary amount of space in front of the unit for the hearth extension.
- The clearances to combustible materials.
- The passage of the chimney.

If possible, select a location for the stove that will minimize the number of offsets in the chimney course. Offsets will reduce the draft, complicate the chimney sweeper's work, and increase installation costs. Technical drawings outlining the chimney route should be prepared prior to the installation. NOTE: The cutting of joists and rafters for floor, ceiling, and roof chimney penetrations will affect the load bearing capacities of the dwelling structure. To determine whether additional support is required, consult your local building codes. Improper cutting of chimney openings in the attic and roof will affect the bearing and thermal insulating capacity, as well as the weather tightness of the dwelling. Avoid incorrect workmanship by consulting a professional engineer or a certified installer.

Through examination of the floor construction, ensure that the stove and chimney system is resting on a surface capable of withstanding its weight. Consult your building codes to see whether additional structural supports are required (applicable for rare and isolated cases).

Avoid having the chimney outlet near any obstructions (such as trees and roof offsets) as the draft of the chimney may be affected by wind turbulence. Ideally position the outlet of the chimney at the highest area of the roof.

**NOTE: It is strongly recommended to install a carbon monoxide (CO) and smoke detector near the location of the unit.**

### 3.2 Floor Protector

A floor protector shields the combustible floor underneath and around the stove from hot embers that may fall during loading of the unit. The floor protector of the Novo must comprise of a continuous non-combustible material, such as steel, cement or mortar, bricks, or ceramic tiles. Note that tiled floor protectors require a continuous non-combustible layer underneath, such as sheet metal or cement board. Note that unidentified materials may be combustible; verify product specifications prior to installation. Refer to Section 3.3 (Figure 3.4) for dimensions of the floor protector.

**CAUTION: Make sure to remove any carpet or fabric under the floor protector.**

### 3.3 Clearances to Combustibles

The Novo stove has been certified under the ULC S627 (Canada), UL 1482 (USA), and UL 737 (USA) safety standards. The clearances below must be respected to ensure safe operation of the unit under normal and extreme conditions.

**WARNING:** Failure to follow the information below is a safety hazard and may result in property damage.

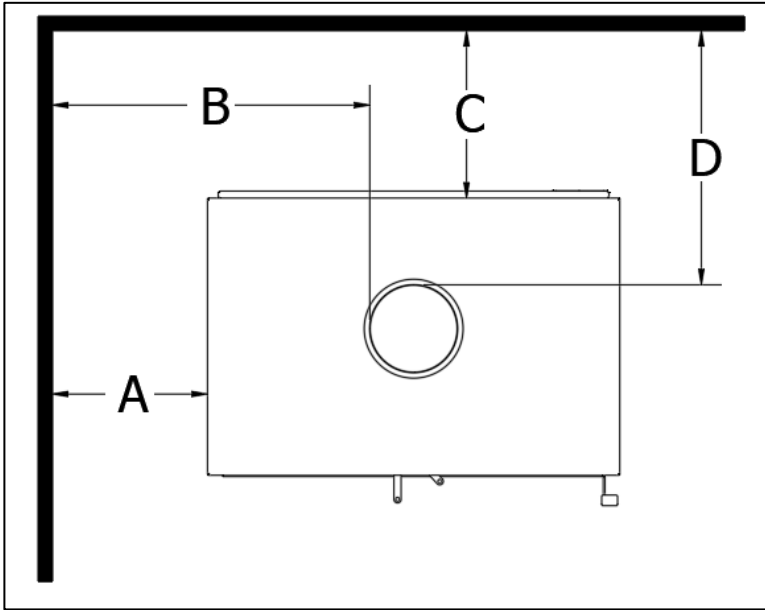


Figure 3-1: Clearances to Combustibles

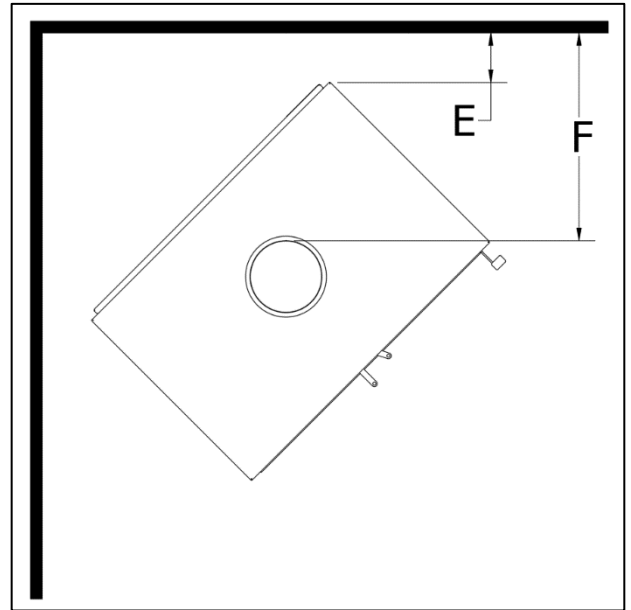


Figure 3-2: Clearance to Combustibles Corner Installation

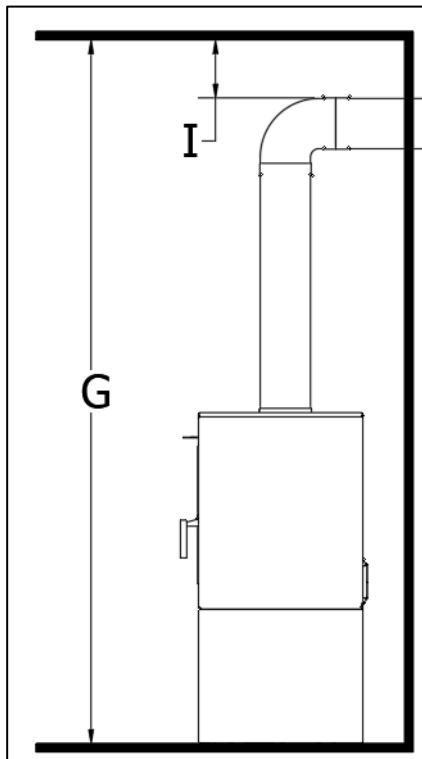


Figure 3-3: Clearances to Combustibles Through Wall Installation

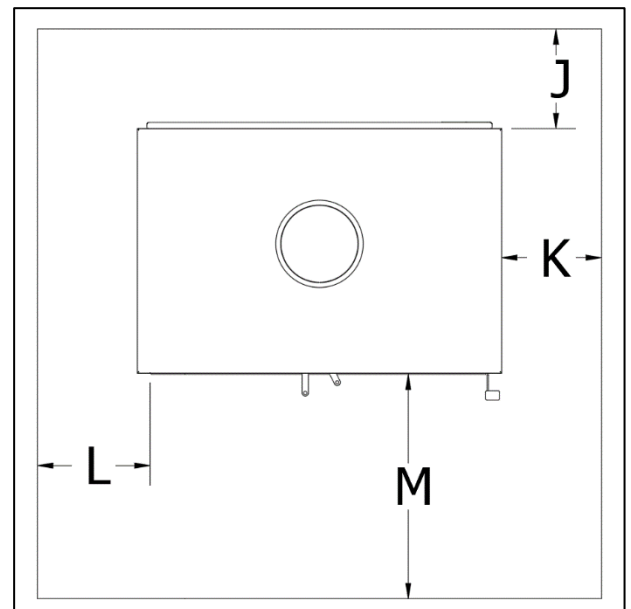


Figure 3-4: Floor Protector

Table 3-1: Clearances to Combustibles - Single Wall Chimney Connector

Single Wall Connector	Canada			USA		
	Novo 18	Novo 24	Novo 38	Novo 18	Novo 24	Novo 38
A	18"	14 $\frac{7}{8}$ "	14 $\frac{7}{8}$ "	18"	14 $\frac{7}{8}$ "	14 $\frac{7}{8}$ "
B	26 $\frac{1}{2}$ "	26 $\frac{1}{2}$ "	26 $\frac{1}{2}$ "	26 $\frac{1}{2}$ "	26 $\frac{1}{2}$ "	26 $\frac{1}{2}$ "
C	11 $\frac{1}{2}$ "	11 $\frac{7}{8}$ "	12 $\frac{1}{2}$ "	11 $\frac{1}{2}$ "	11 $\frac{7}{8}$ "	12 $\frac{1}{2}$ "
D	18"	18"	18"	18"	18"	18"
E	6 $\frac{1}{8}$ "	4 $\frac{1}{4}$ "	4 $\frac{1}{2}$ "	6 $\frac{1}{8}$ "	4 $\frac{1}{4}$ "	4 $\frac{1}{2}$ "
F	18"	18"	18"	18"	18"	18"
G	84"	84"	84"	84"	84"	84"
I	18"	18"	18"	18"	18"	18"
J	8"	8"	8"	0"	0"	0"
K	8"	8"	8"	N/A	N/A	N/A
L	N/A	N/A	N/A	8"	8"	8"
M	18"	18"	18"	16"	16"	16"

Table 3-2: Clearances to Combustibles - Double Wall Chimney Connector

Double Wall Connector	Canada			USA		
	Novo 18	Novo 24	Novo 38	Novo 18	Novo 24	Novo 38
A	14"	11"	11"	14"	11"	11"
B	22 $\frac{1}{2}$ "	22 $\frac{1}{2}$ "	22 $\frac{1}{2}$ "	22 $\frac{1}{2}$ "	22 $\frac{1}{2}$ "	22 $\frac{1}{2}$ "
C	6"	6"	6"	6"	6"	6"
D	12 $\frac{5}{8}$ "	12 $\frac{1}{8}$ "	11 $\frac{1}{2}$ "	12 $\frac{5}{8}$ "	12 $\frac{1}{8}$ "	11 $\frac{1}{2}$ "
E	3"	1 $\frac{1}{4}$ "	1 $\frac{1}{2}$ "	3"	1 $\frac{1}{4}$ "	1 $\frac{1}{2}$ "
F	14 $\frac{7}{8}$ "	14 $\frac{7}{8}$ "	14 $\frac{7}{8}$ "	14 $\frac{7}{8}$ "	14 $\frac{7}{8}$ "	14 $\frac{7}{8}$ "
G	84"	84"	84"	84"	84"	84"
I	7"	7"	7"	7"	7"	7"
J	8"	8"	8"	N/A	N/A	N/A
K	8"	8"	8"	N/A	N/A	N/A
L	N/A	N/A	N/A	8"	8"	8"
M	18"	18"	18"	16"	16"	16"



### 3.3.1 Clearances to Combustibles for Direct Floor Installation

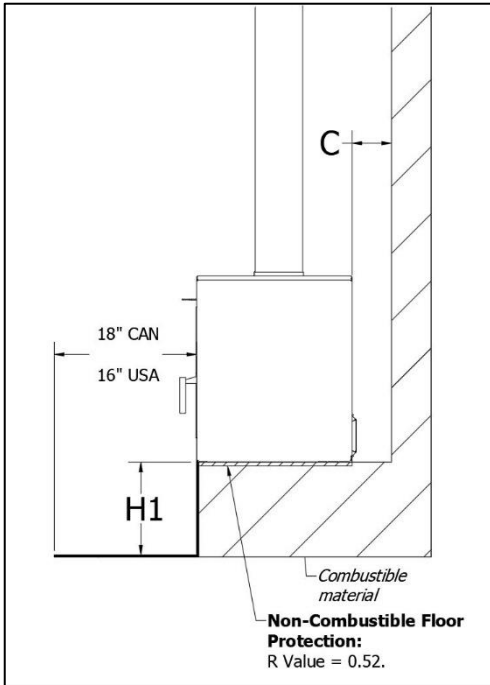


Figure 3-6: Novo Installation at H1

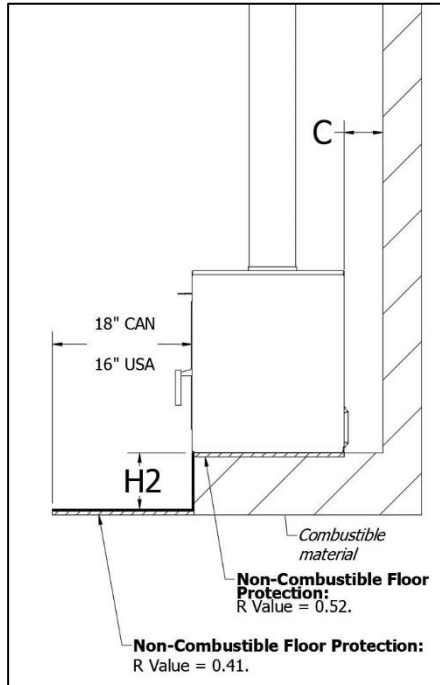


Figure 3-7: Novo Installation at H2

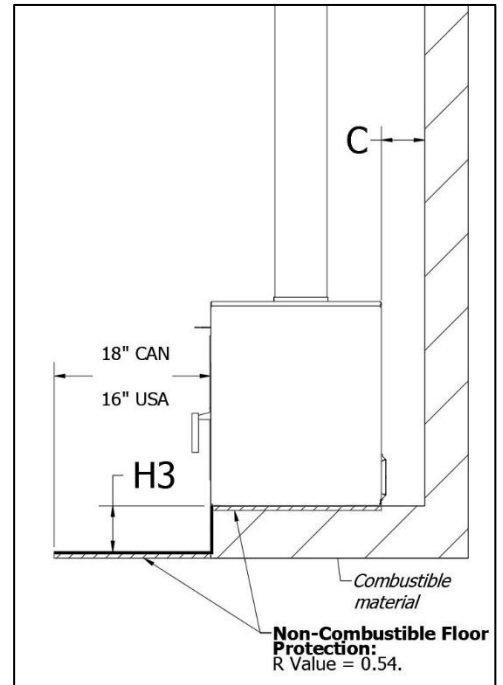


Figure 3-8: Novo Installation at H3

Table 3-3: Clearances to Combustibles  
Direct Floor Installation

H1	12"
H2	8"
H3	6"

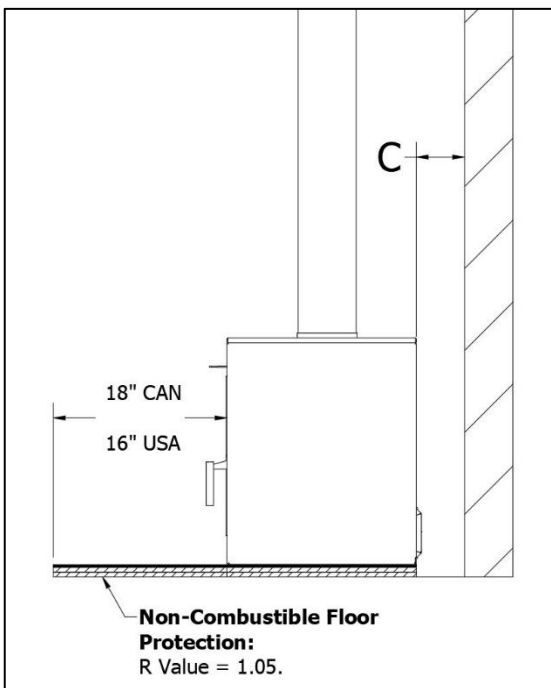


Figure 3-9: Novo Installation Floor Installation

## 3.4 Venting Installation

The Novo is approved with a Type HT 6" chimney that is listed under the UL 103 / ULC S629 standards. **WARNING: Mixing chimney components from different brands is a safety hazard and will void the warranty on the unit.** When connecting the unit to an existing chimney, thoroughly inspect the condition of the chimney and that the installation conforms to the requirements of the chimney manufacturer and the building codes. **Note that to avoid any unnecessary risk, it is often recommended to replace the chimney system.** Always respect the clearances to combustibles from the chimney manufacturers.

### 3.4.1 General Rules and Guidelines

1. Carefully read the instructions from the chimney manufacturer prior to installation (manuals can be obtained from the chimney manufacturer's website or from the vendor). Follow the chimney manufacturer's instructions for proper installation.
2. For optimal performance of the unit, it is recommended to install the chimney system in an interior setting. To prevent drafting issues and creosote buildups, avoid exterior installations of the chimney system in regions that experience extreme cold conditions.
3. The minimum height of the venting from the base of the unit is 15'.
4. Only certified Type HT chimneys approved under the UL 103 / ULC S629 standards can be installed onto the unit.
5. The venting installed onto the unit cannot be connected to another appliance.
6. Do not install the chimney connector through a floor, a ceiling, an attic, a roof space, a closet, or a similar concealed area.
7. Enclose any portion of the chimney that extends to accessible spaces.
8. The clearance of the chimney to any combustible material cannot be filled with insulation or any non-combustible material.
9. To prevent drafting issues, avoid deviations wherever possible.
10. The chimney shall extend at least 3' above its point of contact with the roof and at least 2' higher than wall, roof, or adjacent building within a 10' radius.
11. A secure brace is to be installed if the chimney extends a minimum of 5' above the contact point with the roof.
12. A rain cap must be installed on top of the chimney to avoid internal damage and/or corrosion.
13. Consult the chimney manufacturer for clearances to combustibles when installing a combustible chimney enclosure above the roof.

### 3.4.2 Installation of the Chimney Connector

The Novo stove is approved to be installed with either a single or double wall chimney connector. Double wall chimney connectors have undergone certification and must be installed according to the instructions provided by the manufacturer. However, single wall chimney connectors usually have not undergone certification testing and therefore must be installed according to local codes or the CSA B365 standard.

The following are general rules when installing a single wall chimney connector:

- The maximum overall length of horizontal pipe is 10' (3 m) including the elbows.
- The minimum clearance from combustible material is 18" (450 mm).
- Keep the assembly of the single wall chimney connector as short and direct as possible.
- Preferably use two 45° elbows instead of a 90° elbow to reduce the horizontal length of the chimney connector – this will produce a more favorable flow of the exhaust gases.
- Do not use more than two 90° elbows.
- The maximum unsupported horizontal length is 3' (1 m).
- Do not use galvanized flue pipes due to harmful gases being released at high temperatures.
- Use black painted chimney connectors.
- The single wall chimney connector must have a minimum thickness of 24 gauge.

- The joints of the chimney connector should overlap 1.25" (30 mm).
- Fasten each joint in the assembly with a minimum of three screws.
- If applicable, allow for expansion of the assembly in the elbows. For straight assemblies, include a telescopic section or an inspection wrap (pipe coupler) with one end unfastened.
- The minimum upward slope towards the chimney is 0.25 in/ft (20 mm/m).
- Securely fasten with 3 sheet metal screws the start of the chimney connector assembly to the flue collar of the stove
- Securely fasten with 3 sheet metal screws the end of the chimney connector assembly to the chimney.
- Provide access for cleaning the pipe through a clean out or by dismantling the chimney connector assembly. Note that dismantling the chimney connector assembly should not require to displace the stove.
- Install the male ends of the sections towards the stove to retain the dust and the condensation within the pipe.
- Do not install the chimney connector through a floor, a ceiling, an attic, a roof space, a closet, or a similar concealed area.
- In the case of a through wall/combustible construction assembly, the installation must conform to CAN/CSA-B365, Installation Code for Solid-Fuel-Burning Appliances and Equipment.

