



TEST REPORT

TEST OF A NON-CATALYTIC WOOD BURNING STOVE FOR EMISSIONS AND EFFICIENCY

PER EPA METHODS ALT-125, ASTM E2515, ASTM E3053 and CSA B415.1,

Client:

Foyers Suprême

3594 Rue Jarry E,
Montréal,
QC H1Z 2G4

Model Name: 38 ST_D

Attention: Rafael Sanchez

TESTED BY:

Services Polytests inc.
695-B Gaudette
St-jean-sur-Richelieu, QC, J3B 7S7

TEST DATES: April 20th and 21st 2020

REPORT DATE: May 1st 2020

Project number: PI-20228

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Tested:

A handwritten signature in black ink, appearing to read "Maxime Martin".

Maxime Martin

written by:

A handwritten signature in black ink, appearing to read "Danick Power".

Danick Power, P. Eng

Verified by third party certifier:

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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 cord wood
- Test dates: April 20th and 21st 2020
- Test methods used:
 - Particulate emissions: ASTM E3053-17 ; ASTM E2515-11 methods ALT-125 as referred into 40 CFR Part 60 Subpart AAA
 - Efficiency: CSA B415.1-10

1.2 TEST UNIT INFORMATION

General

- Manufacturer: Foyer Supreme
- Product type: wood heater,
- Combustion system: non-catalytic
- Unit tested: 38 ST_D

Particularities

The engine will have the model numbers of **38SFC_D** (double sided factory-built fireplace) & **38ST_D** (double sided freestanding stove), 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 ST, Novo Duo 38 - Soapstone**) or cast iron (model name: **Astra Duo 38, Monarch See-Through 38, Novo Duo 38 – Cast Iron**).

In Summary:

- **Elegance ST 42**: Double sided factory-built fireplace with an optional rectangular/arched door/façade and a soapstone firebox lining.
- **Astra Duo 38**: Double sided factory-built fireplace with a rectangular door/façade and a cast iron firebox lining.
- **Monarch See-Through 38**: Double sided factory-built fireplace with an arched door/façade and a cast iron firebox lining.
- **Novo Duo 38 – Cast Iron**: Double sided freestanding stove with a cast iron firebox lining.
- **Novo Duo 38 – Soapstone**: Double sided freestanding stove with a soapstone firebox lining.

1.3 RESULTS

Emission results obtained

- Weighted Average Emissions Rate: 2.16 g/hr
- Weighted Average Overall Efficiency HHV: 65 %

Conformity: NSPS Phase 2020, cord wood test method ALT-125

1.4 PRETEST INFORMATION

Unit condition: The unit was received by carrier during March 2020 in good condition. The 50hrs of aging was done by Polytests as screening tests.

Set up

- Venting system type: 6 inches diameter inch steel pipe and insulated chimney
- System height from floor: 15 feet
- Particularities: this unit as been tested with the optional fan for high, medium and low burn rate.

2 SUMMARY OF TEST RESULTS

2.1 MODEL IDENTIFICATION

Model name number	38 ST_D
Manufacturer	Foyers Suprême
address	3594 Rue Jarry E, Montréal, QC H1Z 2G4
appliance category	Double side wood heater
Usable Firebox Volume – ft ³	3.34
Catalytic/Non-Cat	Non-Cat
convection air fan (no, standard, Optional)	Optional

2.2 LABORATORY INFORMATION

Testing laboratory	Polytests Services
address	695-B Gaudette, St-jean-sur-richelieu
ISO/ Accreditation info	17025
Dates tested	April 20 th and 21 st 2020
Test Methods / Standard	ALT-125
Dilution Tunnel Inside diameter – in	8
Filter diameter	47
Filter material	PTFE Pall

2.3 TEST CONDITION SUMMARY

Model Name(s) / number(s)	38 ST_D		
Usable firebox Volume-ft3	3.34		
Convection Air Fan (No, Standard, Optional)	Optional		
Test runs #	1.1	1.2	2.1
Date tested	April 20 th 2020	April 20 th 2020	April 21 st 2020
test run category (L, M, H)	H	L	M
average barometric pressure – in Hg	29,66	29,66	29,29
Max observe Ambient temp. °F	70,36	73,86	73,18
Min observe Ambient Temp °F	67,69	68,64	67,02
Max observe Filter temp °F	89,32	90,35	88,10
Run air settings			
Primary (measured up from minimum)	Full open	Minimum setting	medium Setting
Secondary (measured up from minimum)	Fix	Fix	Fix
Convection air setting	ON	ON	ON
Test fuel load			
Cordwood fuel species	Oak	Oak	Oak
specific Gravity (from Table 1)	0,66	0,66	0,66
Higher heating value - Btu/lb (from Annex A1)	8690	8690	8690
Nom. Test fuel piece length - in	12; 20; 24	12; 20	12 20
Number of test fuel pieces	5	7	7
Test fuel Weight			
Kindling - as fired lb.	0,70	NA	NA
Kindling Wt. - as % of test fuel load	2,0%	NA	NA
Kindling Moisture % Db	9,0	NA	NA
Kindling Kg DB	0,29	NA	NA
SU Fuel Wt- as fired lb	9,00	NA	NA
SU Fuel wt. - as % of test fuel load	25,8%	NA	NA
SU Fuel moisture - % DB	20,0	NA	NA
SU fuel- Kg DB	3,40	NA	NA
Test Fuel Load - As Fired lb	34,84	41,89	40,53
Ave. Test Fuel Load MC % DB	20,50	17,37	22,96
Test Fuel Load - kg DB	13,11	15,70	14,95
Test fuel Loading density lb./ft3	10,43	12,54	12,13
Residual SU fuel wt. - as fired lb.	3,5	NA	NA
Residual SU fuel wt.- as % of test fuel load	10,0%	NA	NA
Test run duration - minutes	154	696	598
Test run duration - h	2,57	11,60	9,97
Test fuel load wt at the end of the test - as fired lb	3,2	0	0
total fuel burned kg Db	13,77	15,70	14,95
% test fuel load wt at end of the test	9,2%	0,0%	0,0%