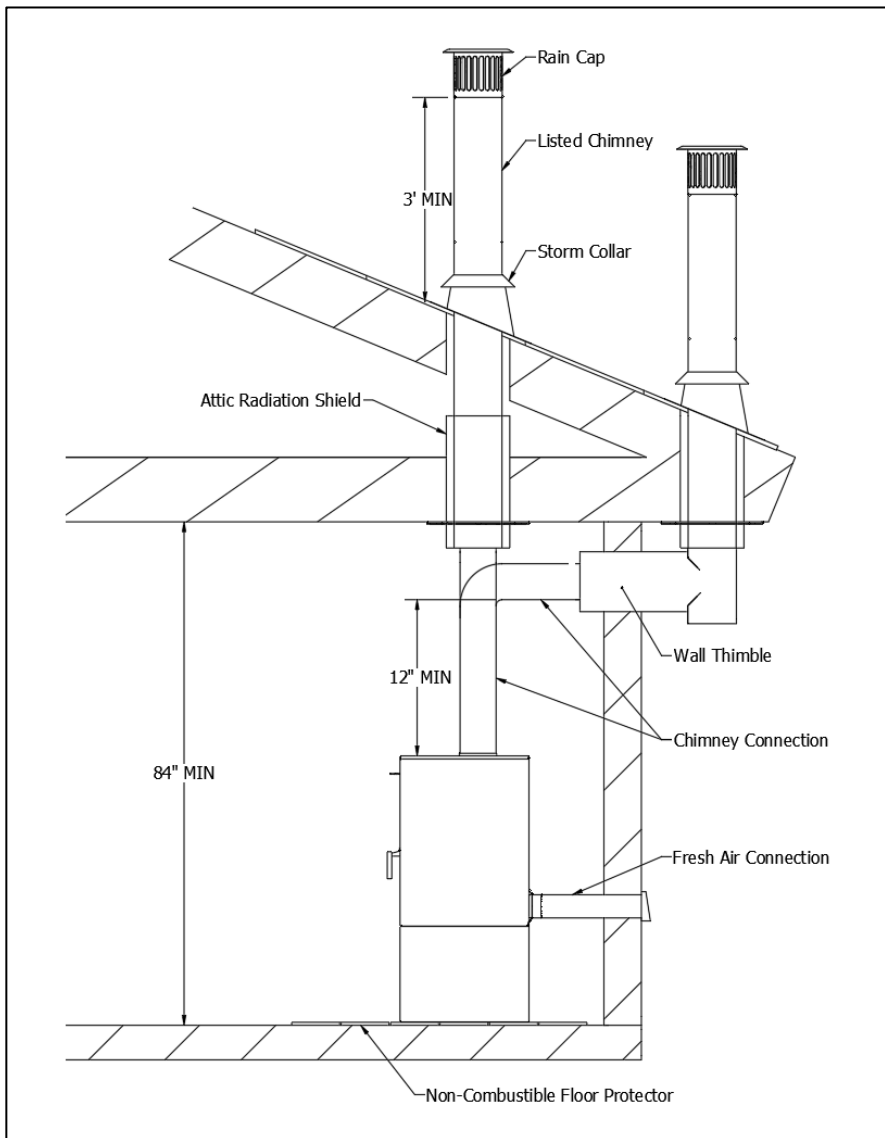


Figure 3-10: Novo Typical Installation

- For straight vertical assembly, installation of a telescopic length or an inspection wrap (pipe coupler) is required to allow for assembly/disassembly of the chimney connector without moving the stove.
- Straight vertical flue pipe assembly offers favorable draft conditions due to the lack of gas flow losses from deviations (elbows). Straight assemblies also require less maintenance due to the lack of creosote build-up from the elbows.
- The chimney connector must be in good condition.

Refer to Figure 3.9 for typical installations.

### 3.4.3 Connecting to a Masonry Chimney

The Novo stove can be connected to a masonry chimney that complies with current national and municipal building codes. A 6" chimney liner that complies with ULC S635 M2000 (Canada) or UL 1777 (US) standards must be installed within the existing masonry chimney.

Note that prior to installation, an inspection from an authority having jurisdiction is required to determine whether the masonry chimney:

- Is constructed in accordance with national and municipal building codes.
- Is in good condition. Note that repairs must be performed on any cracked or missing bricks.
- Is thoroughly cleaned of any soot or creosote.
- Is not connected to another appliance such as a furnace, hot water heater, or another wood heater.
- Has a flue of adequate size for proper installation of the venting.
- Respects minimum clearances to combustibles.

It is recommended to position the stove as close as possible to the masonry chimney to ensure proper venting.

The installation of the stove pipe, the prefabricated listed chimney components, and the liner must comply with the manufacturer's instructions.

## 3.5 Blower Kit

The Novo 18 and Novo 24 comes with a high performance 130 CFM blower kit, which has an electrical rating of 115 V, 60 Hz, and 56 W. The Novo 38 comes with a high performance 260 CFM blower kit, which has an electrical rating of 115 V, 60 Hz, and 112 W. A variable speed control (rheostat) and a heat sensor (therm-o-disc) are included with the kit. **WARNING: Do not install a substitute blower.** For maintenance or replacement purposes, the blower kit is accessible from the back/bottom of the unit by unfastening the blower bracket (Figure 3-11).

Plug the power cord into an 115V **grounded** outlet for protection against a power surge. The blowers will turn on and turn off automatically during the operation of the unit. As the temperature of the stove increases and the therm-o-disc reaches 95°F, the fan(s) will turn on. Note that the average time it takes for the fan(s) to activate is between 30 to 45 minutes after starting a fire. The fan(s) will turn off once the stove has cooled down and the therm-o-disc is 85°F. The speed of the fan(s) can be adjusted with the variable speed control (rheostat) located at the back/bottom of the unit. It is safe to operate the Novo in the event of a power failure (fan(s) not powered).

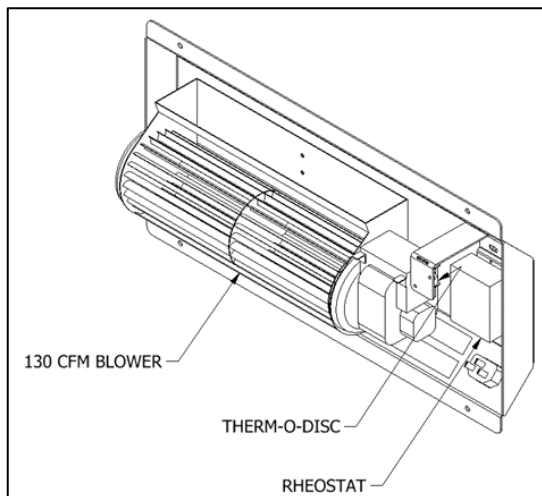


Figure 3-11: Blower Kit for the Novo 18 and Novo 24  
Blower Kit for Novo 38 comes with 2 tangential 130  
CFM Blowers (Not Illustrated)

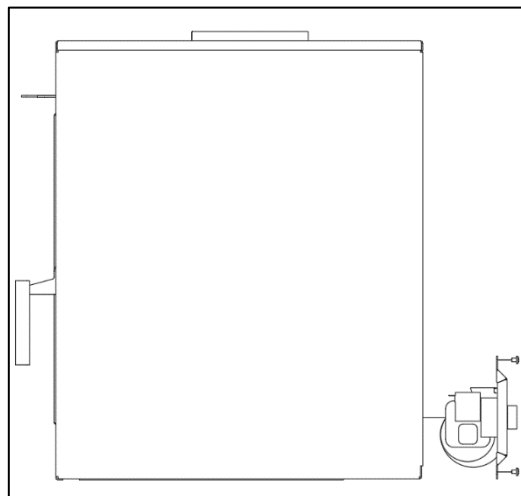


Figure 3-12: Blower Kit Location

## 4 OPTIONS

### 4.1 Fresh Air Kit

Sufficient air exchange is necessary for the stove to operate properly and to maintain a good combustion. In an airtight household, the stove may not function as designed due to a lack of air; it is therefore recommended to install the fresh air kit in such cases. The fresh air system is an optional kit intended to bring combustion air into the stove from an exterior source. Refer to Figure 4-1 for the location of the fresh air intake of the stove.

Note that the Novo is designed to use a minimum amount of air during operation. Using an air exchanger or simply opening a nearby window/door during the ignition of the unit will achieve a similar result as the fresh air kit. When the stove is idle, there is no air escaping from the house through chimney. **Consult a local authority having jurisdiction (such as the fire department, the municipal building department, the fire prevention bureau...) to determine if it is mandatory to install a fresh air kit in your area.**

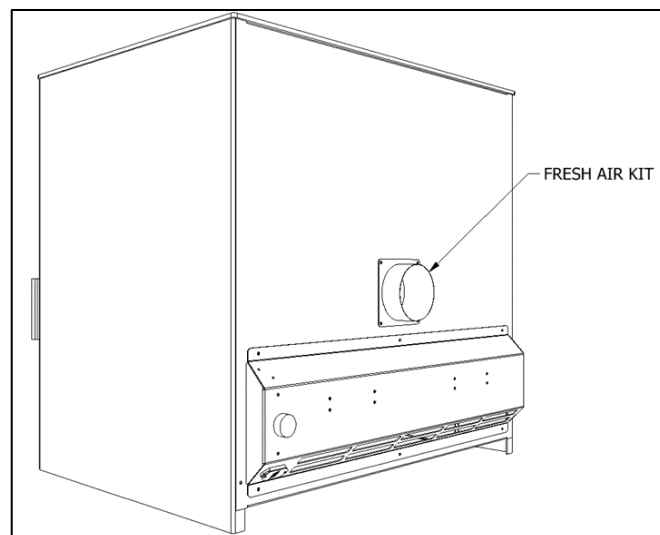


Figure 4-1: Novo Fresh Air Connection

#### General Notes:

The outside air kit should be installed according to the following guidelines:

- The air duct must be insulated, wrapped with a vapor barrier, and have an inner diameter of 4".
- The length of the air duct should be as short as possible.
- Fresh air must come from the outside and not from another room or the attic.
- The outside register must be away from automobile exhaust fumes, gas meters, or other vents.
- Avoid installing the air register where it will likely be covered by snow or exposed to strong winds.
- The air register can be installed above or below the level of the stove.
- Use the SUPREME FIREPLACES INC. Stove Fresh Air Adaptor.
- Use the SUPREME FIREPLACES INC. Fresh Air Kit (UPEA4) or any other HVAC type fresh air kit that meet the ULC S110 or UL 181 class 0 or class 1.

#### Installation:

1. Cut a 4 ½" diameter hole on the exterior wall of an ideal location.
2. Install the air register on the exterior wall.
3. Remove the knockout of the fresh adaptor at the back/bottom of the body.
4. Insert the fresh air adaptor into the stove and secure it with two screws.
5. Install the air duct and secure it with worm gear clamps.

## 4.2 Direct Floor Installation

The Novo has the option to be installed directly onto the floor. Note that the stove can be leveled using 4 bolts at the bottom of the unit (Figure 4-2). Refer to Section 3.3.1 for clearances to combustibles and information regarding R-value of surrounding non-combustible material.

## 4.3 Novo Podium

The Novo has been approved to be installed with an elevated optional podium. This item is sold separately: a) **18NVPD-01** for the Novo 18, b) **24NVPD-01** for the Novo 24, and c) **38NVPD-01** for the Novo 38. The following are instructions on the installation of the Novo stove onto the podium:

- 1) Fasten the 4 leveling bolts at the bottom of the podium (Figure 4-3)
- 2) Place the podium at the install location of the stove.
- 3) Level the podium by fastening from within the storage compartment using a flat head screwdriver.
- 4) Remove the following from the Novo stove to facilitate the lifting of the unit (place components on a soft surface to avoid any damage):
  - a. Door (1X) – refer to Section 2.6
  - b. Firebox Bottom Plate (1X)
  - c. Cast Iron Firebox Lining (4X) – refer to Section 7.4
  - d. Exterior Top Plate (1X)
- 5) From the side of the stove, grab the bottom back and the top front firebox lip of the unit and lift. **WARNING: This step requires a minimum of two (2) people.**
- 6) Slide the stove within the side centering flanges of the podium. Adjustment of leveling bolts may be required (Figure 4-4).

## 4.4 Novo Table

This stove is approved for installation on the SUPREME Novo Series Table (NV\_TB). Refer to the assembly manual provided with this accessory for proper installation.

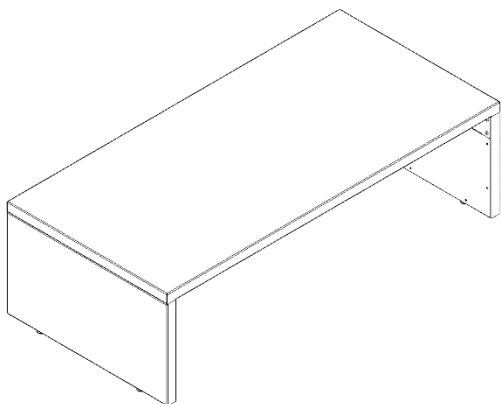


Figure 4-5: Novo Series Table

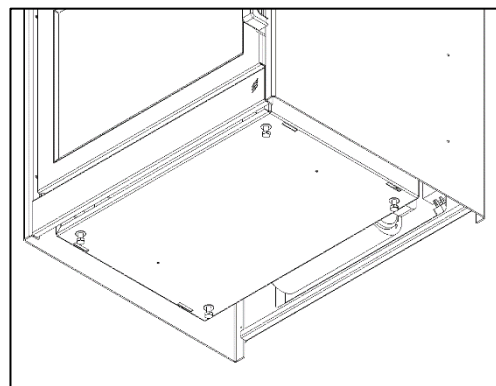


Figure 4-2: Leveling Legs for Direct Floor Installation

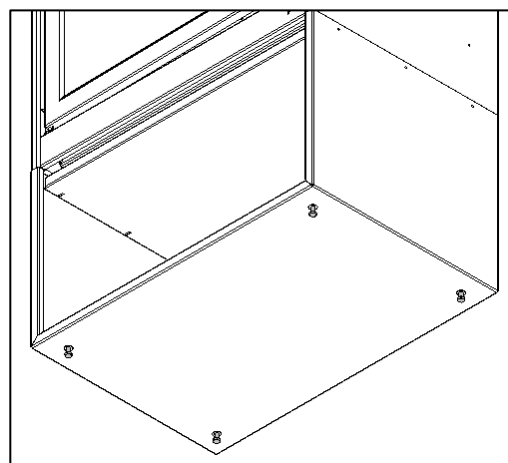


Figure 4-3: Leveling Bolts

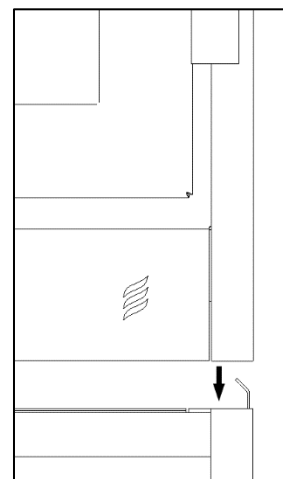


Figure 4-4: Novo Podium Assembly



## 5 OPERATION INSTRUCTIONS

### 5.1 Fuel

The Novo is designed to burn natural wood only. Higher efficiencies and lower emissions generally result when burning air dried seasoned hardwoods (moisture content below 20%), as compared to softwoods or to green or freshly cut hardwoods. The following are a few signs indicating that firewood is sufficiently dry for use: (a) cracks on the ends and surface of the logs, (b) lighter in weight, and (c) color (yellow/grey). It is recommended to use a moisture meter with pin sensors for determining accurately the moisture content of firewood (read manufacturer's instruction manual before operating). The optimum log length is 16-22 inches<sup>9</sup>, preferably split in halves or quarters and left to dry under a cover or away from external elements for a minimum of one year prior to use. Use good quality dry cordwood only. DO NOT burn garbage, lawn clipping, yard waste, materials containing rubber (including tires), materials containing plastic, waste petroleum products, paints, paint thinners, asphalt products, materials containing asbestos, construction debris, demolition debris, railroad ties, pressure-treated wood, manure, animal remains, coal, salt water driftwood or other previously salt water saturated materials, unseasoned wood, paper products, cardboard, plywood, particle boards, or other foreign materials in this product. The prohibition against burning these materials does not prohibit the use of fire starters made from paper, cardboard, saw dust, wax and similar substances for the purpose of starting a fire in an affected wood heater. Burning these materials may result in release of toxic fumes or render the heater ineffective and cause smoke. Do not over fire the Novo stove. Over firing will damage the stove, is hazardous and will void the warranty. NOTE: Gas logs cannot be installed in the Novo stove.

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

Ecological or compressed logs containing chemical additives are not tested and approved to be used with the Novo. Using them will overheat and damage the stove and void the warranty. Ecological or compressed logs that are 100% wood and contain no other additives can be safely used in the Novo. Never use more than two of these logs at a time. Using more is not only dangerous but will damage the stove and void the warranty. Follow the ecological log manufacturer's safety guidelines and recommendations and be sure that they are intended for use in stoves. Reload only once the previous load of wood has been consumed and only embers remain.

**WARNING: Do not keep the door open while the stove is in operation.**

### 5.2 First Fires

For the first 3 fires, burn a maximum of 3 logs at the medium to low burn rate (refer to Section 5.3) to allow for proper conditioning of the unit. Due to oil residues and the curing of the paint of the stove, it is normal to smell an odor for the first fires of the Novo. Open a window or a door near the stove to ventilate the house during the first fires. Oil residues may cause light smoking.

### 5.3 Operating the Combustion Air Control

The burn rate and the heat output are related to the amount of air entering into the firebox. The combustion air control of the Novo has two components: the Activator and the Burn Rate Selector (see Section 2.3). When starting the fire or when adding a new charge of wood, the stove needs additional air in order to establish a

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<sup>9</sup> Refer to Section 2.2 regarding the maximum log length for a specific stove of the Novo series.

good fire. When the wood starts to burn properly, the amount of air can be reduced depending on the heating requirements.

The left combustion control lever is the Activator. When starting a fire or adding a new load of wood, the Activator must be pushed in to allow maximum air to enter the firebox. The right combustion control lever is the Burn Rate Selector. The Burn Rate Selector can slide sideways to achieve different burn rates. When the Burn Rate Selector is positioned to the left, a maximum burn rate is achieved and when it is positioned to the right, a minimum burn rate is set. Keeping the Burn Rate Selector to the right will burn the wood slower. Keeping the Burn Rate Selector to the left will provide a stronger fire and keep the glass of the stove cleaner for longer. Adjust the burn rate according to your heating requirements and the quality of your wood. The combustion air control will automatically and gradually close the primary air source to the selected burn rate setting (right lever) with the presence of heat to maximize the burn time.

**NOTE:** The Burn Rate Selector can remain at the same setting at all times if the burn rate is satisfactory. However, the Activator must be pushed in when starting a fire or when adding a new load of wood.

**WARNING:** The combustion air openings should never be obstructed.

**WARNING:** Never manipulate the Combustion Air Control with bare hands as it gets hot when the Novo is in operation. Use the Cold Hand Key (see Section 2.4) to adjust the Combustion Air Control.

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

## 5.4 Starting a Fire

The Novo has patented technologies and innovative features that make starting a fire quick and easy. Before starting a fire, assure that all the safety precautions mentioned in the owner's manual are being respected. The following instructions describe starting a fire in Novo stove using a "top-down" approach, which results in a cleaner, more efficient, and longer burn:

- a) Place two logs in the firebox. The logs should sit directly on the hearth from left to right or east to west (parallel with the door). Do not use a stove grate.
- b) Place a third and fourth log above the two logs of step a) front to back or north to south.
- c) Depending on the size of the logs, a fifth log can be placed above the logs of step a) and step b). For optimal performance of the unit, leave a minimum 1" space between the logs and the baffle and 2.5" from the door and the logs.
- d) Push the left combustion control lever (the Activator) inwards.
- e) Slide the right combustion control lever (the Burn Rate Selector) to the desired burn rate. Positioning the Burn Rate Selector towards the left is for maximum burn rate and towards the right is for minimum burn rate.
- f) Place and ignite a firestarter between the logs in step b) or below the log in step c). Make sure that the firestarter is visible from the opening (facing the front).
- g) Once the firestarter is well lit, close the door. Do not leave the door open for more than 2 minutes.

**CAUTION:** The wood should be placed away from the door to avoid damage to the glass.

**WARNINGS:** Over firing the unit may result in overheating and can damage the stove and/or result in fire hazards. The maximum firewood load must not exceed 4 medium sized logs (approximately 30 pounds). This stove has been designed to burn with the door closed. When the stove is being used, the door should remain closed at all times. Failing to do so is a safety hazard, will damage the stove and void the warranty.

**WARNING:** Do not use fire accelerants to rekindle the fire if the first attempt to start the fire failed. Do not open the door. Simply reactivate the Activator by pushing it inwards.

NOTE: Sufficient air exchange is necessary for the stove to operate properly. Air is required in order to maintain the combustion of the stove. If the house is airtight, the stove may not function properly. If the stove is deprived of air, it will be necessary to provide a source of fresh air into the dwelling. This may be done by using an air exchanger unit or simply by opening a window or a door near the stove partially for a few minutes. Make sure that other equipment such as the kitchen exhaust fans or oil central heating systems does not affect the stove functionality. Large return ducts of central heating systems located in the same room as the stove may affect the proper functioning of the unit and may cause smoking.

## 5.5 Adding a New Load of Wood

WARNING: Open the door to reload only when the wood has been reduced to embers, otherwise there is a risk of smoke infiltration into the house.

When the wood has been reduced to embers and there's no visible flame, you may add a new load.

- a) Crack the Novo door open and wait a few moments before opening the door completely.
- b) Use your stove tools to gather the remaining embers at the center of the firebox.
- c) Activate the Activator by pushing it in.
- d) Once the embers begin to glow red, add the new load of wood in the firebox.
- e) Keep the door of the Novo slightly unlatched until you see a flame in the firebox. Never leave the Novo door unlatched without constant supervision.
- f) Completely latch the Novo door.

Assure that a flame is maintained. Avoid wood smoldering on top of embers as this will result in a dirty glass, excessive emissions, chimney creosote buildup and poor heat output. If wood is smoldering, ensure the Activator has been activated and unlatch the door slightly with supervision until a flame has been maintained.

## 5.6 Blower Operation

The blower kit for the Novo consists of two blowers mounted at the back/bottom of the unit and a heat sensory therm-o-disc; the blowers will start and stop automatically in the presence and absence of heat respectively. A variable speed control allows the adjustment of the speed of the blowers. Do not install a substitute kit as this may result in overheating and risk of fire. Refer to Section 3.5 for the installation instructions of the blower kit.

When the stove gets hot and the therm-o-disc reaches 95°F, the blowers will turn on. The average time it takes for the blowers to activate is 30 to 45 minutes after starting a fire as explained in this manual (Section 5.4). The fans will turn off once the insert has cooled down and the therm-o-disc reaches 85°F. The speed of the blowers can be adjusted with the variable speed control.

## 6 TROUBLESHOOTING

### 6.1 Backdraft / Smoking

Draft is the force created by a difference in pressure, which moves air from the appliance up through the chimney. It is important to operate the Novo with proper draft to ensure optimal performance of the unit. Draft is depended on the length of the chimney, local geography, nearby obstructions and other factors. Proper draft results in an upwards flow through chimney, which prevents smoke infiltrating into the house during operation of the unit. As the temperature of the unit and chimney rises during combustion, the draft consequently increases due to a higher difference in pressure.

In contrast, backdraft is air flow from the chimney into the house, which results in smoke infiltration from the appliance and/or the chimney joints during operation. The unit is experiencing backdraft if air is flowing out from the exhaust of the baffle system (within the firebox). Backdraft is most commonly caused by fans around the house (such as in the kitchen and bathrooms) simultaneously in operation, insufficient length of the chimney (less than 15 feet), or a blocked chimney. Refer to the following suggestions to eliminate backdraft:

- Close any fans operating around the house (specifically for the duration of ignition).
- Clean the chimney of any obtrusions (when the unit is cold).
- Open one window or one door near the Novo.
- Heat the chimney by burning newspaper near the exhaust of the baffle system.

### 6.2 Over Firing

The appearance of a red glow on the exterior of the firebox (top and sides) and/or on the flue is a sign of over firing. Excess air entering the firebox, over fueling, or an abnormal strong draft causes the unit to reach drastic temperatures from an uncontrollable combustion. Over firing is a safety hazard and may result in permanent damage to the unit. In the occurrence of over firing:

- a) Make sure the Novo door is properly closed.
- b) Manually close the Combustion Air Control by pulling the Activator (left lever).
- c) If possible, turn on the blower to the maximum speed. The red glow on the exterior of the firebox and/or the flue should gradually disappear.

**WARNING: Do not touch hot surfaces with bare hands. Always wear heat protecting gloves and use stove tools.**

Guideline to avoid over firing:

- Always keep the door closed during operation.
- Inspect regularly the door gasket/glass and replace accordingly.
- Always operate the unit with the chimney sweeping cap in position, blocking the hole in the baffle.
- Never load more than 30 lbs of wood at a time.
- Ensure that there is no excess draft.

**WARNING: Failure to follow the above guideline will void the warranty. Over firing is a safety hazard, can cause irreversible damages to the Novo and will void the warranty.**

# 7 MAINTENANCE

## 7.1 Disposal of Ashes

Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial on soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have been thoroughly cooled. **CAUTION: Always wear heat resistant gloves when removing the ashes from the firebox.**

- a) Let the firebox cool to ambient temperature before removing the ashes. It is recommended to remove the ashes once the bed has exceeded a height of 4 inches.
- b) Slowly open the door to prevent ashes from coming into the room.
- c) Place an ash bucket (metal container) near the stove, onto the non-combustible floor protector.
- d) Using a shovel and brush, remove the bulk of the ashes from the firebox into the ash bucket. Note that it is not necessary to keep a thin bed of ashes for the next fire.
- e) Store the ash bucket (with the tight-fitting lid) on a non-combustible surface, away from any combustible materials, pending final disposal.

## 7.2 Chimney Maintenance

**Creosote – Formation and Need for Removal:** When wood is burned slowly, it produces tar and other organic vapors, which combine with expelled moisture to form creosote. The creosote vapor condenses in the relatively cool chimney flue of a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited, this creosote makes an extremely hot fire. The chimney connector and chimney burning wood or coal should be inspected at least once every two months during the heating season to determine if creosote buildup has occurred. **Never use chemical cleaners for your chimney.**

**WARNING: In the case of a chimney fire: 1) close the door of the stove; 2) set the burn rate of the Combustion Air Control to minimum (Section 5.3); 3) call the local fire department (if assistance is needed); 4) use a dry chemical fire extinguisher (baking soda or sand) to control the fire.**

**CAUTION: Never use water to extinguish a fire as it may result to dangerous steam explosions. Do not use the unit until the chimney is inspected and repaired (if needed) by a qualified technician.**

**NOTE:** Do not clean the chimney when the unit is in operation/hot. Follow the instructions below for sweeping the chimney and chimney connector of a Novo stove:

- a) Open the door of the unit.
- b) From within the firebox, displace the chimney sweeping cap located in the baffle by lifting and moving it to the side.
- c) Close the door of the unit.
- d) Using an appropriately sized chimney sweeping brush, clean the chimney from any creosote buildup and other residues. Note that disassembly of the chimney connector may be required for a thorough cleaning.
- e) Remove all the fallen/loose creosote/residues from the firebox and baffle system (a shop vacuum cleaner can be used for a thorough cleaning).
- f) Place back the chimney sweeping cap.

**CAUTION: Operating the unit without the chimney sweeping cap in position will result in over firing and void the warranty.**

## 7.3 Cleaning of Glass

It is recommended to clean the glass door with a soft cloth, dampened with a non-abrasive solution, such as soap and water.

**CAUTION: Cleaning the glass with an abrasive solution will result in surface scratches, reducing glass transparency and resistance to impacts.**

The glass of the door may be cleaned with commercial products intended for fireplaces and stoves. After cleaning the glass, remove any remaining solutions with a wet cloth to avoid chemical reactions at elevated temperatures ("cloudiness" on the surface of the glass).

**CAUTION: Do not apply commercial cleaners onto any painted surfaces as discoloration/peeling may occur.**

**NOTE: Never clean the glass when the unit is in operation or hot.**

## 7.4 Replacing Cast Iron or Soapstone Panels

Four panels are assembled along the combustion chamber side walls (left, right, and back) allowing for a longer and a constant heat output. It is recommended to perform a weekly check on the condition of the panels to ensure proper operation of the unit. The panels need to be replaced when it is gravely chipped and/or cracked. Failure to replace the panel under the mentioned conditions will alter the performance of the unit. Refer to the following instructions for replacing a panel:

- a) Order the replacement kit for the Novo panel (refer to Section 7.9).
- b) Remove the door from the firebox and place it face down on a soft surface. NOTE: Rotate the handle to permit proper placing.
- c) Remove the bottom plate (hearth) by lifting it out of the firebox.
- d) For the Novo 18 and the Novo 38, slide the left/right side wall panel(s) by tilting the bottom and swivelling them out of the top retainer.
- e) For the Novo 24, slide the back wall panels (2) by tilting the bottom and swivelling them out of the top retainer.
- f) Replace the damaged panel if it was removed in step d) or e) and position the panels back in place by swiveling them behind the top retainer.
- g) In the case of a damaged panel on the Novo 18 and Novo 38 back wall, replace the damaged panel and reposition the side wall panels by swiveling them behind the top retainer.
- h) In the case of a damaged panel on the Novo 24 side walls, replace the damaged panel and reposition the back wall panels by swiveling them behind the top retainer.
- i) Insert the bottom plate (hearth) and door to its original position.

**WARNING: Do not operate the unit with any of the panels missing.**

## 7.5 Replacement of Door Gasket

SUPREME FIREPLACES INC. assembles heat resistant graphite coated gaskets on the doors of all products, allowing for a proper seal of the unit at extreme temperatures (up to 1000°F). It is recommended to perform a weekly visual check on the condition of the ¾" gasket to ensure proper operation of the unit. The ¾" gasket of your door needs to be replaced when 1) the fibers of the gasket are coming loose and 2) the gasket is disintegrating. Failure to replace a gasket under the mentioned conditions can cause irreversible damage to the unit due to over firing. Refer to the following instructions for replacing the ¾" gasket:

- a) Order the replacement kit for the Novo ¾" door gasket.
- b) Remove the door from the firebox and place it face down on a soft surface. NOTE: Rotate the handle to permit proper placing.



- c) Cover all painted surfaces of the door to avoid damages.
- d) Using a wedging tool or flat head screwdriver, gently remove the old 3/4" gasket (along with the old silicone) from the door framing.
- e) Apply a bead of high temperature silicone along the groove of the metal brackets.
- f) Place the new 3/4" gasket around the door framing and cut any excess gasket with scissors. NOTE: It is recommended to tape the extremity of the gasket for a cleaner result.

Give significant amount of time to allow the silicone to cure before reinstalling the door onto the firebox. A slight resistance is expected when closing the door with the new 3/4" gasket; the door will close normally after the gasket has taken proper shape.

## 7.6 Replacement of Glass

SUPREME FIREPLACES INC. uses a high quality 5mm thick Pyroceram III / Keralite ceramic glass that can withstand temperatures up to 1300°F. It is recommended to perform a weekly visual check for any damages or cracks on the glass.

**WARNING: Avoid striking the glass and slamming the door shut. Never operate the unit with a broken or damage glass.**

**CAUTION: Wear protective gloves when handling broken glass.** Refer to the following instructions for replacing the glass:

- a) Order the replacement kit for the Novo glass (refer to Section 7.9).
- b) Remove, clean, and dispose any broken glass from the door and the surroundings.
- c) Remove the door from the firebox and place it face down on a soft surface. NOTE: Rotate the handle to permit proper placing.
- d) Using a wedging tool or flat head screwdriver, gently remove the 3/4" gasket (along with the silicone) from the door framing.
- e) Using a wrench, remove the 8 nuts fastened around the door framing.
- f) Remove the first row of metal brackets (2 small and 2 big) and thin gasket.
- g) Remove the damage glass and clean thoroughly the door framing from loose glass fragments.
- h) Place the new glass onto the second row of thin gasket, centered with the door framing.
- i) Place back the first row of metal brackets (2 small and 2 big) and thin gasket.
- j) Using a wrench, fasten the 8 nuts around the door framing (do not over-tighten).
- k) Apply a bead of high temperature silicone along the groove of the metal brackets.
- l) Place the 3/4" gasket back into position.

Give significant amount of time to allow the silicone to cure before reinstalling the door onto the firebox.

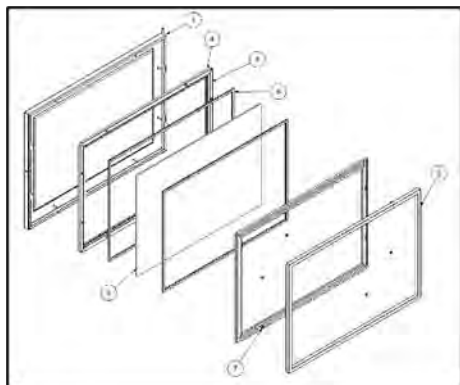


Figure 7-2: Exploded View of Door Assembly

Tableau 7-1: Parts List of Door Assembly

Item	NOVO 18 Code	NOVO 24 Code	NOVO 38 Code	Description	Qty
1	DR4110	DR2110	DR1110	Door frame assembly	1
2	PYRO_18.75 X13.75	PYRO_24.875 X14.75	PYRO_24.25X 17	Pyroceram glass	1
3	DR_1988	DR_2525	DR_2525	Vertical metallic bracket	4
4	DR_1488	DR_1588	DR_1806	Horizontal metallic bracket	4
5	GSK_75_7	GSK_75_7	GSK_75_7	Thick gasket	1
6	GSK_31_7	GSK_31_7	GSK_31_7	Thin gasket	2
7	NUT 8-32	NUT 8-32	NUT 8-32	8-32 Nut	8

## 7.7 Door Latch Maintenance

Lightly lubricate the hook of door latch (CM0031) on a yearly basis to prevent abrasive wear. Note that the door latch can be tightened to the door frame using a 5/32" hex key.


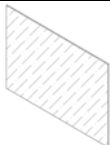




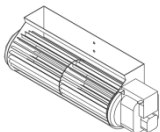
## 7.8 Paint

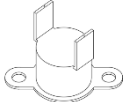
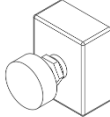
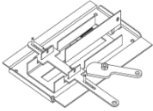

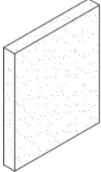
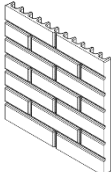
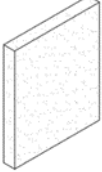
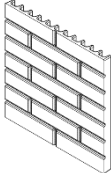
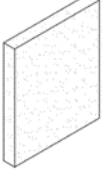
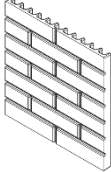
Paint touch-ups can be performed on the unit using a high temperature paint (in aerosol spray can format) by Stove Bright®. Refer to your invoice to determine the precise color of your unit. Contact your local hearth shop for further information on purchasing this paint.

NOTE: Apply the paint in a well ventilated area. If applying paint to the door, properly cover/mask the glass of the door using painters tape and cardboard. Wait for paint to dry before operating the unit. Refer to the instructions on the label of the aerosol spray can for proper paint application. **WARNING: Never apply paint to the unit during operation or when it is hot.**

## 7.9 Replacement Parts

Refer to the codes from the table below for any replacement parts:

Code	Description	Illustration
24SFC_WP	Wood pull handle (specify color)	
PYRO_18.75_13.75	Novo 18 - 18.75" X 13.75" Pyroceram III / Keralite 5mm thick glass	
PYRO_24.875_14.75	Novo 24 - 24.875" X 14.25" Pyroceram III / Keralite 5mm thick glass	
PYRO_24.25_17	Novo 38 - 24.25" X 17" Pyroceram III / Keralite 5mm thick glass	
GSK_0.3125"_8'	Graphite coated square gasket 0.3125" thick X 8' length	
GSK_0.75"_8'	Graphite coated square gasket 0.75" thick X 8' length	
55416.32130	AC tangential blower <u>Electrical rating:</u> 115VAC, 60Hz, 56W <u>Certification:</u> VDE, CSA, UL, CE	

60T22	Thermo-disk <u>Electrical rating:</u> 120VAC, 15A <u>Certification:</u> UL/CSA	
B6518	Speed Control <u>Electrical rating:</u> 2.5 Amps, 115VAC – 50/60Hz <u>Certification:</u> UL, ULC	
PA5000	Combustion Air Control (specify color)	
CM0020	Cold Hand Key	
18SF1175	Soapstone Panel 13" X 10.125" X 1.25"	
18SFC1175	Cast Iron Panel 13" X 10.125" X 1.25"	
24SF1175	Soapstone Panel 13" X 11.75" X 1.25"	
24SFC1175	Cast Iron Panel 13" X 11.75" X 1.25"	
38SF1175	Soapstone Panel 16" X 12.625" X 1.25"	
38SFC1175	Cast Iron Panel 16" X 12.625" X 1.25"	

## 8 WARRANTY

SUPREME FIREPLACES INC. warrants that the factory-built fireplaces, fireplace inserts, and stoves will be free from defects in material and workmanship, under normal use and service, for a period of **ten (10) years** from the date of purchase.

This warranty is only intended for the original retail purchaser and is non-transferable, given that the product was purchased from SUPREME FIREPLACES INC. or one of its authorized dealers. This warranty is conditional upon correct installation and intended use of the products and does not cover damages caused by misuse. This warranty shall be void if the fireplace, fireplace insert or wood stove is not installed by an authorized qualified technician in accordance with the installation instructions in the manual provided with this product. The installation must meet local and national building codes.