2.4 TEST RUN RESULTS SUMMARY

Model name / number	38 ST_D		
Usable Firebox volume	3.34		
Convection air Fan (no, Standard, option)	Optional		
Test runs nu.	1.1	1.1	2.1
Date tested	April 20 th 2020	April 20 th 2020	April 21 st 2020
Test run category	H	L	M
Burn rate - Kg/hr DB	5,34	1,35	1,50
Burn rate as % of low to high Midpoint	NA	NA	44,8%
Burn duration - h	2,57	11,60	10
Heat output btu/hr	61 231	17 524	19 628
Average Dilution Tunnel Flow Rate - dscfm	310,4	338,3	365,9
Average Sample Flow Rates - dscfm			
Train 1	0,1694	0,1702	0,1641
train 2	0,1696	0,1705	0,1649
Total PM Emissions - g			
Train 1 g	13,16	18,88	14,59
train 2 g	11,68	18,45	12,97
Average	12,42	18,67	13,78
PM emission train precision %	5,94%	1,14%	5,88%
PM emission g/kg	0,90	1,19	0,92
PM emission rate g/h	4,84	1,61	1,38
Total Co Emission g	722,4	1640,9	1581,3
Co emission Rate g/h	328,3	141,5	158,7
1 st hour emission rate g/h	12,1	12,5	11,6
Overall Efficiency - CSA B415,1			
% HHV Basis	62,23%	66,09%	65,25%
% LHV Basis	66,96%	71,12%	70,21%

2.5 WEIGHTED AVERAGE SUMMARY

Model name / number	38 ST_D		
Usable Firebox volume	3.34		
Convection air Fan (no, Standard, option)	Optional		
average for each test run category	L	M	H
burn rate kg/h DB	1,35	1,50	5,34
PM Emission rate - g/h	1,61	1,38	4,84
Co emission rate - g/h	141,45	158,66	328,35
Overall Efficiency - CSA B 415,1			
% HHV Basis	66,1%	65,3%	62,2%
% LHV Basis	71,1%	70,2%	67,0%
Heat output - Btu/hr	17524	19628	61231
Category weighting	0,4	0,4	0,2

2.6 WEIGHTED AVERAGE FINAL RESULTS

ASTM E 3053 Weighted averages			
PM Emission Rate - g/h	2,16		
CO Emission Rate g/h	185,7		
Overall Efficiency - CSA B415,1			
% HHV Basis	64,98%		
% LHV Basis	69,92%		
Heat output range - Btu/h	17 524	to	61231
Co Arithmetic average g/min	3,49		

2.7 TEST FACILITY CONDITIONS

Run Number	Room Temperature		Barometric pressure		Relative humidity		Air Velocity	
	Before	After	Before	After	Before	After	Before	After
	(F)	(F)	(in.Hg)	(in.Hg)	(%)	(%)	(ft/min)	(ft/min)
1.1	72	73	29,71	29,62	20,8	20,2	0	0
1.2	72	73	29,71	29,62	20,8	20,2	0	0
2.1	71	68	29,23	29,35	21,9	19,6	0	0

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

Average dilution tunnel measurements				Sample Data			
Run Number/ test category	Burn Rate (Min)	Volumetric Flow Rate (dscf/min)	Total Temperatures (°R)	Volume sampled (DSCF)		Particulate catch (mg)	
				1	2	1	2
1.1	154	310,44	597,65	26,088	26,111	7,30	6,50
1.2	696	338,32	548,94	118,483	118,673	9,50	9,30
2.1	598	365,87	547,52	98,130	98,583	6,60	5,90

2.9 DILUTION TUNNEL DUAL TRAIN PRECISION

Run Number / test category	Sample Ratio		Total Emission (g)		
	Train 1	Train 2	Train 1	Train 2	% Deviation
1.1	1832,55	1830,94	13,16	11,68	5,94%
1.2	1987,40	1984,21	18,88	18,45	1,14%
2.1	2229,58	2219,35	14,59	12,97	5,88%

3 PROCESS DESCRIPTION

3.1 DISCUSSION

The wood heater has been received in a good shape by a carrier in March 2020. A few screening tests have been done to ensure the repeatability of the results. Maximum burn rate has been done on April 20th 2020 followed by a low burn rate. On April 21st 2020 the medium burn rate has been done.

3.2 UNIT DIMENSIONS

Baffle

- Location: between top of combustion chamber and hearth
- Dimensions: covers the hearth area minus the restriction 9.875-inch X 3 inch at the middle
- Material: Stainless steel baffle

Bricks

- Cast Iron brick 1 ¼ inch. Thick cover all back and sides and bottom

Flue gas exhaust

- Location: Top
- Dimensions: 6 in. diameter
- Material: Steel

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 44 of 38SFC_D_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 13.5 in. deep x 17.875 in. high
- Usable volume: 3.34 cuft.
- Overall heater dimension: 29.75-inch-wide 20-inch-deep 44.75 inch high

Convection fan

- Optional convection centrifugal fan (Ebm-Papst, part num. RG 125-19/06) supplied with unit see appendix 6 for all detail

Catalyst

- None

Description

The wood heater is equipped two doors allowing for loading at the front and back of the unit. In addition, the combustion air intakes (primary and secondary) are regulated with bi-metallic variable burn rate controllers. 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 can be installed into the unit.