Description	Coverage	Labour
Patented combustion air control, chimney sweeping cap, door handle (breakage only), door latch assembly, podium structure of wood stove series, legs of wood stove series, circulating chamber of fireplace insert series, bimetallic strip of combustion air control, removable ash lip, surround structure, cold hand key, wall intake and outtake grilles of gravity kit	10 years	2 years
Baffle (excluding bypass mechanism), bottom plate, stainless steel components, cast iron panel, firebox soapstone slab, exterior door frame, liner adaptor of Fusion series	5 years	2 years
Painted and plated parts, door gasket	2 years	1 year
Electrical components	2 years	90 days
Glass panel (thermal breakage only)	90 days	90 days

### 8.1 Warranty Limitations

Abuse and improper use of the unit may cause irreversible damage and will void the warranty.

Transportation, packaging, and other related costs or expenses arising from the replacement or repair of defective parts will not be covered by this warranty, nor will SUPREME FIREPLACES INC. assume responsibility for them.

Freight related damages of products that are shipped directly from the SUPREME INC. warehouse are covered under warranty if they were indicated on the Bill of Lading from the carrier and SUPREME FIREPLACES INC. is notified within 48 hours.

This warranty is void for any fireplace, wood stove or fireplace insert that wasn't purchased from an authorized SUPREME FIREPLACES INC. dealer.

The warranty does not cover any physical or esthetic damages that were caused by glass cleaners, soap, or any other cleaning products.

Soapstone is a natural material. Normal wear and tear of the soapstone may result in surface fractures or small hairline cracks. Since these do not affect the functionality nor the integrity of the product, the warranty only covers fractures that are over 3 mm thick and spread across one extremity of the slab to the other.

Deformations, discoloration, corrosion and scratches are not covered under warranty.

All parts are limited to one replacement per warranty term.

This warranty does not cover the labor or other related costs for the removal of a product already installed, the installation of a replacement product and the shipping and handling for the return of a product or for the replacement part.

This warranty applies to normal residential use only. Damages caused by acts nature or natural disasters, accidents, over firing, misuse, abuse, negligence, improper installation, alterations or substitutions of components of the fireplace, abrasives, chemical cleaners, and negligence are not covered by this warranty. Burning anything other than natural wood will damage your fireplace and void the warranty.

This warranty is void for any product that has been moved from its original installation location.

SUPREME FIREPLACES INC. will not be responsible for environmental conditions and drafting issues such as inadequate vents or ventilation, excessive venting configurations or negative air pressures which may or may not be caused by geographic elements, exterior elements and/or mechanical systems such as exhaust fans, furnaces, clothes dryers, etc.

The noise generated by the expansion and contraction of the metallic components is normal as they heat up and cool down and are not covered under the warranty.

Labour covered under the warranty must not exceed the retail price of the part being replaced, are based on a predetermined rate amount found in the dealer program, exclude dealer travel costs and are disbursed to the dealer.

The manufacturer at its discretion may decide to repair or replace any part or unit after inspection and investigation of the defect. The manufacturer may, at its discretion, fully discharge all obligations with respect to this warranty by refunding the wholesale price of the defective part(s).

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

Repairs and/or replacements of parts and labor covered under warranty must be preauthorized by SUPREME FIREPLACES INC.

**A proof of purchase (copy of the invoice) is required for all warranty claims, as well as the completed warranty claim form and pictures/videos of the issue.**

This **Limited Warranty** is effective on all appliances sold after May 31<sup>st</sup>, 2022, and supersedes any and all warranties currently in existence.

**Please register your SUPREME product online at <https://supremem.com/warranty.php> to ensure full warranty coverage. Prior to contacting your dealer, have the following information available for warranty claim processing:**

- **Customer information (name, telephone number, and address)**
- **Proof of purchase**
- **Model name and serial number (see Section 2.17)**
- **Detailed description of defected component**
- **Pictures (minimum of three)**
- **Videos of the issues**

**In the case of a return for repair or replacement, it is the responsibility of the customer to adequately package the component/unit to prevent further damage during transport. Items sent to SUPREME FIREPLACES INC. without an open warranty claim will be returned to the sender.**

## APPENDIX 8: Photographs of test set up



**Dilution picture Dia 8 no. EG-029**

Polytests Services Inc. 695 B rue Gaudette, St-Jean-sur-Richelieu Québec, Canada, J3B 7S7



Velocity ports at 90 degrees and tunnel temperature sensor location

Particulate sample extraction ports located 48 inches under (requirement 4D=32 inches minimum) velocity ports and 18 inches above downstream Tee. (Requirement 2D=16 inches minimum)

Adjustable damper for flow adjustments

Extraction blower



Last elbow from horizontal run

8 inches diameter stainless steel pipe

Velocity ports located 138 inches downstream of the last elbow (requirement  $8D=64$  inches minimum) and 48 inches upstream of the sampling ports (requirement  $4D=32$  inches minimum)

Total length between hood and sampling port: 23 feet.





Two 8 inches elbow with horizontal mixing section.

60 inches horizontal run between two elbows. Mixing section, No mixing baffle. 8 inches diameter pipe

Hood diameter 32 (requirement  $4D=32$  inches minimum) inches and height of 24 inches (requirement  $3D=24$  inches minimum)

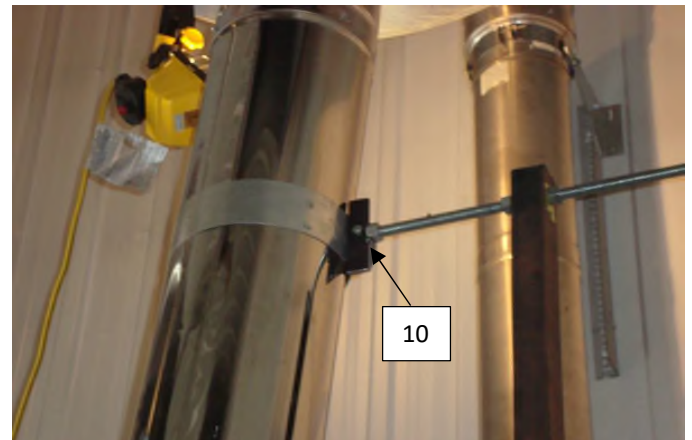
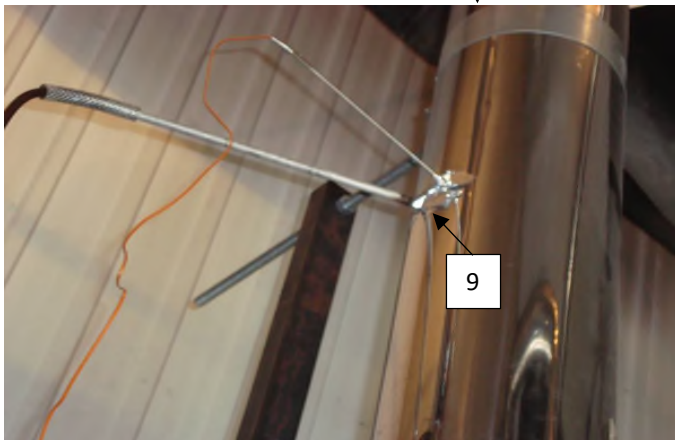
All pipe joints are sealed.

Stack sampling



Gas analysis and temperature probe

chimney support



**9** : Temperature and gas analyser sampling ports located 9 feet above platform

**10** : Exhaust system support bracket

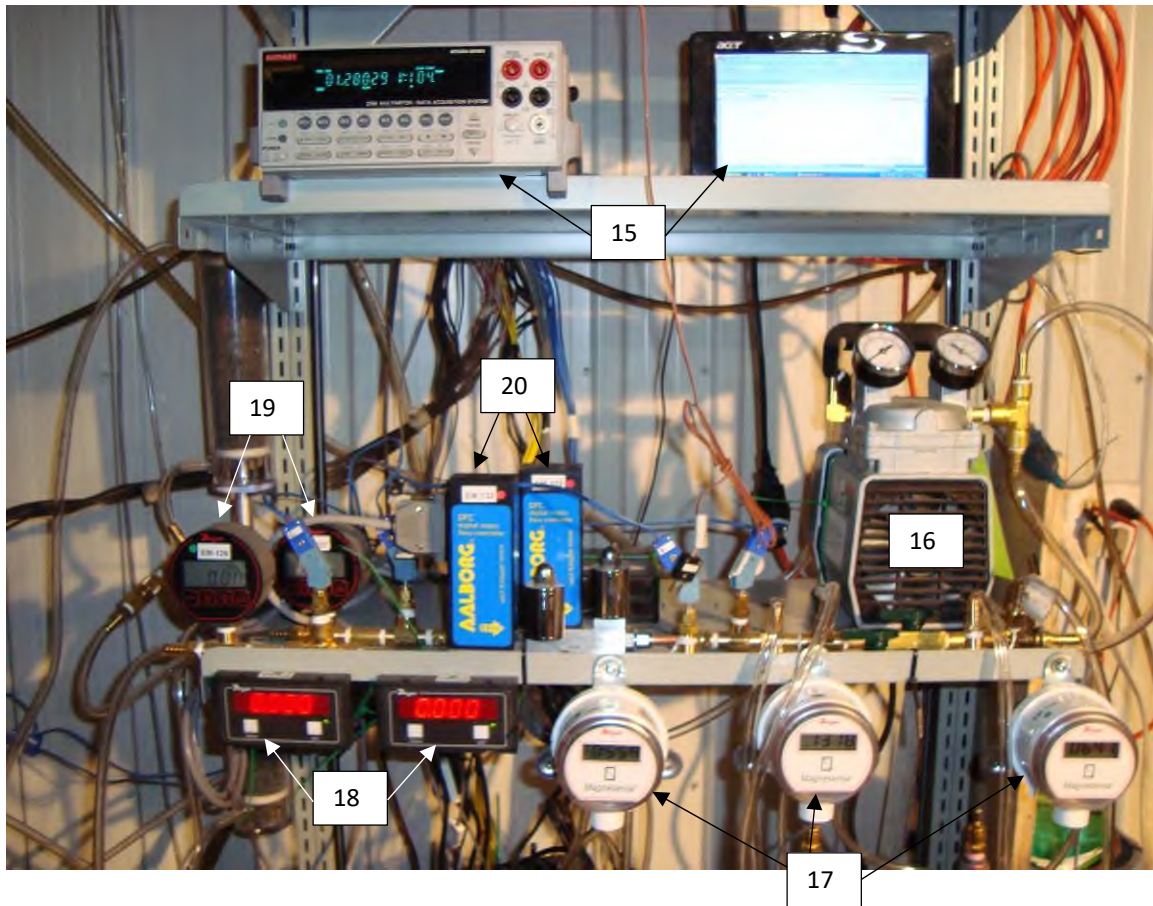


Draft sampling



**14** : Draft sampling port located 6 in. from the flue outlet

Equipment's



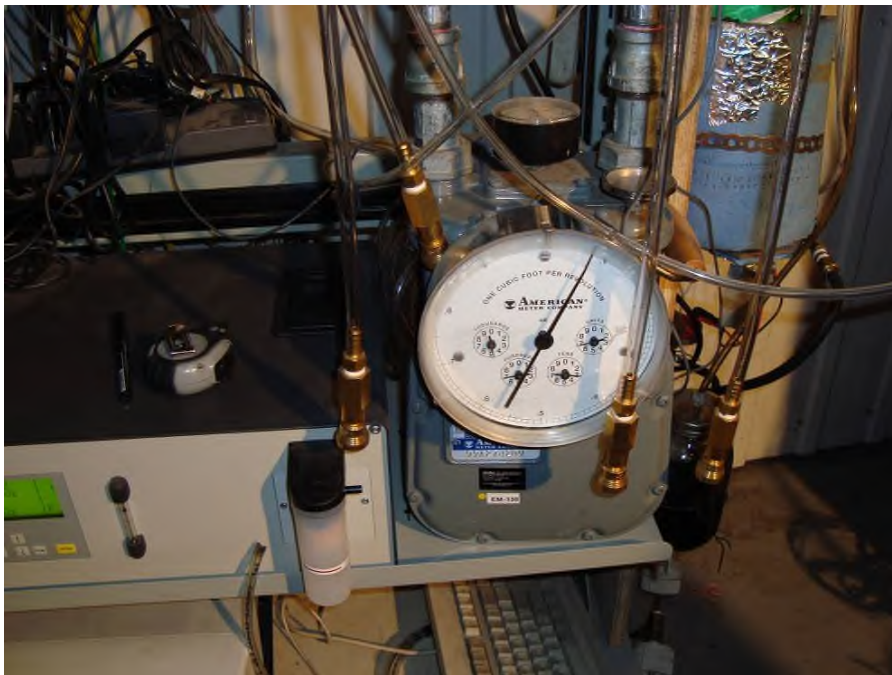
- 15 : Acquisition system
- 16 : Vacuum pump
- 17 : Digital manometer
- 18 : Digital read out for mass flow meter
- 19 : Digital vacuum gage
- 20 : Mass flow meter



Gaz analyser



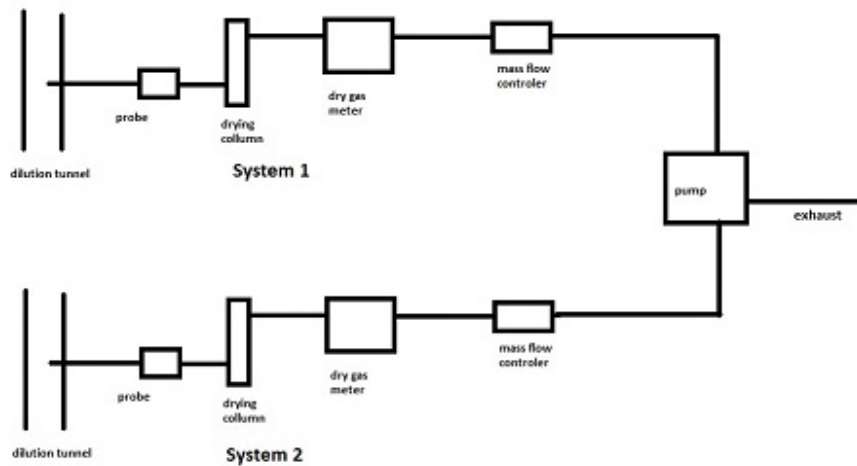
Reference dry gas meter



Dry gas meter for train 1, train 2 and room filter.



Picture 12 : Dilution tunnel sample system



Dilution tunnel

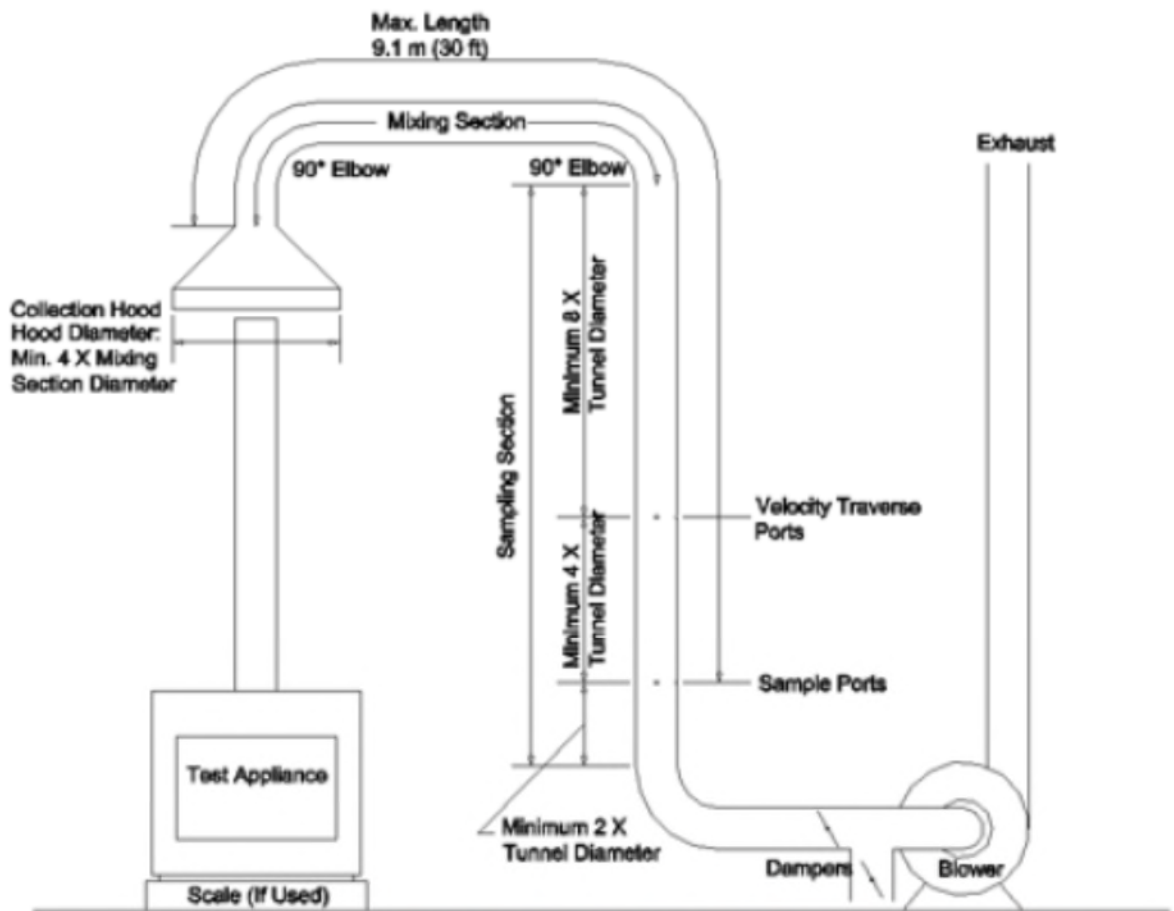


FIG. 3 Steel-Constructed Dilution Tunnel Apparatus

## APPENDIX 9: Test load photographs



**Run 1 minimum burn March 14<sup>th</sup> 2018**

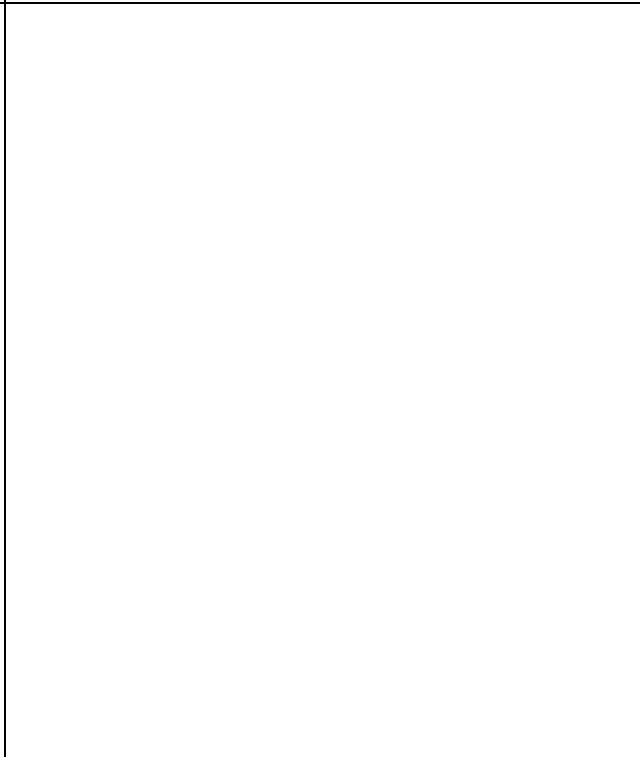




**Run 2 minimum burn March 15<sup>th</sup> 2018**

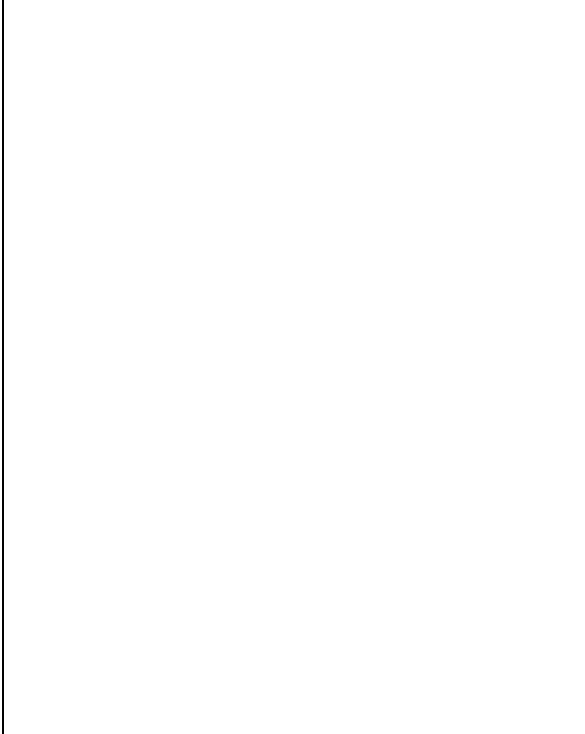


**Run 3 Medium burn March 19<sup>th</sup> 2018**

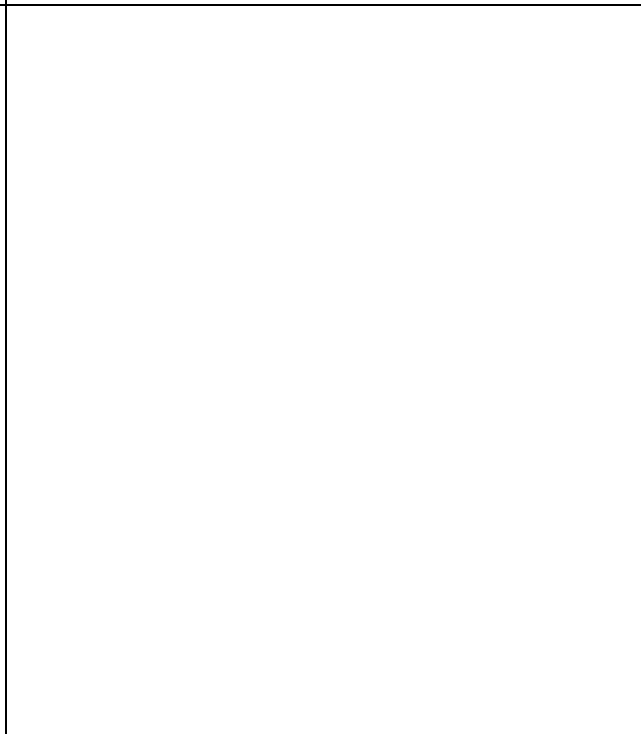




**Run 4 Medium burn March 20<sup>th</sup> 2018**



**Run 5 High burn March 21<sup>st</sup> 2018**





**Run 6 Medium burn, No Fan March 22<sup>nd</sup> 2018**



## APPENDIX 10: Laboratory Operating Procedures



# **POLYTESTS Services inc.**

## **SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE**

### **INTRODUCTION**

This document provides a step by step guide for the technician conducting tests to EPA standard requirements. Procedures outlined here, when followed, will result in tests in conformance with EPA Methods 28R, ASTM E2780, ASTM E2515, ASTM E2618, Method 28WHH, Method 28 PTS.

The primary measurements to be made are particulate emissions rates. The technician's duties include the following steps.

1. Incoming inspection of test units.
2. Set-up of test units.
3. Preliminary testing to establish unit operating procedures and familiarity with operating controls.
4. Calibration of test equipment.
5. Set-up, checking and operation of sampling apparatus.
6. Conduct of tests including complete record keeping and data recording for non-automated functions.
7. Operation of hardware and software included in automatic data acquisition system.
8. Review and analysis of data at test completion to ensure test validity.

The technician running this test must be familiar with the following documents, which are to be kept in the laboratory at all, times.

### **EPA METHODS**

1. EPA Methods 28R
2. ASTM E2780
3. ASTM E2515
4. ASTM E2618
5. Method 28WHH
6. Method 28 PTS

# POLYTESTS Services inc.

## SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

### I. APPLIANCE INSPECTION AND SET-UP

#### A. INCOMING INSPECTION

1. Check for completeness of unit including parts, accessories, installation and operating instructions, drawings and specifications etc. Note any discrepancies or missing parts or information.
2. Check for shipping damage. If damage has occurred, notify the laboratory manager. In some cases, repairs may be made, provided the manufacturer and laboratory manager concur that repairs will not affect the unit's performance. If damage is irreparable, a new unit will need to be obtained.
3. Note whether unit is catalytic or non-catalytic.
4. Mark unit with manufacturer's name, model number, work order number and date received.
5. If unit is safety listed, note label data including listing agency and serial number. If unit is not listed, mark all data sheets "UNLISTED". Test results will not be released until unit passes safety tests without modification unless authorized by laboratory manager.

#### B. UNIT SET-UP

1. All new units must be operated for a breaking in period as follows.
  - a) Non-catalytic units: Ten (48) hours at medium burn rate with Douglas Fir scrap or cordwood.
  - b) Catalytic units: Fifty (50) hours at medium burn rate with Douglas Fir scrap or cordwood.

During these break-in runs the unit may be connected to a lab chimney and fuel additions noted into the corresponding data acquisition file. For catalytic units, a thermocouple must be installed in the catalyst.

Record catalyst temperature at 1-hour intervals or on chart recorder. Operating should continue until data shows at least fifty (50) hours of operation with catalyst temperature in excess of 800 degrees Fahrenheit (active range).

For non-catalytic units a stack thermocouple should be installed and stack temperature recorded at 1-hour intervals. Fourty-eight (48) hours minimum burn time with a stack temperature of at least 250 degrees Fahrenheit is required.

2. Once break-in is completed, allow unit to cool. Clean unit thoroughly.

# POLYTESTS Services inc.

## SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

3. Unit is to be placed on scale for testing. Prior to proceeding with verification process, scale should be turned on and allowed to warm up for one (1) hour minimum. Zero scale and check calibration with standard weights. One (1) 1 kg weight and one (1) 2 kg weight are provided for this purpose. Use scale verification test form no. EPA-7-TP to record results. If scale fails to reproduce weights within tolerance, check with laboratory manager before proceeding.
  4. If scale checks out, place unit on scale and align so chimney will be centered in hood.
  5. Attach chimney connector and chimney. Be sure all joints are sealed below sampling points. Chimney and connector should be cleaned with a wire brush. Be sure chimney connector terminates and chimney starts at proper level above scale platform. Chimney must be supported from scale so that it does not touch test enclosure or hood walls.
  6. Thermocouples should be attached to surfaces of unit prior to testing. EPA requires a thermocouple on the bottom of the firebox. This must be installed prior to putting the unit on the scale. In some cases, the required thermocouple locations will be inaccessible on finished units. These units should have thermocouples installed by the manufacturer during construction. Check with the laboratory manager if problems are encountered in proper thermocouple attachment.
  7. Measure firebox dimensions and record on data forms nos. EPA-2-TP. Make a three dimensional sketch of the firebox including firebrick, baffles and obstructions. Calculate firebox volume in cubic feet with both addition and subtraction methods using forms nos. EPA-3-TP and EPA-4-TP. See Section 6.2.4 of EPA Method 28 for details of firebox volume determination.
  8. If unit is catalytically equipped, additional thermocouples must be installed upstream and downstream of catalyst. Thermocouples should also be placed in the primary and secondary combustion chambers of all units.
  9. Plug thermocouples into data acquisition system jacks making a check of locations and jack numbers for each test on data form no. EPA-5-TP.
  10. Note that inserts are tested as if they are freestanding stoves.
  11. Dilution tunnel should be cleaned prior to each certification test series and at anytime a higher burn rate follows a lower test burn rate.
- II. SAMPLING SYSTEM – SET-UP
- A. GAS ANALYSIS**
1. Instruments should be turned on and allowed to warm up for one (1) hour minimum.

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## SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

### 2. Calibrate analyzers as follows:

NOTE : Prior to proceeding with calibration, make sure to use NIST traceable calibration gas bottles. Adjust flow meter if necessary at each instrument to required flow value.

- a) Using span gas, adjust span control to values specified on calibration gas label.
- b) Using nitrogen, adjust zero controls to provide a 0.00 analyzer readout.
- c) Repeat a) and b) until no further adjustment is required.
- d) Check readout vs. calibration gases (2) labels.

The CO<sub>2</sub> and CO analyzers are “ZEROED” on nitrogen. The O<sub>2</sub> analyzer is spanned on air and set for 20.9%. It is zeroed on nitrogen as well.

### 3. Check for response time synchronization.

- a) With no fire in unit, allow reading to stabilize (O<sub>2</sub> should be 20.93, CO and CO<sub>2</sub> should equal 0).
- b) Flow the calibration gas in the unit and start stop watch. Note the time required for each unit to reach .90 of the calibration gas bottle value. If all three analyzers reach this value within 15 seconds of each other, synchronization is adequate. If not, contact the laboratory manager. Synchronization is adjusted by internal instrument setting.

### 4. Set-up sample clean-up and water collection train as follows.

- a) Load impingers as follows:  
Impinger #1: 100 ml distilled water and 5 ml H<sub>2</sub>SO<sub>4</sub>  
Impinger #2: 100 ml distilled water and 5 ml H<sub>2</sub>SO<sub>4</sub>  
Impinger #3: Empty  
Impinger #4: 200 – 300 grams silica gel (dry)
- b) Place impingers in container and connect with “U TUBES”. Grease carefully on bottom half of ball joint so that grease will not get into tubes.
- c) Connect filter to first impinger and sample line to last impinger.
- e) Leak check system as follows.

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## SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

- 1) Plug probe.
  - 2) Turn on sample system.
  - 3) Observe sample flow rotometer and vacuum gauge. If necessary, use vacuum; adjust valve to set vacuum to the maximum inches Hg.
  - 4) If the float in rotometer does not stabilize below 10 on scale, system must be resealed.
  - 5) Repeat leak check procedure until satisfactory results are obtained.
- f) Just prior to starting test, fill impinger container with water and ice and record ambient conditions on data form no. EPA-8-TP.

### **B. DILUTION TUNNEL SAMPLE TRAIN SET-UP**

1. Filters and holders.
  - a) Clean probes and filter holder front housings carefully and desiccate for at least 24 hours prior to use.
  - b) Filters should be numbered and filter and probe combinations labeled prior to use.
  - c) Weigh desiccated filters and probe-filter units on analytical balance. Record weights data form no. EPA-10-TP. Note that probe and front half of front filter are to be weighed as a unit.
  - d) Carefully assemble filter holder units and connect to sampling systems. Check "DRIERITE" columns for adequate dry absorbent (blue).
2. Leak checking.
  - a) Each sample system is to be checked for leakage prior to inserting probes in tunnel.
  - b) Plug probes and start samplers, adjust pump bypass valve to produce a vacuum reading of 5 inches Hg. (NOTE: During test, vacuum must not exceed 5 inches unless posttest leak check shows acceptable results.)

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## SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

- c) Allow vacuum indication to stabilize for two (2) minutes, then record time and dry gas (DGM<sub>1</sub>) and (DGM<sub>2</sub>) meter readings. Wait ten (10) minutes and record dry gas meter readings again (DGM<sub>3</sub>, DGM<sub>4</sub>). NOTE: If mark, system is leaking too much and all seals should be checked.
- d) Calculate leakage rate as follows.
- 1) System 1:  $\frac{(DGM_3 - DGM_1)}{10} = CFM_1$
- 2) System 2:  $\frac{(DGM_4 - DGM_2)}{10} = CFM_2$

If CFM<sub>1</sub> or CFM<sub>2</sub> is greater than .02 CFM, leakage is unacceptable and system must be resealed.

If CFM<sub>1</sub> or CFM<sub>2</sub> is greater than 0.04 X sample rate, leakage is unacceptable. For most tests, the sample rate will be about 0.15 CFM, thus leakage rates in excess of 0.04 X 0.15 = 0.006 CFM are not acceptable. Record leakage rates on form no. EPA-5-TP

- e) Once leakage check is satisfactory, unplug probe and set flow to appropriate rate for test. This should be done in the minimum amount of time necessary and with the probes in ambient air. Do not insert probes in tunnel until the start of the test run. When flow is established, replug probes to prevent contamination.

### III. TEST CONDUCT

#### A. FUEL LOAD

1. Determine optimum load weight by multiplying firebox volume in cubic feet by 7. This is the load weight on an as-fired basis.
2. Determine piece size to obtain the requested load configuration and meet the test load weight criteria. The load should consist of the following: **TO BE DETERMINED**
3. Weigh out test load and adjust weight by shortening all pieces equally if necessary. Record individual piece load on form no. EPA-11-TP.



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## SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

4. Measure and record moisture content of each fuel piece using Delmhorst moisture meter. Determine if fuel load moisture content is in required range. If not, construct new load using wood with required moisture content. All wood in the humidity chamber should be within range. Contact project manager if you cannot find suitable pieces. Record moisture of each individual piece load on form no. EPA-11-TP.

### **B. UNIT START-UP**

1. Before lighting a fire, turn on dilution tunnel and set flow rate to 140 SCFM if burn rate is to be less than 3 kg/hr or to an appropriate rate from table provided in laboratory for higher burn rates. Record readings on data form no. EPA-9-TP.
2. Check draft imposed on cold stove with all inlets closed and a draft gauge in the chimney. If draft is greater than 0.005 inches water column, adjust tunnel to stack gap until draft is less than 0.005.
3. Check for ambient airflow around unit with hot wire anemometer. Must be less than 50 ft/min.
4. Check all equipment for proper operation. Analyzers should be on and in sample mode. Computer should be loaded with test program and awaiting test start command.
5. Zero scale and start fire with uncolored newspaper and kindling representing 10 % of test load with the same type of fuel.
6. Once kindling is burning well after 5 minutes, add splitted pieces having a bottom surface around 4 sq. inches and representing 25% of test load weight. Operate at high fire for 15 minutes. Then adjust settings to intended test run levels as per the manufacturer's.
7. Following addition of pretest fuel load (splitted pieces), start computer for data logging.

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## SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

8. All fuel additions, air intake settings and operational characteristics shall be noted with associated time stamp on form no. EPA-1-TP.

### C. TEST RUN

1. Once the targeted test fuel bed weight is obtained, the test is to be started as follows:
  - a) Insert the sample probes into the tunnel being careful not to hit sides of tunnel with probe tip.
  - b) Check tunnel pitot tube for proper position. (Pitot should be carefully cleaned prior to each test.)
  - c) Turn on probe sample systems and stack sampler.
  - d) Open stove door, rake coals and load stove as follows: **TO BE DETERMINED**
  - e) Close door or follow manufacturer's start-up procedures. (Five (5) minutes maximum time before all doors and controls must be set to final positions for duration of test.)
  - f) An alarm will sound an audible signal at the (10) minutes intervals. This signal a reading interval. You must verify at each interval that the following readings are correctly logged by the data acquisition system and make observations of any unusual or non routine events that could occur.
    - 1) Rotometer readings.
    - 2) Tunnel pitot tube reading.  
(Zero regularly between readings)
    - 3) Gas meter readings.
    - 4) Temperature readings.
    - 5) Draft reading
    - 6) Test load weight
    - 7) CO, CO<sub>2</sub> and O<sub>2</sub> readings
    - 8) Observations of any unusual or non-routine events.
  - g) During the test, any condition approaching unacceptable limits will be noted. The filter probes and housings are installed in small holders just outside the tunnel. If the filter temperature gets too high, you will have to increase the water flow through the cooling unit until acceptable temperatures are obtained. In between readings, check on

# POLYTESTS Services inc.

## SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

other equipment. Be sure dryers and filters are working and monitor impinger train for proper water and ice levels etc.

- h) When the fuel charge is consumed, it will signal end of test and shut down the sampling systems. When this occurs, remove filter holder and probes from tunnel and impingers from sample line.

### IV. POST TEST PROCEDURES

#### A. SAMPLE RECOVERY – FILTER TRAINS

1. Carefully clean outside of probes and filter housings with alcohol.
2. Disassemble filter holder and transfer filters to clean petri dish. Scrape gasket with scalpel and collect any loose material on filters.
3. Place probe and front half of first filter holders (still assembled) and filters in desiccator. Allow 24-hour desiccation before weighing.
4. Weigh probe filter holder units and filters at six (6) hour intervals until weight change between weighings is less than 0.2 mg. Record all weights taken on data form no. EPA-10-TP.

#### B. CALCULATION OF RESULTS

The computer program carries out all final calculations. When run, it will ask for data from forms used during the test. Enter data as called for.

### GENERAL

This guide cannot cover every possible contingency, which may develop during a particular test program. Many questions, which may arise, can be answered by a complete understanding of the test standards and their intent. When in doubt on any detail, check with the laboratory manager and be sure you understand the procedures involved.

It is critical that all spaces on the data forms be properly filled in. Each test must be represented by a complete record of what was done and when.