Bi-metallic combustion air control

Primary 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/back center of the unit. The combustion air control of the 38SFC_D & 38ST_D 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 33 of 38SFC_D_TECH_DRAW.pdf for details on the Primary Air Control assembly.

Secondary Air Control

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 air control of the 38SFC_D & 38ST_D is factory set and has no intervention of the user. Please refer to page 34 of 38SFC_D_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
Identification	Type	Imin	Imax	Controlled	(sq. in.)
A *	Primary	0.05	6.55	Yes	4.99
B *	Secondary	0	1.75	Yes	1.83
C *	Pilot	N/A	N/A	No	-

* 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

Run #1.1

This run was performed on April 20th 2020. It lasted 154 minutes and a Maximum burn rate was obtained at 5.34 kg/hr & emission at 4.8 gr/hr. The convection fan was at automatic setting during the entire test. The air inlet damper was at the Maximum setting.

Run #1.2

This run was performed on April 20th 2020. It lasted 696 minutes and a minimum burn rate was obtained at 1.35 kg/hr & emission at 1.61 gr/hr. The convection fan was at automatic setting during the entire test. The air inlet damper was at the minimum setting.

Run #2.1

This run was performed on April 21st 2020. It lasted 598 minutes and a Medium burn rate was obtained at 1.50 kg/hr & emission at 1.38 gr/hr. The convection fan was at automatic setting during the entire test. The air inlet damper was at the Medium setting.

- 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: Red Oak, 18 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 at a point 15 feet from the tunnel entrance. The tunnel has two elbows in the system ahead of the sampling section. The sampling section is a continuous 20-foot section of 8-inch diameter pipe straight over its entire length. Tunnel velocity pressure is determined by a standard pitot tube located 48 inches from the beginning of the sampling section. Thermocouple is installed on the pitot tube to measure the dry bulb temperature. MC is assumed, as allowed, to be 4%. Tunnel samplers are located 56 inches downstream of the pitot tube and 24 inches upstream from the end of this section.

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 EMFAB TX40H 120-WW Pall 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

Date: 2020-04-20 Manufacturer: Byer Supreme Model: 38 STD
 Project #: PI 20228 Run: 1 Tech: MM Reviewer: SP

- kindling 9 LBS STAND FAN
- 20 Sec torch
- close Door
FAN ON
- At 5.5 LBS stop FAN
- At 3.5 LBS instant load
- After 45 sec close Door
- At 788 OF Plus open FAN
- At 6.8 LBS stop pump
- At 4.5 LBS stop FAN
At 4.3 LBS instant load
At 4 min close Door
At set air hit 2/3 close
At 11 min close air hit
At 13 min open FAN
TEST LOAD CONFIGURATION

PRE / POST CHECKS

Date: 2020-04-26 Manufacturer: foyer supreme Model: 38 STD
 Project #: PI 20228 Run: 1 Tech: mm Reviewer: SP

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
Em. 1a1	7:00	ok	ok

Pre-Test

Post-Test

Facility Conditions:

Air Velocity from less than 2 feet
 Smoke Capture Check (Tunnel velocity).....
 Picture.....

<input type="radio"/> (max50 Fpm)	<input type="radio"/> (max50 Fpm)
ok	NA
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.....

2020-04-26
2020-04-26
ok
ok

Temperature System:

Ambient (65°-90°F).....

ok °F

Proportional Checks:

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

ok
ok
ok

Sampling Train ID Numbers:

	Med. low fire test			High fire test		
	1 st hour	Train 1	Train 2	1 st hour	Train 1	Train 2
Probe.....	02	10	30	35	41	50
Filter Front.....	08	10	12	45	47	49
Filter Back.....	02	11	13	46	48	50
Filter Thermocouple.....	11	11	12	11	11	12
Filter (80°F ≥ <90°F).....	OK	OK	OK	OK	OK	OK

SAMPLING EQUIPMENT CHECK OUT

 Date: 2020-04-20

 Manufacturer: Flyer Supreme

 Model: 38 STD

 Project #: PT 20228

 Run: 1

 Tech: MM

 Reviewer: [Signature]

Leakage Checks Tunnel Samplers

High fire test	System 1 st 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)	213131.32	213918.16	213131.94	213918.26	147870.98	148664.80
Initial 1minute DGM (Liter)	213131.28	213918.10	213131.40	213918.19	147870.80	148664.65
Change © (Liter)	004	006	004	007	018	015
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	OK	OK	OK	OK	OK	OK

Low medium fire test	System 1 st 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)	213918.34	217460.65	213918.58	217460.85	148666.65	152247.95
Initial 1minute DGM (Liter)	213918.32	217460.60	213918.48	217460.80	148666.55	152247.90
Change © (Liter)	002	005	010	005	010	004
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	OK	OK	OK	OK	OK	OK

SAMPLING EQUIPMENT CHECK OUT

Date: 2020-04-20 Manufacturer: Foyce Supreme Model: 38 STD
 Project #: PI 20228 Run: 1 Tech: MM Reviewer: [Signature]