## APPENDIX 11: Sample calculations

## Validation du fichier de calcul avec les équations provenant des normes:

ASTM E2515-11

ASTME2618

## Dry burn rate (BR)

### Equation used

B415.1, 13.4

$$BR = \left[ \frac{60W_{WD}}{\theta} \right] \left[ \frac{100 - \%M_W}{100} \right]$$

### Nomenclature

BR	Dry wood burn rate, kg/hr (lb/hr)
$W_{WD}$	Total mass of wood burned (wet basis) during the test run, kg (lb)
$\theta$	Total time of test run, minutes
$\%M_W$	Average moisture in test fuel charge, wet basis, % To convert from dry basis to wet basis: % moisture wet basis =

### Sample calculation

#### Data

$W_{WD}$	26,448 lbs
$\theta$	651 min
$\%M_W$	17,03 %

#### Calculation

BR	0,918 Dry kg/hr
----	-----------------

## Volume of gas sample corrected to dry standard conditions ( $V_{m(std)}$ )

### Equation used

ASTM 2515, equation 6

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

### Nomenclature

$V_{m(std)}$	Volume of gas sample , corrected to standard conditions, dscm <sup>3</sup> (dscf)
$K_1$	17.64 R/in Hg
$V_m$	Volume of gas sample
$Y$	DGM calibration factor
$P_{bar}$	Barometric pressure mmHg (in Hg)
$\Delta H$	Average pressure at the outlet of the dry gas meter mm water (in. Water)
$T_m$	Absolute average dry gas meter temperature K (R)

### Sample calculation

#### Data

$V_m$	128,60 dcf
$Y$	0,98843
$P_{bar}$	29,29 in Hg
$\Delta H$	-0,7602 in Hg
$T_m$	537,1 R

#### Calculation

$V_{m(std)}$	119,13 dscf
--------------	-------------



## Total amount of particulate matter collected ( $m_n$ )

### Equation used

ASTM 2515, equation 12

$$m_n = F_1 + F_2 + \Delta PF$$

### Nomenclature

$m_n$	Total amount of particulate matter collected, mg
$F_1$	Particulate matter collected on front filter, mg
$F_2$	Particulate matter collected on second filter, mg
$\Delta PF$	Post-test weight gain of probe and filter holder assembly, mg

### Sample calculation

#### Data

$F_1$	0,0116 g
$F_2$	-0,001 g
$\Delta PF$	0,003 g

#### Calculation

$m_n$	13,600 mg
-------	-----------

Calculation based of train 2 data

## Particulate concentration ( $C_s$ )

### Equation used

ASTM 2515, equation 13

$$C_s = (0,001 \text{ g/mg}) \times \left( \frac{m_n}{V_{m(\text{std})}} \right)$$

### Nomenclature

$C_s$	Concentration of particulate matter in stack gas or dilution tunnel, dry basis, corrected to standard conditions, $\text{g/dsm}^3$ (g/dscf)
$m_n$	Total amount of particulate matter collected in the sampling train, mg
$V_{m(\text{std})}$	Volume of gas sample measured corrected to dry standard conditions, $\text{dsm}^3$ (dscf)

### Sample calculation

#### Data

$m_n$	13,600 mg
$V_{m(\text{std})}$	119,13 dscf

#### Calculation

$C_s$	0,000114 g/dscf
-------	-----------------

Calculation based of train 2 data

## Particulate concentration for room air ( $C_r$ )

### Equation used

ASTM 2515, equation 14

$$C_r = (0,001 \text{ g/mg}) \times \left( \frac{m_r}{V_{mr(std)}} \right)$$

### Nomenclature

$C_r$	Concentration of particulate matter in room air, dry basis, corrected to standard conditions, g/dsm <sup>3</sup> (g/dscf)
$m_r$	Total amount of particulate matter collected in the sampling train, mg
$V_{mr(std)}$	Volume of room air sample measured corrected to dry standard conditions, dsm <sup>3</sup> (dscf)

### Sample calculation

#### Data

$m_r$	0,200 mg
$V_{mr(std)}$	52,40 dscf

#### Calculation

$C_r$	0,000004 g/dscf
-------	-----------------

Calculation based of train 2 data

## Adjustment factor for alternative pitot tube placement (FP)

### Equation used

ASTM 2515, equation 1

$$F_P = \frac{V_{strav}}{V_{scent}}$$

### Nomenclature

$V_{strav}$	Average gas velocity cacluated after the Pitot tube traverse
$V_{scent}$	Average gas velocity at the center of the dilution tunnel cacluated after the multi-point Pitot traverse
$F_P$	Adjustment factor for center of tunnel pitot tube placement

### Sample calculation

#### Data

$V_{strav}$	0,221146574
$V_{scent}$	0,22693344

#### Calculation

$F_P$	0,974500
-------	----------

## Average dilution tunnel gas velocity ( $V_S$ )

### Equation used

ASTM 2515, equation 9

$$V_S = F_p K_p C_p (\sqrt{\Delta P})_{avg} \sqrt{\frac{T_S}{P_S M_S}}$$

### Nomenclature

$V_S$	Average dilution tunnel gas velocity, m/s (ft/s)
$K_p$	Pitot tube constant For the metric units: $34.97 \text{ m/sec} \left[ \frac{(\frac{g}{\text{mole}})(\text{mm Hg})}{(^{\circ}\text{K})(\text{mm H}_2\text{O})} \right]^{1/2}$ For English units: $85.49 \text{ ft/sec} \left[ \frac{(\frac{\text{lb}}{\text{mole}})(\text{in Hg})}{(^{\circ}\text{R})(\text{in H}_2\text{O})} \right]^{1/2}$
$C_p$	Pitot tube coefficient (use 0.99 for standard pitot tube, 0.84 may be used for S-type tubes constructed according to Method 2 specifications)
$F_p$	Pitot tube correction factor
$(\sqrt{\Delta P})_{avg}$	Average square root of each individual velocity head ( $\Delta P$ )
$P_{bar}$	Barometric pressure at measurement site, mm H <sub>2</sub> O (in. H <sub>2</sub> O)
$P_g$	Stack static pressure, mm Hg (in. Hg)
$P_S$	Absolute dilution tunnel static gas pressure, mm Hg (in. Hg), or $P_{bar} + P_g$
$M_S$	Molecular weight of dilution tunnel gas, wet basis, g/g-mole (lb/lb-mol) may be assumed to be 28.78 or 29 for CSA B415
$t_s$	Dilution tunnel temperature, °C (°F)
$T_S$	Absolute dilution tunnel temperature, °K (°R), or $273 + t_s$ for metric units, $460 + t_s$ for English units

### Sample calculation

#### Data

$K_p$	85,49
$C_p$	0,99
$F_p$	0,974
$(\sqrt{\Delta P})_{avg}$	0,2343 in H <sub>2</sub> O <sup>1/2</sup>
$P_{bar}$	29,29 in Hg
$P_g$	0,23 in H <sub>2</sub> O
$P_S$	29,31 in Hg
$M_S$	28,78 lb/lb-mol
$t_s$	83,54 F

$T_s$  543,54 R

**Calculation**

$V_s$  15,5093 ft/s



## Average dilution tunnel gas flow rate (Qstd)

### Equation used

ASTM 2515, equation 3

$$Q_{std} = 60(1 - B_{ws})V_s A \left(\frac{T_{std}}{T_s}\right) \left(\frac{P_s}{P_{std}}\right)$$

### Nomenclature

$Q_{std}$	Total gas flow rate corrected to dry standard conditions, $\text{dsm}^3/\text{min}$ (dscf/min)
60	Conversion factor minutes per hour
$B_{ws}$	Water vapour in the dilution tunnel stream, proportion by volume (may be assumed to be 2%)
$V_s$	Average dilution tunnel gas velocity, m/s (ft/s)
A	Cross-sectional area of dilution tunnel, $\text{m}^2$ ( $\text{ft}^2$ )
$T_{std}$	Standard absolute temperature, 293 °K (528°R)
$T_s$	Absolute average dilution tunnel temperature, $\text{K}$ ( $^{\circ}\text{R}$ ), or $273 + t_s$ for metric units, $460 + t_s$ for English units
$t_s$	Dilution tunnel temperature, °C (°F)
$P_s$	Absolute dilution tunnel static gas pressure, mm Hg (in. Hg), or $P_{bar} + P_g$
$P_{bar}$	Barometric pressure at measurement site, mm Hg (in. Hg)
$P_g$	Dilution tunnel static pressure, mm Hg (in. Hg)
$P_{std}$	Standard absolute pressure, 760 mm Hg (29.92 in. Hg)

### Sample calculation

#### Data

$B_{ws}$	0,02
$V_s$	15,509
A	0,349 $\text{ft}^2$
$T_{std}$	528 R
$T_s$	543,54 R
$P_s$	29,311 in Hg
$P_{std}$	29,92 in Hg

#### Calculation

$Q_{std}$	302,93 dscf/min
-----------	-----------------

## Particulate emission rate (E)

### Equation used

$$E = (C_s - C_r)Q_{std}$$

### Nomenclature

E	Particulate emission rate, g/hr
$C_s$	Concentration of particulate matter in stack gas or dilution tunnel gas, dry basis corrected to standard conditions, g/dscm <sup>3</sup> (g/dscf)
$C_r$	Concentration of particulate matter in room air, g/dscm <sup>3</sup> (g/dscf)
$Q_{std}$	Total gas flow rate, dry basis corrected to standard conditions, dsm <sup>3</sup> /min (dscf/min)

### Sample calculation

#### Data

$C_s$	0,000114 g/dscf
$C_r$	0,000004 g/dscf
$Q_{std}$	302,93 dscf/min

#### Calculation

E	0,03 g/min
E	2,01 g/h

Calculation based on train 2 data.

## Total particulate emission rate ( $E_T$ )

### Equation used

ASTM 2515, equation 15

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

### Nomenclature

$E_T$	Total particulate emission, g
$C_S$	Concentration of particulate matter in stack gas or dilution tunnel gas, dry basis corrected to standard conditions, g/dscm <sup>3</sup> (g/dscf)
$C_r$	Concentration of particulate matter in room air, g/dscm <sup>3</sup> (g/dscf)
$Q_{std}$	Total gas flow rate, dry basis corrected to standard conditions, dsm <sup>3</sup> /min (dscf/min)
$\theta$	Total sampling time, min

### Sample calculation

#### Data

$C_S$	0,000114 g/dscf
$C_r$	0,000004 g/dscf
$Q_{std}$	302,93 dscf/min
$\theta$	651 min

#### Calculation

E 21,76 g  
Calculation based on train 2 data.

## Average gas velocity in dilution tunnel during each min interval, i, of the test run

### Equation used

ASTM 2515, equation 10

$$v_{si} = F_p K_p C_p \sqrt{\Delta p_i} \sqrt{\frac{T_{si}}{P_s M_s}}$$

### Nomenclature

	Average gas velocity in dilution tunnel during each min interval, i of the test run
$v_{si}$	m/sec (ft/sec)
$F_p$	Pitot tube correction factor
$K_p$	Pitot tube constant
	For the metric units: $34.97 \text{ m/sec} \left[ \frac{(\frac{g}{\text{mole}})(\text{mm Hg})}{(^{\circ}\text{K})(\text{mm H}_2\text{O})} \right]^{1/2}$
	For English units: $85.49 \text{ ft/sec} \left[ \frac{(\frac{\text{lb}}{\text{mole}})(\text{in Hg})}{(^{\circ}\text{R})(\text{in H}_2\text{O})} \right]^{1/2}$
$C_p$	Pitot tube coefficient (use 0.99 for standard pitot tube, 0.84 may be used for S-type tubes constructed according to Method 2 specifications)
$\Delta p_i$	interval, i, of the test run
$T_{si}$	Absolute average gas temperature in the dilution tunnel during the $i^{\text{th}}$ minutes
$P_s$	Absolute dilution tunnel static gas pressure, mm Hg (in. Hg), or $P_{\text{bar}} + P_g$
$M_s$	Molecular weight of dilution tunnel gas, wet basis, g/g-mole (lb/lb-mol) may be assumed to be 28.78

### Sample calculation

#### Data

<b>i=1</b>		<b>i=2</b>	
$F_p$	0,974	$F_p$	0,974
$K_p$	85,49	$K_p$	85,49
$C_p$	0,99	$C_p$	0,99
$\Delta p_i$	0,055 in H <sub>2</sub> O	$\Delta p_i$	0,055 in H <sub>2</sub> O
$T_{si}$	545,3 R	$T_{si}$	543,1 R
$P_s$	29,31 in Hg	$P_s$	29,31 in Hg
$M_s$	28,78 lb/lb-mol	$M_s$	28,78 lb/lb-mol

#### Calculation

<b>i=1</b>		<b>i=2</b>	
$v_{si}$	15,57 ft/sec	$v_{si}$	15,54 ft/sec

## Percent of proportional sampling rate (PR)

### Equation used

B415, equation 13.1

$$PR = \left( \frac{\theta V_{mi(std)} V_S T_m T_{Si}}{\theta_i V_m V_{Si} T_{mi} T_S} \right) \times 100$$

### Nomenclature

PR	Percent of proportional sampling rate (%)
$\theta$	Total sampling time, min
$\theta_i$	Time of interval, 1 min
$V_m$	Volume of gas sample measured by the DGM, dsm <sup>3</sup> (dscf)
$V_{mi(std)}$	Volume of gas sample measured by the digital mass flow controller during the i <sup>th</sup> 1 minutes interval, dsm <sup>3</sup> (dscf)
$V_S$	Average gas velocity in the dilution tunnel, ft/min
$V_{Si}$	Average gas velocity in the dilution tunnel during the i <sup>th</sup> 10 minutes interval, ft/min
$T_m$	Absolute average digital mass flow controller temperature, K (R)
$T_{mi}$	Absolute average digital mass flow controller temperature during the i <sup>th</sup> 1 minutes
$T_S$	Absolute average gas temperature in the dilution tunnel, K (R)
$T_{Si}$	Absolute average gas temperature in the dilution tunnel during the i <sup>th</sup> 1 minutes

### Sample calculation

#### Data

train =1			train =2		
$\theta$	651	min	$\theta$	651	min
$\theta_i$	1	min	$\theta_i$	1	min
$V_m$	115,52	dcf	$V_m$	119,17	dcf
$V_{mi(std)}$	0,182	cuft	$V_{mi(std)}$	0,1835	cuft
$V_S$	15,51	ft/sec	$V_S$	15,51	ft/sec
$V_{Si}$	15,578	ft/sec	$V_{Si}$	15,578	ft/sec
$T_m$	536,5	R	$T_m$	537,1	R
$T_{mi}$	535,11	R	$T_{mi}$	535,59	R
$T_S$	543,54	R	$T_S$	543,54	R
$T_{Si}$	545,3	R	$T_{Si}$	545,3	R

#### Calculation

train=1		train=2	
PR	102,6 %	PR	100,4 %

## Filter face velocity check

### Equation used

$$FV_{max} = \frac{V_{mL}}{1} \times \frac{1}{F_A}$$

### Nomenclature

$FV_{max}$	Maximum filter face velocity during the test run, m/min (ft/min)
$V_{mL}$	Largest 1 minute interval metered gas volume value recorded during the test run, dm <sup>3</sup> (dcf)
$F_A$	Filter area exposed to gas sample during train operation, m <sup>2</sup> (ft <sup>2</sup> )

### Sample calculation

#### Data

$V_{mL}$	0,175 dcf
$F_A$	0,0116 ft <sup>2</sup>

#### Calculation

$FV_{max}$	15,12 ft/min
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## Dual train precision

### Equation used

$$\frac{\text{Train 1} - \text{average train 1 and train 2}}{\text{average train 1 and train 2}} \times 100 \leq 7.5\%$$

### Nomenclature

Dual train precision	Deviation between emission's train 1 and 2
Train 1	Total emission for train 1
Train 2	Total emission for train 2

### Sample calculation

#### Data

Train 1	23,47 g
Train 2	21,27 g

#### Calculation

Dual train precision	4,91 %
----------------------	--------

## Analyzer drift checks

### Equation used

$$Drift = \frac{\Delta R}{span} \times 100$$

### Nomenclature

Drift	The change in analyzer response to calibration gas over the duration of the test run
$\Delta R$	The difference between the analyzer response at the end of the test run and the
Span	The upper limit of the instrument range, ppmv or %

### Sample calculation

#### Data

$\Delta R$	0,015 %
Span	5 %

#### Calculation

Drift	0,30 %
-------	--------

Calculated with CO concentration values.

## APPENDIX 12: Volume calculations

## 4 Volume Calculations

The usable firebox of the 38SF/38SFC and 38ST ( $V_U$ ) consists of a rectangular cuboid with a width ( $W_U$ ) of 23.875 in, depth of ( $D_U$ ) 13.875 in, and a height of ( $H_U$ ) 18.250 in, making a 3.499 ft<sup>3</sup> combustion chamber (refer to Figure 4-1).

$$V_U = W_U * D_U * H_U$$

$$V_U = 23.875 \text{ in} * 13.875 \text{ in} * 18.250 \text{ in}$$

$$V_U = 6,045 \text{ in}^3 = 3.499 \text{ ft}^3$$

The non-usable section of the firebox consists of the front portion facing the door, where the load cannot be placed due to the angled flanges of the ¼" hearth plate. This portion of the firebox ( $V_{NU}$ ) consists of a rectangular cuboid with a width ( $W_{NU}$ ) of 23.875 in, depth of ( $D_{NU}$ ) 2.500 in, and a height of ( $H_{NU}$ ) 17.000 in, making a 0.587 ft<sup>3</sup> combustion chamber (refer to Figure 4-2).

$$V_{NU} = W_{NU} * D_{NU} * H_{NU}$$

$$V_{NU} = 23.875 \text{ in} * 2.500 \text{ in} * 17.000 \text{ in}$$

$$V_{NU} = 1,015 \text{ in}^3 = 0.587 \text{ ft}^3$$

The total firebox volume ( $V_T$ ) is therefore calculated by adding the usable portion ( $V_U$ ) with the non-usable portion ( $V_{NU}$ ) which result to 4.086 ft<sup>3</sup>.

$$V_T = V_U + V_{NU}$$

$$V_T = 3.499 \text{ ft}^3 + 0.587 \text{ ft}^3$$

$$V_T = 4.086 \text{ ft}^3$$

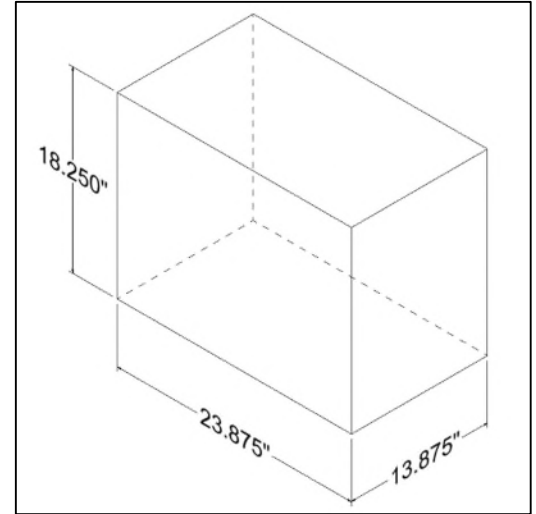


Figure 4-1: 38SFC Usable Firebox

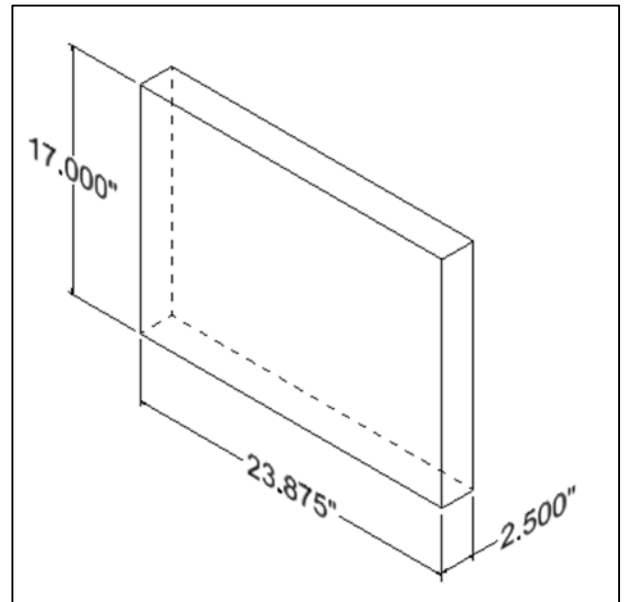


Figure 4-2: 38SFC Non-Usable Firebox

## APPENDIX 13: Operating instruction

# 17 Unit Pre-Burn

## 17.1 Category 2

1. Load pieces of 2" X 4" BC Fir summing to a weight between 28 to 29 lbs.
2. Set the speed of the blowers to 80% capacity.
3. Place and ignite a firestarter at the bottom of the load.
4. Activate the control, set the burn rate to the maximum (Figure 17-1), and close the door.
5. Once a third of the load is remaining, set the PAC to the minimum burn rate position (Figure 17-2).
6. Throughout the combustion, crush and mix the wood until a uniform charcoal bed is created with a v-groove along the center of the firebox (door to back wall).
7. Start the official test once the average temperature of the firebox has reached 250 to 260°F.
8. Place a column of 3 pieces of 4X4 at the back (4 spacers each) and a column of 2 pieces of 4X4 at the front (4 spacers each) – keep a distance of 2.5 inches from the front load to the front lip of the bottom plate.
9. Activate control and close door immediately.

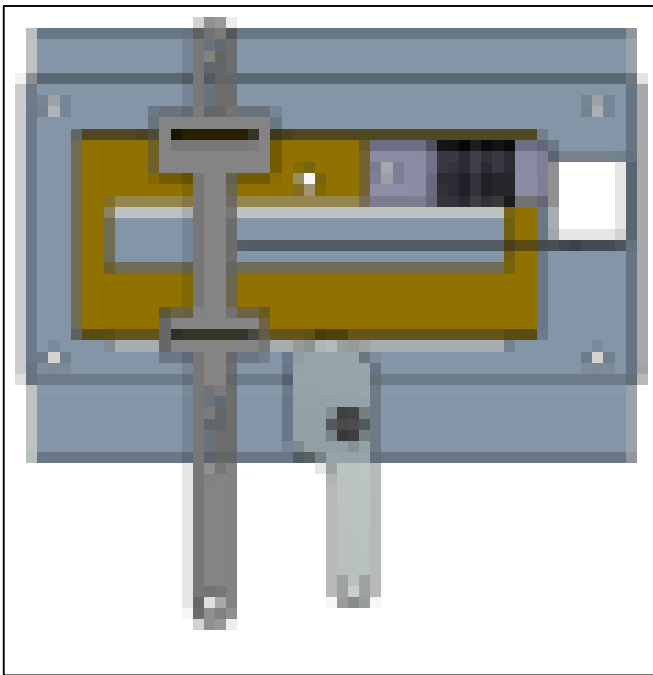


Figure 17-2: PAC Set to Maximum Burn Rate Position

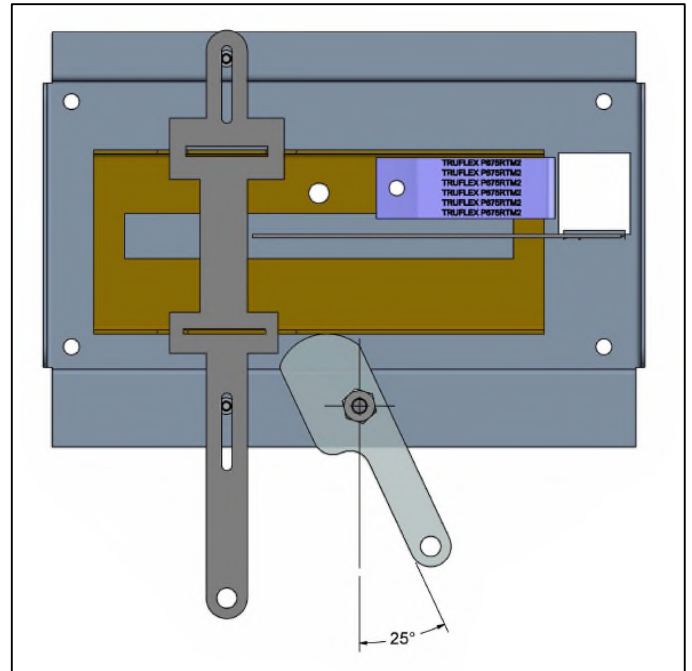


Figure 17-1: PAC Set to Minimum Burn Rate Position



## 17.2 Category 3

1. Load pieces of 2" X 4" BC Fir summing to a weight between 28 to 29 lbs.
2. Set the speed of the blowers to 90% capacity.
3. Place and ignite a firestarter at the bottom of the load.
4. Activate the control, set the burn rate to the maximum (Figure 17-1), and close the door.
5. Once a third of the load is remaining, set the PAC to the medium-high burn rate position (Figure 17-3).
6. Throughout the combustion, crush and mix the wood until a uniform charcoal bed is created with a v-groove along the center of the firebox (door to back wall)
7. Start the official test once the average temperature of the firebox has reached 360 to 370°F.
8. Place a column of 3 pieces of 4X4 at the back (4 spacers each) and a column of 2 pieces of 4X4 at the front (4 spacers each) – keep a distance of 2.5 inches from the front load to the front lip of the bottom plate.
9. Activate control and close door immediately.

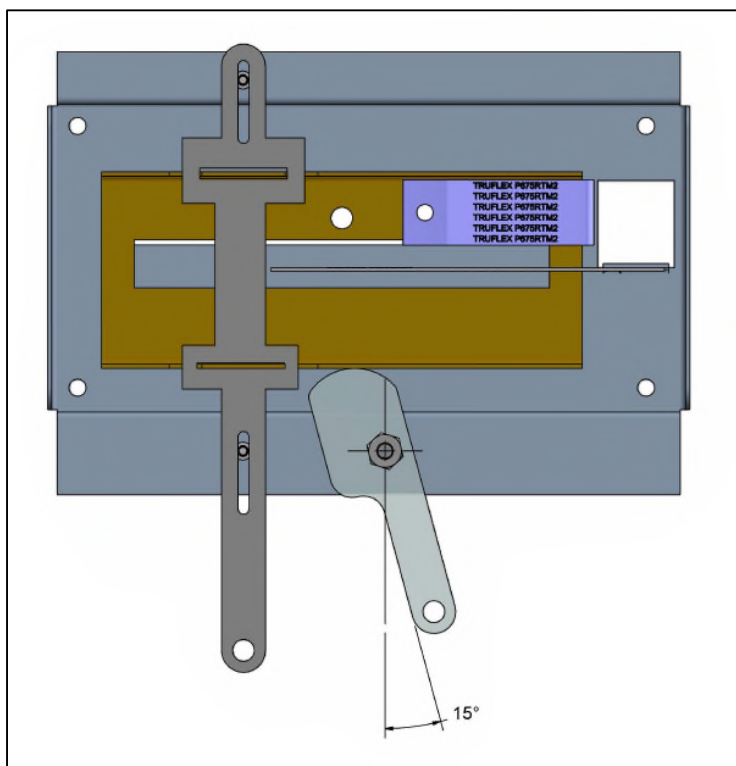


Figure 17-3: PAC Set to Medium-High Burn Rate Position

## 17.3 Category 4

1. Load pieces of 2" X 4" BC Fir summing to a weight between 29 to 30 lbs.
2. Set the speed of the blowers to 100% capacity.
3. Place and ignite a firestarter at the bottom of the load.
4. Activate the control, set the burn rate to the maximum (Figure 17-1), and close the door.
5. Throughout the combustion, crush and mix the wood until a uniform charcoal bed is created with a v-groove along the center of the firebox (door to back wall).
6. Start the official test once the average temperature of the firebox has reached 430 to 440°F.
7. Place a column of 3 pieces of 4X4 at the back (4 spacers each) and a column of 2 pieces of 4X4 at the front (4 spacers each) – keep a distance of 2.5 inches from the front load to the front lip of the bottom plate.
8. Activate control and close door immediately.

## APPENDIX 14: Drawing Air flow pattern

### 3 Air Flow Patterns

The primary air enters into the unit from two channels; the air wash and the booster. The opening of the channels is regulated by an automatic bi-metal control (refer to Section 15). Please refer to the following illustrations:

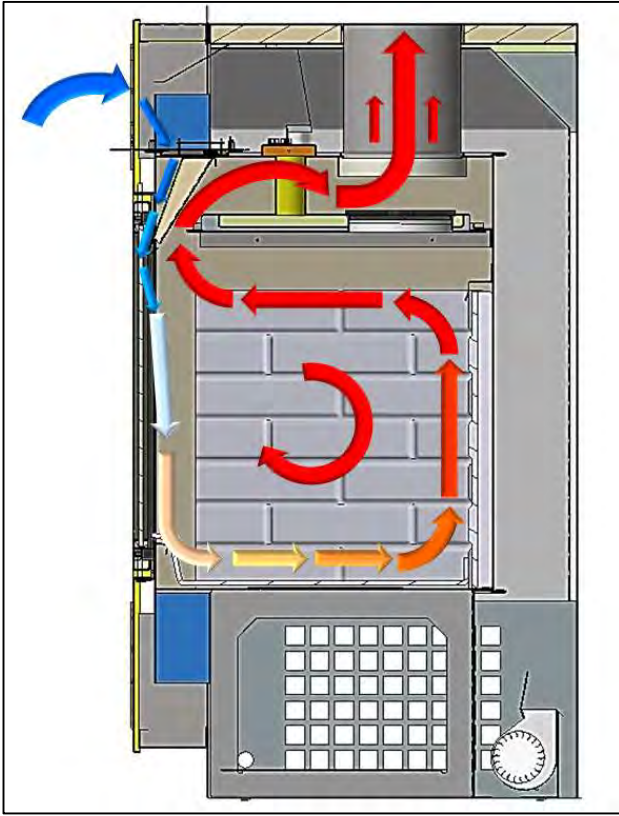


Figure 3-1: Air Flow through Primary Air Wash Channel

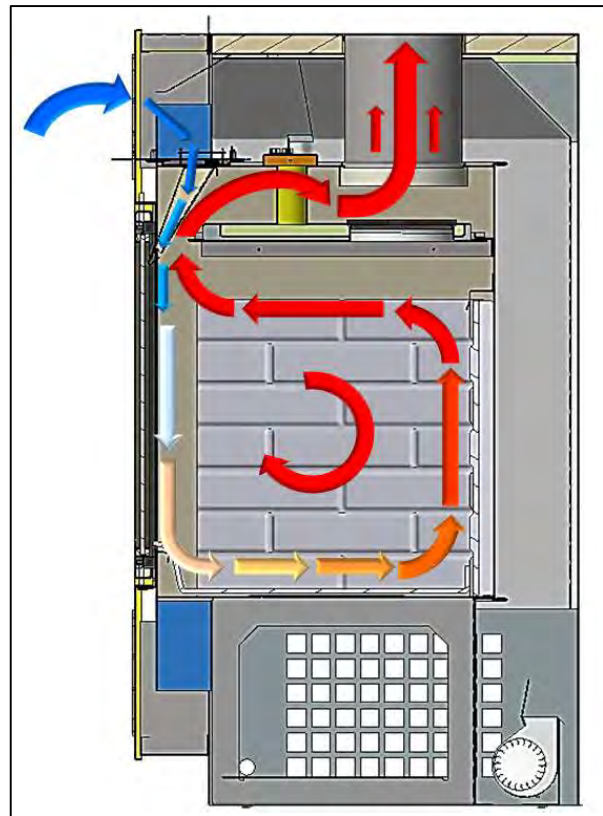
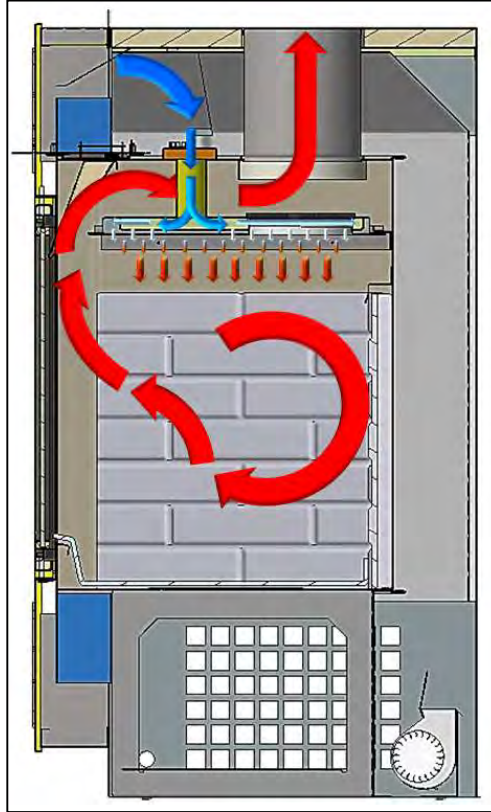


Figure 3-2: Air Flow through Primary Air Booster Channel

The secondary air enters the combustion chamber from the top and through the baffle system. The opening of the secondary air intake is regulated by a bi-metallic control and opens with heat:



**Figure 3-3: Air Flow through Secondary Air Channel**

## APPENDIX 15: Application for wood stove program



**U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)**  
**2015 Standards of Performance for New Residential Wood Heaters, New Residential**  
**Hydronic Heaters and Forced-Air Furnaces Application**  
**40 CFR PART 60 SUBPARTS AAA AND QQQQ**

Disclaimer: The statutory provisions and the EPA regulations described in this document contain legally binding requirements. This document is not a substitute for those provisions or regulations, nor is it a regulation itself. In the event of a discrepancy, please refer to 40 CFR PART 60 Subparts AAA AND QQQQ, Sections 60.533(b), 60.5475(b), and Appendix A-8. This document may be revised periodically without public notice. If you have additional questions, please contact Rafael Sanchez at 202-564-7028 or via email at sanchez.rafael@epa.gov.

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**APPLICATION FOR A CERTIFICATE OF COMPLIANCE PURSUANT TO 40 CFR  
PART 60 SUBPARTS AAA AND QQQQ  
2015 STANDARDS OF PERFORMANCE FOR NEW RESIDENTIAL WOOD HEATERS, NEW  
RESIDENTIAL HYDRONIC HEATERS AND FORCED-AIR FURNACES**

**GENERAL INFORMATION**

**Manufacturer's Name:**

Foyers Supreme Incorporated

<b>Heater Type (Circle One):</b>	Adjustable Burn Rate Wood Heater	Pellet Stove	Single Burn Rate Heater	Hydronic Heater	Forced Air Furnace	Other:
<b>Hydronic Heater Type (Circle One):</b>	Traditional	Full Storage	Partial Storage	Indoor/Outdoor	Other:	
<b>Forced-Air Furnace Type (Circle One):</b>	Small (less than 65,000 BTU/hr heat output)		Large (greater than 65,000 BTU/hr heat output)		Other:	
<b>Fuel Tested:</b>	Crib	Pellet	Cordwood	Wood Chips	Other:	

**Test Method(s) Method 28R** **Catalyst: No**

**Model Names: Astra 38, Elegance 42, Novo 38 – Soapstone, Novo 38 – Cast Iron**

<b>Physical Address (Street number and Address, not P.O. Box):</b> 3594 Jarry, East	<b>Mailing Address:</b> 3594 Jarry, East, Montreal, QC, H1Z 2G4, Canada
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<b>City: Montreal</b>	<b>State: QC, Canada</b>	<b>ZIP Code: H1Z 2G4</b>
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<b>Phone: (514) 593-4722</b>	<b>Email: alexander@supremem.com</b>	<b>Website: www.supremem.com</b>
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**EPA Submission Date of 30 day Notice: 13<sup>th</sup> of February, 2018**

**MANUFACTURER'S AUTHORIZED REPRESENTATIVE INFORMATION**

**Name: Alexander Marcakis**

**Position/Title: Engineering Department**

**Address: 3594 Jarry, East**

<b>City: Montreal</b>	<b>State: QC, Canada</b>	<b>ZIP Code: H1Z 2G4</b>
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<b>Phone: (514) 593-4722</b>	<b>E-mail: alexander@supremem.com</b>	<b>Website: www.supremem.com</b>
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**Remarks:**

**EPA-APPROVED TEST LABORATORY**



**APPLICATION FOR A CERTIFICATE OF COMPLIANCE PURSUANT TO 40 CFR  
PART 60 SUBPARTS AAA AND QQQQ  
2015 STANDARDS OF PERFORMANCE FOR NEW RESIDENTIAL WOOD HEATERS, NEW  
RESIDENTIAL HYDRONIC HEATERS AND FORCED-AIR FURNACES**

**Name of Test Laboratory:**  
Polytests Services inc

**Name of Person Authorized or Responsible for Conducting Compliance Test:** Danick Power

**Position/Title:** VP operation

**Address:** 695-B Gaudette,

**City:** St-Jean-sur-Richelieu

**State:** Quebec, Canada

**ZIP Code:** J3B 7S7

**Phone:** 450 741-3636

**Email:** dpower@polytests.com

**Website:** www.polytests.com

**Remarks:**

EPA-Approved Third Party Certifier

**Name of Certifier Entity:** PFS-TECO, Inc.

**Name of Person Authorized or Responsible for Reviewing Test Report and/or Issuing Certification of Conformity:**  
John Steinert

**Position/Title:**  
General Manager – Portland Laboratory

**Address:** 11785 SE Hwy. 212 Suite 305

**City:** Clackamas

**State:** OR

**ZIP Code:** 97015

**Phone:** (503) 650-0088

**Email:**  
john.steinert@pfsteco.com

**Website:** www.pfsteco.com

**Remarks:**



**COMPLIANCE STATEMENTS AND ACKNOWLEDGEMENTS – SECTIONS 60.533(B) AND 60.5475(B)**

**INSTRUCTIONS: PLEASE READ THE BELOW STATEMENTS AND AFFIRMATIONS AND ADDRESS ACCORDINGLY.**

**FOR EMISSIONS DATA SUMMARY TABLES SEE ATTACHMENTS**

**1. Engineering Drawings Statement**

Foyers Supreme Incorporated has provided as CBI information along with the report engineering drawings and specifications of components that may affect emissions (including specifications for each component listed in paragraphs (k)(2), (3) and (4) of 60.533(b) and 60.5475(b). All K list component drawings contain full measurements and dimensions as required. All tolerances of components identified in paragraph (k)(2) of 60.533(b) and 60.5475(b) are in compliance with the allowable tolerances as specified per the CFR. The drawings and/or manual identify how the emission critical parts, such as baffle and air control can be readily inspected and replaced.

**2. Firebox Statement Requirement**

Foyers Supreme Incorporated will manufacture the firebox composed with the same materials from the material used for the firebox or firebox component in the wood heater on which certification testing was performed.

**3. CBI**

Foyers Supreme Incorporated has clearly labeled all confidential business information (CBI). Both CBI and Non-CBI reports have been provided electronically.

**4. Valid Certification Statement**

Foyers Supreme Incorporated has submitted a test report that contains the information required for report submittal per the CFR. This includes a summary table that clearly presents the individual and overall emission rates, efficiencies and heat outputs.

**5. Warranties**

Foyers Supreme Incorporated has provided a copy of the warranties for the model line, which includes a statement that the warranties are void if the unit is used to burn materials for which the unit is not certified by the EPA and void if not operated according to the owner's manual.

**6. Q/A Statement**

Foyers Supreme Incorporated will conduct a quality assurance program for the model line that satisfies the requirements of paragraph (m) of the CFR.

**7. Laboratory Sealing of Unit**

Services Polytests Inc. (laboratory) has sealed the tested unit (Astra 38, Elegance 42, Novo 38 – Cast Iron, Novo 38 - Soapstone) after completion of the test series and the unit will be stored at Foyers Supreme Incorporated facility for a minimum of 5 years from the completion of the certification test.