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre-Test	Post Test
Vacuum (inches Hg.)	- 5	- 5
Rotameter 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 ₂ O static	Pre Test 0.4-0.5 H ₂ O velocity	Post Test 3 H ₂ O Static	Post Test 0.4-0.5 H ₂ 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: 2020-04-20 Manufacturer: Boyer Supreme Model: 38 STD
 Project #: PI 2228 Run: 1 Tech: MM Reviewer: [Signature]

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	200g, 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: 2020-04-20 Manufacturer: Foyen Supreme Model: 38 STD
 Project #: PJ 2028 Run: 1 Tech: MM Reviewer: [Signature]
FOR TUNNELS < 12 in

 Barometric pressure (P_{bar}) 100.6 (KPa.) Static pressure (P_q) 0.17 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0072	71.90
B - Centroid	3.00	3.50	4	0073	71.79
A-1	0.40	0.50	0.50	0058	71.90
A-2	1.50	1.75	2	0074	71.95
A-3	4.50	5.25	6	0075	71.95
A-4	5.60	6.5	7.5	0059	71.82
B-1	0.40	0.50	0.50	0060	71.82
B-2	1.50	1.75	2	0069	71.70
B-3	4.50	5.25	6	0078	71.55
B-4	5.60	6.5	7.5	0059	71.55
				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.

 Δ_p = manometer reading (inches H₂O)

 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. H₂O
 { 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 (Δ_p) measured at each traverse point.

CONTINUOUS ANALYZERS

Date: 2020-04-20 Manufacturer: Foyen Supreme Model: 38 STD
 Project #: PJ 20228 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	2990	3000	0990	1000
Tolerance CO	0	+/- 0.02	000	+/- 0.15	000	+/- 0.05
CO ₂	0	0	1793	1800	972	1000
Tolerance CO ₂	0	+/- 0.02	007	+/- 0.5	028	+/- 0.5
O ₂ 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	2994	0995	0	0.02	004	0.15	005	0.05	✓	
CO ₂	0	1786	975	0	0.02	007	0.5	003	0.5	✓	

TEST DATA LOG

Date: 2020-04-26 Manufacturer: Fogon Supreme Model: 38 STD
 Project #: PT 20228 Run: 1 Tech: MM Reviewer: DP

RAW DRY GAS METER READINGS

		System 1	System 2	Blank
High fire test	Final (Liter)	213 917, 08	148 663 57	813 51
	Initial (Liter)	213 133, 81	147 879, 00	7 91, 43
Low medium fire test	Final (Liter)	217 459, 59	152 246, 62	913 25
	Initial (Liter)	213 919, 66	148 668, 30	813 51

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	100.6	100.3
Dry Bulb (F):	71.9	72.9
Humidity (%):	20.8	20.2

FUEL DATA

Date: 2020-04-20 Manufacturer: Foyea Supreme Model: 38 STD
 Project #: PI 2028 Run: 1 Tech: MM Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

KINDLING AND START-UP LOAD

Piece Size	Weight	Meter Moisture Content (% dry)			
X X 9 in.	08 lbs.	9		9	9
X X 9 in.	90 lbs.	20		20	20
X X in.	lbs.				
X X in.	lbs.				
X X in.	lbs.				
X X in.	lbs.				
X X in.	lbs.				
X X in.	lbs.				
X X in.	lbs.				

HIGHFIRE TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)			
450 X 450 X 20 in.	708 lbs.	23 ^u		186	190
500 X 500 X 12 in.	5990 lbs.	22 ⁱ		184	20 ⁱ
450 X 500 X 12 in.	5932 lbs.	23 ^u		190	190
X X in.	lbs.				
450 X 700 X 20 in.	7520 lbs.	23 ⁱ		20 ⁱ	193
500 X 350 X 24 in.	8316 lbs.	24 ⁱ		186	189
X X in.	lbs.				
X X in.	lbs.				
X X in.	lbs.				

FUEL DATA

Date: 2020-04-20 Manufacturer: Foyea Supreme Model: 38 STD
 Project #: PI 20228 Run: 1 Tech: MR Reviewer: [Signature]

FUEL DESCRIPTION:

Type of wood:

LOW OR MEDIUM TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)
4.25 x 4.25 x 20 in.	7482 lbs.	20' 196 182
5.00 x 5.00 x 12 in.	632 lbs.	229 190 183
5.00 x 5.00 x 12 in.	6526 lbs.	273 241 199
x x in.	lbs.	
4.50 x 4.75 x 20 in.	823 lbs.	274 231 203
4.50 x 5.00 x 12 in.	5088 lbs.	191 186 190
4.00 x 4.00 x 12 in.	4348 lbs.	191 189 204
4.00 x 4.00 x 12 in.	4126 lbs.	235 186 189
x x in.	lbs.	
x x in.	lbs.	
x x in.	lbs.	
x x in.	lbs.	
x x in.	lbs.	
x x in.	lbs.	