**8. Statements that the wood heaters manufactured under this certificate will be—**

- (i) The unit tested (Astra 38, Elegance 42, Novo 38 – Cast Iron, Novo 38 - Soapstone) is similar in all material respects that would affect emissions as defined in §60.531 to the wood heater submitted for certification testing, and labeled as prescribed in §60.536 and 60.5478.
- (ii) Foyer Supremes Incorporated has provided an owner's manual that meets the requirements in § 60.536 and 60.5478. In addition, a copy of the owner's manual will be submitted to the Administrator and be available to the public on the Foyers Supreme Incorporated's web site.

**9. Third Party Certification Statement**

Foyers Supreme Incorporated has contracted an approved laboratory (Services Polytests Inc.) and an approved third-party certifier (PFS-TECO) whom satisfy the requirements of paragraph (f) of the CFR.

**10. Approved laboratory/third party Statement**

The test laboratory (Services Polytests Inc.) and approved third-party certifier (PFS-TECO) are authorized to submit information on behalf of the Foyers Supreme Incorporated, including any claimed to be CBI.

**11. Manufacturer's Website Certification Test Reports Availability Statement**

Foyers Supreme Incorporated agree to place a copy of the certification test report and summary on its web site available to the public within 30 days after the Administrator issues a certificate of compliance.



**12. Transferability Acknowledgement Statement**

Foyers Supreme Incorporated acknowledge that the certificate of compliance cannot be transferred to another manufacturer or model line without written approval by the Administrator.

**13. Statement about Selling Wood Heaters without an EPA Certificate**

Foyers Supreme Incorporated acknowledge that it is unlawful to sell, distribute or offer to sell or distribute an affected wood heater without a valid certificate of compliance.

**Print Name and Title:**

**Alexander Marcakis, Engineering Department**

**Date:**

**17<sup>th</sup> of May, 2018**

Signature of responsible representative of the manufacturer certifying the accuracy of the above statements:

The authorized person whose signature is above certifies that the appliance (Astra 38, Elegance 42, Novo 38 – Cast Iron, Novo 38 - Soapstone) as tested is in compliance with all certification requirements of the 2015 NSPS. Foyers Supreme Incorporated (manufacturer) also acknowledge that we remain responsible for compliance regardless of any error by the test laboratory (Services Polytests Inc.) or third-party certifier (PFS-TECO).



Attachments

**WOOD BURNING HEATERS**

**I. Test Method 28R for Certification and Auditing of Wood Heaters**

**A. SUMMARY RESULTS – ADJUSTABLE WOOD BURNING HEATERS**

<i>Category 2 .80 to 1.25 kg/hr.</i>		<i>Category 2 .80 to 1.25 kg/hr.</i>		<i>Category 3 1.25 to 1.90 kg/hr.</i>		<i>Category 4 Maximum</i>	
Date	2018-03-14	Date	2018-03-15	Date	2018-03-20	Date	2018-03-21
Run Number	1	Run Number	2	Run Number	4	Run Number	5
Emission Rate g/Hr.	2.062	Emission Rate g/Hr.	1.812	Emission Rate g/Hr.	1.05	Emission Rate g/Hr.	2.84
Burn Rate KG/Hr.	0.92	Burn Rate KG/hr.	1.18	Burn Rate KG/hr.	1.54	Burn Rate KG/hr.	2.1
BTU/Hr. (HHV)	11 704	BTU/Hr. (HHV)	15 225	BTU/Hr. (HHV)	19 548	BTU/Hr. (HHV)	26 354
Overall Efficiency (%)	67.9	Overall Efficiency (%)	68.6	Overall Efficiency (%)	67.5	Overall Efficiency (%)	66.7
CO Emissions (g/MJ Output)	7.46	CO Emissions (g/MJ Output)	6.55	CO Emissions (g/MJ Output)	7.09	CO Emissions (g/MJ Output)	5.72
CO Emissions (g/kg Dry Fuel)	100.35	CO Emissions (g/kg Dry Fuel)	89.02	CO Emissions (g/kg Dry Fuel)	94.79	CO Emissions (g/kg Dry Fuel)	75.55
CO Emissions (g/min)	1.53	CO Emissions (g/min)	1.75	CO Emissions (g/min)	2.44	CO Emissions (g/min)	2.65
ASTM E2515 Emissions – First Hour (g/hr)	20.20	ASTM E2515 Emissions – First Hour (g/hr)	14.69	ASTM E2515 Emissions – First Hour (g/hr)	5.67	ASTM E2515 Emissions – First Hour (g/hr)	11.82
<b>Weighted particulate emission average of 4 test runs: 1.85 grams per hour.</b>							
<b>Weighted average HHV efficiency of 4 test runs: 67.83 %.</b>							
<b>Average Co 2.09 gr/min</b>							



# Certificate of Conformity

Issued to: Foyers Supreme: (AKA) Supreme Fireplace  
Alexander Marcakis  
3594 Jarry East  
Montreal, QC H1Z 2G4  
Canada  
(877) 593-4722

Model: 38 SFC  
Name(s): Astra 38, Elegance 42, Novo 38 – Soapstone, Novo 38 – Cast Iron  
Effective Date: May 18, 2018  
Revised Date(s)\*: May 10, 2023  
Report # 18-411

\*-See page 2 for revision history

Certification tests were performed by Services Polytests, Inc. located at: 695-B Gaudette- St-jean-sur-Richelieu, QC, J3B 7S7 Canada.

PFS TECO certifies conformity to the following per 40 CFR Part 60 §60.533 (f) (A):

- The test report is complete and accurate.
- The instrumentation used for the test was properly calibrated.
- The representative model tested meets the applicable emission limits.
- The tests have been conducted per the appropriate guidelines.
- The manufacturer's Quality Control Plan has been reviewed to ensure that all production units are similar in all material respects that would affect emissions to the tested/certified model and that the units in the model line will meet all (other) applicable requirements.

PFS TECO certifies that the emissions levels as measured in the test report are in compliance with the 2020 PM emission limit of  $\leq 2.0$  g/hr using crib wood per EPA Method 28R. Efficiency calculated per CSA B415.1-22.

The weighted average emissions for the Model 38 SFC wood heater is **1.8 g/hr** with an average efficiency of **68%**. Average CO emissions are **2.1 g/min.**

Issued by: PFS TECO  
1507 Matt Pass  
Cottage Grove, WI 53527

Scott Drake, President and CEO





## Revision History

Date: May 18, 2018 – Original Issue for Polytest report dated April 3, 2018

Date: May 10, 2023 – Reviewed revised Polytest report dated April 6, 2023 for the following changes:

- Appendix 3 additional list of equipment with certification date due.
- Appendix 1 Raw data additional sheet with negative weight filter rounded to zero calculation demonstration and all efficiency data calculations.
- Appendix 9 updated for more detailed fuel load
- The section 3.4 p.12 updated for runs Anomalies, Validity, and appropriateness detail.
- The section 3.4 p.12 updated to address the negative back filter weight.
- Appendix 1 molecular weight updated to 29 for all runs
- Appendix 1 wood density calculation corrected for each run
- Table 2.6 updated to include deviation in g/kg
- Table 2.7 additional detail: run 3 failing of the temperature differential criteria (+-126F), Table 2.7 ASTM 2780 Section 9.5.10 Wood heater thermal equilibrium
- Appendix 8 updated with more details on dilution tunnel
- Table 2.1 reformatted to include CSAB415.1 g/Mj, Heat output & Efficiency for each run
- Section 3.6 updated for dilution tunnel details
- Section 3.4 run1, run2 included rule citation for low burn rate 40 CFR 60.537 (a)(2)

## APPENDIX 16: Discussion for alternative Firebox Lining

## **Danick Power**

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**Objet:** TR: FW: Supreme Fireplaces Inc.: Option in K-List Material

----- Forwarded message -----

From: **Sanchez, Rafael** <[Sanchez.Rafael@epa.gov](mailto:Sanchez.Rafael@epa.gov)>

Date: Wed, Mar 21, 2018 at 12:16 PM

Subject: RE: FW: Supreme Fireplaces Inc.: Option in K-List Material

To: "Toney, Mike" <[Toney.Mike@epa.gov](mailto:Toney.Mike@epa.gov)>, Alexander Marcakis <[alexander@supremem.com](mailto:alexander@supremem.com)>

Cc: "Johnson, Steffan" <[johnson.steffan@epa.gov](mailto:johnson.steffan@epa.gov)>, Danick Power <[dpower@polytests.com](mailto:dpower@polytests.com)>, John Steinert <[john.steinert@pfsteco.com](mailto:john.steinert@pfsteco.com)>

Hi Alexander,

Thank you for contacting the U.S. Environmental Protection Agency (EPA). Based on the information you have provided and Mr. Toney's professional opinion, I am of the opinion that a certification test should be conducted using the worst case condition which is a firebox lined with grey cast iron. A confirmation test should be conducted using firebox lined with soapstone. Regarding future certification tests, I recommend that you include certification test data pertaining to this certification test in all future test reports as supporting evidence. Also, please make sure that you include all EPA/Supreme correspondence in your test report. If you have further questions, please let me know.

**Rafael Sanchez, Ph.D.**

**Wood Heater Program Lead**

**Air Branch**

**Monitoring, Assistance, and Media Programs Division**

**Office of Compliance**

**U.S. Environmental Protection Agency (EPA)**

**Room 7149-D**

**[1200 Pennsylvania Ave., NW](#)**

**MS:2227A**

**Washington, DC 20460**

202-564-7028

202-564-0050 fax

Please make a note of the new inbox for wood heater certification requests:  
[WoodHeaterReports@epa.gov](mailto:WoodHeaterReports@epa.gov)

If you have a wood heater question, please visit the USEPA Wood Heater Compliance Monitoring Program website at <http://www2.epa.gov/compliance/wood-heater-compliance-monitoring-program>. On that web page, you will find information about the EPA wood heater compliance program including the List of EPA Certified Wood Heaters.

This message may contain sensitive and/or privileged information. If you believe you have received this e-mail in error, please notify me and delete the e-mail immediately.

---

**From:** Toney, Mike  
**Sent:** Wednesday, March 21, 2018 11:31 AM  
**To:** Alexander Marcakis <[alexander@supremem.com](mailto:alexander@supremem.com)>  
**Cc:** Sanchez, Rafael <[Sanchez.Rafael@epa.gov](mailto:Sanchez.Rafael@epa.gov)>; Johnson, Steffan <[johnson.steffan@epa.gov](mailto:johnson.steffan@epa.gov)>; Danick Power <[dpower@polytests.com](mailto:dpower@polytests.com)>; John Steinert <[john.steinert@pfsteco.com](mailto:john.steinert@pfsteco.com)>  
**Subject:** RE: FW: Supreme Fireplaces Inc.: Option in K-List Material

Hi Mr. Marcakis,

Thank you for your inquiry. I do not believe another soap stone test is required based on the data from your previous tests. Rafael will have to give the final approval.

**From:** Alexander Marcakis [<mailto:alexander@supremem.com>]  
**Sent:** Wednesday, March 21, 2018 8:37 AM  
**To:** Toney, Mike <[Toney.Mike@epa.gov](mailto:Toney.Mike@epa.gov)>  
**Cc:** Sanchez, Rafael <[Sanchez.Rafael@epa.gov](mailto:Sanchez.Rafael@epa.gov)>; Johnson, Steffan <[johnson.steffan@epa.gov](mailto:johnson.steffan@epa.gov)>; Danick Power <[dpower@polytests.com](mailto:dpower@polytests.com)>; John Steinert <[john.steinert@pfsteco.com](mailto:john.steinert@pfsteco.com)>  
**Subject:** Re: FW: Supreme Fireplaces Inc.: Option in K-List Material

Dear Mr. Toney,

Thanks for forwarding the recommendation to Dr. Sanchez.

Just a small clarification... does future testing on similar projects (optional firebox lining) require a confirmation test with the soapstone? We are currently undergoing official testing on new wood heater and we were wondering whether a confirmation test with the soapstone lining is necessary given the previous data.

Sincerely,

Alexander Marcakis  
Engineering Department  
Supreme Fireplaces Inc.  
Tel: (514) 593-4722  
Fax: (514) 593-4424  
[www.supremem.com](http://www.supremem.com)

On Tue, Mar 20, 2018 at 10:31 AM, Toney, Mike <[Toney.Mike@epa.gov](mailto:Toney.Mike@epa.gov)> wrote:

Hi Rafael,

I am forwarding to you and email that you already have from Mr. Marcakis of Supreme Fireplace. Mr. Marcakis and I have talked before and I recommended him to contact you and explain what he had done with regard to the K-list material request. Mr. Marcakis has tested his heater with soapstone and gray cast iron on the model Elegance 36, Astra 24, and the newer model Astra 32. The material properties as outlined in the January 22, 2018 letter clearly show that the Grey Cast Iron is the worst case scenario compared to the properties of soap stone but the emissions data show they are right there together in a testing scenario, on the second page of the January 22, 2018 letter. I would recommend to allow Mr. Marcakis to use the grey cast in place of the soap stone. Thanks Rafael.

---

**From:** Alexander Marcakis [mailto:[alexander@supremem.com](mailto:alexander@supremem.com)]  
**Sent:** Tuesday, January 23, 2018 9:30 AM  
**To:** WoodHeaterReports <[WoodHeaterReports@epa.gov](mailto:WoodHeaterReports@epa.gov)>  
**Cc:** Emmanuel Marcakis <[emmanuel@supremem.com](mailto:emmanuel@supremem.com)>; [jsteinert@dirigolab.com](mailto:jsteinert@dirigolab.com); 'Danick Power' <[dpower@polytests.com](mailto:dpower@polytests.com)>; Toney, Mike <[Toney.Mike@epa.gov](mailto:Toney.Mike@epa.gov)>  
**Subject:** Supreme Fireplaces Inc.: Option in K-List Material

Dear Dr. Sanchez,

Attached is a letter requesting permission for an optional firebox lining of either grey cast iron or soapstone. The request has been discussed with your colleague, Michael Toney, where it was agreed that if the unit was tested under worst case conditions (grey cast iron lining) that this option is justifiable. In addition, I have also attached a letter from our third party certifier, John Steinert from PFS-TECO, recommending approval of our request.

Please kindly review the attached documents and let me know if you have any questions or concerns.

Sincerely,



**Alexander Marcakis**  
Engineering Department

[3594 Jarry East](#)  
Montreal, QC H1Z 2G4  
T: [877-593-4722 ext. 226](tel:877-593-4722)

F: [514-593-4424](tel:514-593-4424)  
[www.supremem.com](http://www.supremem.com)





January 22, 2018

Dr. Rafael Sanchez  
Office of Compliance  
U.S. Environmental Protection Agency (EPA)  
Room 7149-D  
1200 Pennsylvania Ave., NW  
MS:2227A  
Washington, DC 20004

Dear Dr. Sanchez,

Supreme Fireplace of Montreal, Qc, CANADA has requested a k-list material option for the Astra 32 and Elegance 40 wood heaters. The requested change as outlined in the letter to you dated January 22, 2018 would allow the use of a soapstone lined firebox along with a cast iron version. Upon review of the supplied test data, we are satisfied that the EPA test series performed with the cast iron lined firebox represents the worst case scenario as compared to the soapstone version. Because of this, we recommend that this request be granted. No further testing is required.

Kind Regards,

A handwritten signature in blue ink, appearing to read "John Steinert".

John Steinert,  
General Manager  
PFS-TECO, Portland Laboratory  
[John.Steinert@pfsteco.com](mailto:John.Steinert@pfsteco.com)  
503-650-0088



3594 Jarry east, Montreal, Qc, Canada H1Z 2G4

Phone: 1.877.593.4722 Fax: 514.593.4424

[info@supremem.com](mailto:info@supremem.com)

[www.supremem.com](http://www.supremem.com)

January 22<sup>nd</sup>, 2018

**From:** Alexander Marcakis  
Engineering Department  
Supreme Fireplaces Inc.  
3594 Jarry East  
Montreal, QC H1Z 2G4

**To:** Rafael Sanchez, Ph.D.  
Wood Heater Program Lead Air Branch  
Monitoring, Assistance, and Media Programs Division  
Office of Compliance  
U.S. Environmental Protection Agency (EPA)  
1200 Pennsylvania Ave., NW  
Washington, DC 20460

Dear Dr. Rafael Sanchez,

The purpose of this letter is to request permission to allow an option in a k-list material of a wood heater (the lining of the firebox) under one certification number – the unit would be certified under worst case conditions.

Over the past two years, Supreme Fireplaces Inc. has been testing wood heaters with a firebox lined with either soapstone or grey cast iron. The thermal properties of soapstone with respect to grey cast iron are favorable for emission testing, with a specific heat capacity (C) that is nearly double and a thermal conductivity (k) that is seven times less:

$$\begin{aligned}C_{\text{soapstone}} &= 0.98 \text{ kJ / kg - K} \\k_{\text{soapstone}} &= 6.4 \text{ W / m - K} \\C_{\text{grey cast iron @ 25}^\circ\text{C}} &= 0.49 \text{ kJ / kg -K} \\k_{\text{grey cast iron}} &= 46 \text{ W / m -K}\end{aligned}$$

In brief, the properties above show that a soapstone panel within a firebox will hold more energy per kilogram and have a hotter surface exposed to the burning wood than grey cast iron. Therefore, worst case scenario testing conditions would theoretically be a firebox lined with grey cast iron, as opposed to soapstone.

In addition, Supreme Fireplaces Inc. has certified two identical variable burn rate wood heaters with different firebox lining (soapstone and grey cast iron) using the Method 28R test method. The following are the specifications of those products:

<b>Name</b>	<b>Firebox Lining</b>	<b>Emission Rate [g/hr]</b>	<b>Heat Output [btu/hr]</b>	<b>Efficiency (CSA B415.1) [%]</b>	<b>CO [g/min]</b>	<b>EPA Certification Number</b>
Elegance 36	Soapstone	1.77	10,125 – 25,944	67	1.7	88-17
Astra 24	Grey Cast Iron	1.91	12,237 – 23,872	68	1.7	102-17

The above data illustrates a lower emission rate with the firebox lined with soapstone, supporting the theoretical claim for worst case conditions with grey cast iron.

Last December, official testing at Polytests Services were performed on a new variable burn rate wood heater with a grey cast iron lined firebox (Astra 32) using the Method 28R test method. An additional official confirmation test was performed on the unit with the cast iron substituted with soapstone; the following are the results:

<b>Name</b>	<b>Firebox Lining</b>	<b>Test Category</b>	<b>Emission Rate [g/hr]</b>
Astra 32	Grey Cast Iron	2 (1.03 kg/hr)	0.8
Astra 32	Grey Cast Iron	2 (1.00 kg/hr)	1.0
Elegance 40	Soapstone	2 (1.14 kg/hr)	1.1

The above data shows comparable results with emission rates well below the 2020 NSPS standards. Further information on these test runs will be submitted with the final report in the upcoming weeks.

The request for an optional firebox lining was discussed with Michael Toney, where he agreed with our claim and approach that testing with grey cast iron would be the worst case condition due to the favorable thermal properties of soapstone.

Let me know if you have any further questions regarding our request.

Sincerely,

Alexander Marcakis  
Engineering Department