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-04-19 Project #: PT 20228 Run: _____
 Manufacturer: Fogyn Supreme Model: 38 STD
 Tech: M.M. Reviewer: DP

HIGHFIRE TEST FILTERS											
SYSTEM 1 - 1 st 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	Blanc
Date	Time	35	45	46	8	41	47	48	9	51	
2020-04-19	14:00	109,2837	0,1267	34,9471	110,3659	0,1798	34,9263	0,1308			
2020-04-20	8:00	109,2837	0,1267	34,9471	110,3659	0,1798	34,9263	0,1308			
SYSTEM 1 - 1 st hour											
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	Blanc
Date	Time	35	45	46	8	41	47	48	9	51	
2020-04-20	14:00	109,2840	0,1840	34,9489	110,3662	0,1812	34,9279	0,1310			
2020-04-27	8:00	109,2838	0,1833	34,9472	110,3660	0,1805	34,9264	0,1309			
2020-04-28	8:00	109,2838	0,1833	34,9471	110,3659	0,1805	34,9263	0,1309			
2020-04-28	17:00	109,2838	0,1832	34,9471	110,3659	0,1805	34,9263	0,1309			



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-04-19 / 1 Manufacturer: Tecon Supreme Model: 38 STD
 Project #: PT 20228 Run: _____ Tech: MT Reviewer: NP

HIGH FIRE TEST FILTERS				
SYSTEM 2				
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	50	49 / 50	35
2020-04-19	14:00	107 6482	0 1782	34 8611
2020-04-20	8:00	107 6482	0 1782	34 8611

HIGH FIRE TEST FILTERS				
SYSTEM 2				
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	50	49 / 50	35
2020-04-20	14:00	107 6488	0 1852	34 8626
2020-04-27	8:00	107 6483	0 1844	34 8611
2020-04-28	8:00	107 6483	0 1845	34 8612
2020-04-28	17:00	107 6483	0 1845	34 8612



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-04-19 Run: 1 Manufacturer: Agca Supreme Model: 385fb
 Project #: PT 10218 Tech: MR Reviewer: NO

MEDIUM / LOW FIRE TEST FILTERS									
SYSTEM 1 - 1 st 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	Blanc
Date	Time	02	09	02	10	10	11	13	14
2020-04-19	14:30	610990	01765	354505	946387	01772		357176	01238
2020-04-20	11:00	610990	01765	354505	946387	01772		357176	01238

MEDIUM / LOW FIRE TEST FILTERS									
SYSTEM 1 - 1 st 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	Blanc
Date	Time	02	09	02	10	10	11	13	14
2020-04-21	8:30	611002	01841	354536	946393	01806		357196	01238
2020-04-27	17:30	610990	01827	354506	946388	01802		357177	01238
2020-04-28	8:00	610990	01827	354506	946388	01802		357177	01238



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-04-19 Project #: PT 2018 Run: 1 Manufacturer: Fager Supreme Model: 38 S4B
 Tech: MM Reviewer: DD

MEDIUM / LOW FIRE TEST FILTERS					
SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	30	12 13	20	
2020-04-19	14:30	110 2166	01779	35 2251	
2020-04-20	11:30	110 2166	01779	35 2251	

MEDIUM / LOW FIRE TEST FILTERS					
SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	30	12 13	20	
2020-04-21	8:30	110 2180	01875	35 2288	
2020-04-27	17:30	110 2167	01870	35 2252	
2020-04-28	8:30	110 2167	01870	35 2252	

Paramètres

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

Code verrouillage:

SUP

Description du test

Test standard	EPA
Run #	1
Date	20-04-2020
Technicien	M.M
Project #	PI 20228

Description de l'unité

Manufacturier	FOYER SUPREME	
Modèle	38 STD	
Combustion system	Non-Cat	
Appliance type	FIREPLACE	
Firebox volume	3,34	cu ft.
Appliance weight empty	n.a	lbs
Fan (no, Standard, Option)	OPTION	

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):	0,995	Dimensionless
Equipment number (DGM #1):	EM 178	
Calibration Factor (DGM #2):	0,990	Dimensionless
Equipment number (DGM #2):	EM 179	
Calibration Factor (DGM #3):	0,997	Dimensionless
Equipment number (DGM #3):	EM 070	

Tunnel

Targeted tunnel flow rate	300	scfm
Tunnel diameter	8	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	PI 20228
Date	20-04-2020
Technicien	m.m

Fuel data

Fuel type	Cord
Fuel specie	Oak
HHV	20207,0 kJ/kg
%C	49,5
%H	6,6
%O	43,7
%Ash	0,2
HHV	8689,9 Btu/lb
LHV	7600,4 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	20 207
%C	48,73	49,5
%H	6,87	6,62
%O	43,9	43,7
%Ash	0,5	0,2
HHV (Btu/lb)	8519	8690
LHV (Btu/lb)	7451	7600

Adjunct to ASTM E XXXX Wood Heater Cordwood Test Method - May 10, 2017 Version

Cordwood Fuel Load Calculators - 10 lb/ft³ Nominal Load Density

Core 45-65% of Total Load Weight, Remainder 35-55% of Total Load Weight

Values to be input manually

For All Usable Firebox Volumes - High Fire Test Only						
Nominal Required Load Density (wet basis)	10	lb/ft ³				
Usable Firebox Volume	3,34	ft ³				
Total Nom. Load Wt. Target	33,40	lb				
Total Load Wt. Allowable Range	31,70	to	35,10	lb		
Core Target Wt. Allowable Range	15,00	to	21,70	lb		
Remainder Load Wt. Allowable Range	11,70	to	18,40	lb		
					Mid-Point	
Core Load Pc. Wt. Allowable Range	5,00	to	8,40	lb	6,70	
Remainder Load Pc. Wt. Allowable Range	3,30	to	18,40	lb	10,85	
		Pc. #				
Core Load Piece Wt. Actual	1	7,08	lb	In Range		
	2	5,99	lb	In Range		
	3	5,93	lb	In Range		
Core Load Total. Wt. Actual		19,00	lb	In Range		
		Pc. #				
Remainder Load Piece Wt.	1	7,52	lb	In Range		
(1 to 3 Pcs.)	2	8,32	lb	In Range		
	3		lb	NA		
Remainder Load Tot. Wt. Act		15,84	lb	In Range		
Total Load Wt. Actual		34,84	lb	In Range		
Core % of Total Wt.		55%		In Range	45-65%	
Remainder % of Total Wt.		45%		In Range	35-55%	
Actual Load % of Nominal Target		104%		In Range	95-105%	
Actual Fuel Load Density		10,4	lb/ft ³			
<u>Kindling and Start-up Fuel</u>						
Maximum Kindling Wt. (20% of Tot. Load Wt.)		6,97	lb			
Actual Kindling Wt.		0,70	lb	In Range	2,0%	
Maximum Start-up Fuel Wt. (30% of Tot. Load Wt.)		10,45	lb			
Actual Start-up Fuel Wt.		9,00	lb	In Range	25,8%	
Allowable Residual Start-up Fuel Wt. Range	3,5	to	7,0	lb	Mid-Point	
Actual Residual Start-up Fuel Wt.		3,5	lb	In Range	5,2	
Total Wt. All Fuel Added (wet basis)		44,54	lb			
<u>High Fire Test Run End Point Range</u>						
	Low		High		Mid-Point	
Based on Fuel Load Wt. (w/tares)	3,1	to	3,8	lb	3,5	
Actual Fuel Load Ending Wt.		3,2	lb	In Range		

Fuel Piece Moisture Reading (%-dry basis)							
	1	2	3	Ave.		Pc. Wt. Dry Basis	
	23,4	18,6	19	20,3	In Range	5,88	2,67
	22,1	18,4	20,1	20,2	In Range	4,98	2,26
	23,6	19	19	20,5	In Range	4,92	2,23
	23,1	20,1	19,3	20,8	In Range	6,22	2,82
	24,1	18,6	18,9	20,5	In Range	6,90	3,13
				NA	NA	NA	NA
Total Load Ave. MC (%-dry basis)				20,5	In Range		
Total Load Ave. MC % (wet basis)				17,0			
Total Test Load Weight (dry basis)						28,91	13,11
<u>Kindling Moisture (%-dry basis)</u>							
	9	9	9	9,0	In Range	0,64	0,29
<u>Start-up Fuel Moisture Readings (%-dry basis)</u>							
	20	20	20	20,0	In Range	7,50	3,40
Total Wt. All Fuel Added (dry basis)						37,05	16,81
Total Wt. All Fuel Burned (dry basis)						30,4	13,8

Load pieces Length in. **12 20 24** in.

Adjunct to ASTM E XXXX Wood Heater Cordwood Test Method - May 10, 2017 Version

Cordwood Fuel Load Calculators - 12 lb/ft³ Nominal Load Density
 Core 45-65% of Total Load Weight, Remainder 35-55% of Total Load Weight

Values to be input manually

For Usable Firebox Volumes up to 3.0 ft ³ - Low and Medium Fire				
Nominal Required Load Density (wet basis)	12	lb/ft ³		
Usable Firebox Volume	3.34	ft ³		
Total Nom. Load Wt. Target	40.08	lb		
Total Load Wt. Allowable Range	38.08	to 42.08	lb	
Core Target Wt. Allowable Range	18.036	to 26.05	lb	
Remainder Load Wt. Allowable Range	14.03	to 22.04	lb	
				Mid-Point
Core Load Fuel Pc. Wt. Allowable Range	6.01	to 10.02	lb	8.02
Remainder Load Pc. Wt. Allowable Range	4.01	to 12.02	lb	8.02
	Pc. #			
Core Load Piece Wt. Actual	1		lb	Out of Range
	2		lb	Out of Range
	3		lb	Out of Range
Core Load Total. Wt. Actual		0.00	lb	Out of Range
	Pc. #			
Remainder Load Piece Wt.	1		lb	Out of Range
(2 or 3 Pcs.)	2		lb	Out of Range
	3		lb	Out of Range
Remainder Load Piece Weight Ratio - Small/Large	#NOMBRE!	NA		≤ 67%
Remainder Load Tot. Wt. Act	0.00	lb		Out of Range
Total Load Wt. Actual	0.00	lb		Out of Range
Core % of Total Wt.	#DIV/0!	#DIV/0!		45-65%
Remainder % of Total Wt.	#DIV/0!	#DIV/0!		35-55%
Actual Load % of Nominal Target	0%			Out of Range 95-105%
Actual Fuel Load Density	0.0	lb/ft ³		
Allowable Charcoal Bed Wt. Range (lb)	0.1	to -0.1		Mid-Point
Actual Charcoal Bed Wt.			lb	Out of Range 0.0
Actual Fuel Load Ending Wt.			lb	Valid Test ≥ 90%
Total Wt. of Fuel Burned During Test Run lb.			0.0	lb
Load pieces Length in.				in.

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Fuel Piece Moisture Reading (%-dry basis)					
1	2	3	Ave.	#DIV/0!	Pc. Wt. Dry Basis
			#DIV/0!	#DIV/0!	lb #DIV/0! kg
			#DIV/0!	#DIV/0!	lb #DIV/0! kg
			#DIV/0!	#DIV/0!	lb #DIV/0! kg
			NA	NA	lb NA kg
Total Load Ave. MC % (dry basis)			#DIV/0!	#DIV/0!	
Total Load Ave. MC % (wet basis)			#DIV/0!	#DIV/0!	
Total Test Load Weight (dry basis)				#DIV/0!	lb #DIV/0! kg
Total Fuel Weight Burned During Test Run (dry basis)				#DIV/0!	lb #DIV/0! kg

For Usable Firebox Volumes above 3.0 ft ³ - Low and Medium Fire				
Nominal Required Load Density (wet basis)	12	lb/ft ³		
Usable Firebox Volume	3.34	ft ³		
Total Nom. Load Wt. Target	40.08	lb		
Total Load Wt. Allowable Range	38.08	to 42.08	lb	
Core Target Wt. Allowable Range	18.04	to 26.05	lb	
Remainder Load Wt. Allowable Range	14.03	to 22.04	lb	
				Mid-Point
Core Load Fuel Pc. Wt. Allowable Range	6.01	to 10.02	lb	8.02
Remainder Load Pc. Wt. Allowable Range	4.01	to 8.02	lb	6.01
	Pc. #			
Core Load Piece Wt. Actual	1	7.48	lb	In Range
	2	6.32	lb	In Range
	3	6.53	lb	In Range
Core Load Total. Wt. Actual		20.33	lb	In Range
	Pc. #			
Remainder Load Piece Wt.	1	8.00	lb	In Range
(3 or 4 Pcs.)	2	5.09	lb	In Range
	3	4.35	lb	In Range
	4	4.13	lb	In Range
Remainder Load Piece Weight Ratio - Small/Large	52%			≤ 67%
Remainder Load Tot. Wt. Act	21.56	lb		In Range
Total Load Wt. Actual	41.89	lb		In Range
Core % of Total Wt.	49%			In Range 45-65%
Remainder % of Total Wt.	51%			In Range 35-55%
Actual Load % of Nominal Target	105%			In Range 95-105%
Actual Fuel Load Density	12.5	lb/ft ³		
Allowable Charcoal Bed Wt. Range (lb)	4.2	to 8.3		Mid-Point
Actual Charcoal Bed Wt.	4.3	lb		In Range 6.3
Actual Fuel Load Ending Wt.	0.0	lb		Valid Test ≥ 90%
Total Wt. of Fuel Burned During Test Run lb.			41.9	lb

Fuel Piece Moisture Reading (%-dry basis)					
1	2	3	Ave.	#DIV/0!	Pc. Wt. Dry Basis
20.1	19.6	18.2	19.3	In Range	6.27 lb 2.84 kg
22.9	19	18.3	20.1	In Range	5.26 lb 2.39 kg
27.3	24.1	19.9	23.8	In Range	5.27 lb 2.39 kg
27.4	23.1	20.3	23.6	In Range	6.47 lb 2.94 kg
19.1	18.6	19	18.9	In Range	4.28 lb 1.94 kg
19.1	18.9	20.4	19.5	In Range	3.64 lb 1.65 kg
25	18.6	18.9	20.8	In Range	3.41 lb 1.55 kg
Total Load Ave. MC % (dry basis)			21.0	In Range	
Total Load Ave. MC % (wet basis)			17.4		
Total Test Load Weight (dry basis)					34.61 lb 15.70 kg
Total Fuel Weight Burned During Test Run (dry basis)					34.6 lb 15.70 kg

	Start	End
Barometer (kPa):	100,6	100,3
Barometer (in.Hg):	29,707169	29,61857885
Dry Bulb (F):	71,9	72,9
Humidity (%):	20,8	20,2
Air velocity (ft/min)	0	0

High fire test				
DGM #1	Final:	7554,411 cuft	Final:	213917,080 Liter
	Initial:	7526,750 cuft	Initial:	213133,810 Liter
DGM #2	Final:	5250,005 cuft	Final:	148663,570 Liter
	Initial:	5222,121 cuft	Initial:	147874,000 Liter
DGM room			Final:	813,510 cuft
			Initial:	791,430 cuft

min or med burnrate				
DGM #1	Final:	7679,513 cuft	Final:	217459,590 Liter
	Initial:	7554,502 cuft	Initial:	213919,660 Liter
DGM #2	Final:	5376,539 cuft	Final:	152246,620 Liter
	Initial:	5250,172 cuft	Initial:	148668,300 Liter
DGM room			Final:	913,250 cuft
			Initial:	813,510 cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du test commence	94
Numéro de la ligne dans "Raw data" à partir duquel les données du highfire test commence	117
Numéro de la ligne dans "Raw data" à partir duquel les données du min ou medium fire test commence	319

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

Project nu.	PI 20228
Date	20-04-2020
Technicien	M.M

Filter set weight highfire

	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	45/46	8	41	47/48	9	50	49/50	35	51		
Before (1)												
Before (2)												
Before (3)												
Before (4)												
Before (5)	109,2837	0,1767	34,9471	110,3659	0,1798	34,9263	107,6482	0,1782	34,8611	0,1308	2020-04-19	14:00
Before (6)	109,2837	0,1767	34,9471	110,3659	0,1798	34,9263	107,6482	0,1782	34,8611	0,1308	2020-04-20	08:00
After (1)	109,2840	0,1840	34,9489	110,3662	0,1812	34,9279	107,6488	0,1852	34,8626	0,1310	2020-04-20	14:00
After (2)	109,2838	0,1833	34,9472	110,3660	0,1805	34,9264	107,6483	0,1844	34,8611	0,1309	2020-04-27	08:00
After (3)	109,2838	0,1833	34,9471	110,3659	0,1805	34,9263	107,6483	0,1845	34,8612	0,1309	2020-04-28	08:00
After (4)	109,2838	0,1832	34,9471	110,3659	0,1805	34,9263	107,6483	0,1845	34,8612	0,1309	2020-04-28	17:00
After (5)												
After (6)	109,2838	0,1832	34,9471	110,3659	0,1805	34,9263	107,6483	0,1845	34,8612	0,1309	2020-04-28	17:00
Difference	0,0001	0,0065	0,0000	0,0000	0,0007	0,0000	0,0000	0,0001	0,0063	0,0000	0,0001	0,0001
Total (mg)	6,6			7,3			6,5			0,1		
Total ajusté (mg)	6,50			7,20			6,40					

Project nu.	PI 20228
Date	20-04-2020
Technicien	maxime martin

Filter set weight Low/ medium fire

	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	09-août	2	10	11-oct	13	30	13-déc	20	14		
Before (1)												
Before (2)												
Before (3)												
Before (4)												
Before (5)	61,0990	0,1765	35,4505	94,6387	0,1772	35,7176	110,2166	0,1779	35,2251	0,1238	2020-04-19	14:00
Before (6)	61,0990	0,1765	35,4505	94,6387	0,1772	35,7176	110,2166	0,1779	35,2251	0,1238	2020-04-20	11:00
After (1)	61,1002	0,1841	35,4536	94,6393	0,1806	35,7196	110,2180	0,1875	35,2288	0,1238	2020-04-21	08:00
After (2)	61,0990	0,1827	35,4506	94,6388	0,1802	35,7177	110,2167	0,1870	35,2252	0,1238	2020-04-27	17:00
After (3)	61,0990	0,1827	35,4506	94,6388	0,1802	35,7177	110,2167	0,1870	35,2252	0,1238	2020-04-28	08:00
After (4)												
After (5)												
After (6)	61,0990	0,1827	35,4506	94,6388	0,1802	35,7177	110,2167	0,1870	35,2252	0,1238	2020-04-28	08:00
Difference	0,0000	0,0062	0,0000	0,0001	0,0030	0,0000	0,0001	0,0001	0,0091	0,0000	0,0001	0,0000
Total (mg)		6,3			9,5				9,3			0
Total ajusté (mg)		6,30			9,50				9,30			

Project nu.	PI 20228
Date	20-04-2020
Technicien	maxime martin

* Elapsed	Raw data row	* Weight Remaining	* CO	* CO ₂	*1 Fluor Gas	*2 Room Temp	*3 Tunnel Dry Bulb	*4 Unit Top	*6 Unit R.Side	*7 Unit L.Side	*8 Unit Bottom	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
Time min		lbs	%	%	°F	°F	°F	°F	°F	°F	°F	cuft/min	°F	°F	°F	cuft/min	°F	°F	°F
0,00	94,00	9,5	0,0	0,1	87,2	67,8	70,2	74,9	68,9	69,5	67,9	0,17	68,42	68,50	85,67	0,17	68,56	68,88	84,75
1,0	95,0	9,5	0,1	4,7	125,7	67,7	71,9	92,3	70,2	74,1	67,9	0,17	68,51	68,57	84,85	0,17	68,66	68,90	84,25
2,0	96,0	9,4	0,1	4,4	154,5	67,8	73,4	104,6	72,3	82,4	67,9	0,17	68,55	68,64	83,90	0,17	68,78	68,95	83,82
3,0	97,0	9,2	0,1	4,1	201,4	67,8	76,7	119,4	75,2	92,0	67,9	0,17	68,52	68,70	82,99	0,17	68,94	69,00	83,37
4,0	98,0	9,1	0,1	4,9	267,2	67,8	81,5	140,3	79,4	102,2	67,9	0,17	68,58	68,81	82,14	0,17	69,19	69,09	82,90
5,0	99,0	8,9	0,2	5,9	328,2	67,8	87,3	167,1	85,1	111,6	67,9	0,17	68,69	68,90	81,46	0,17	69,40	69,19	82,47
6,0	100,0	8,6	0,2	6,5	396,8	67,8	94,0	204,3	92,6	118,3	68,0	0,17	68,83	69,01	84,44	0,17	69,68	69,30	82,00
7,0	101,0	8,4	0,5	7,9	464,2	67,9	101,8	264,1	101,8	124,6	68,1	0,17	68,92	69,01	86,37	0,17	69,71	69,39	82,33
8,0	102,0	8,1	1,0	7,9	523,7	67,9	109,5	333,7	109,5	132,9	68,2	0,17	68,99	69,11	85,65	0,17	69,99	69,50	83,70
9,0	103,0	7,9	1,4	8,8	567,3	67,9	116,3	393,6	114,4	143,5	68,4	0,17	69,08	69,15	84,75	0,17	70,12	69,63	84,93
10,0	104,0	7,6	1,5	9,3	610,6	68,0	122,9	457,7	117,2	154,4	68,8	0,17	69,15	69,14	83,99	0,17	70,16	69,70	85,87
11,0	105,0	7,3	1,9	9,5	632,1	68,0	128,1	508,6	121,4	164,4	69,1	0,17	69,21	69,19	83,38	0,17	70,34	69,81	85,81
12,0	106,0	7,0	2,1	9,5	656,9	68,1	132,4	547,4	126,9	176,2	69,5	0,17	69,35	69,29	82,83	0,17	70,58	69,97	85,54
13,0	107,0	6,6	3,2	10,5	682,3	68,2	138,3	590,7	133,1	189,7	70,1	0,17	69,47	69,33	82,45	0,17	70,73	70,11	85,31
14,0	108,0	6,2	1,4	11,7	710,7	68,2	142,3	637,2	139,8	204,2	70,8	0,17	69,54	69,38	82,06	0,17	70,94	70,25	85,07
15,0	109,0	5,8	1,1	12,3	739,3	68,1	148,1	681,5	149,7	220,0	71,6	0,17	69,62	69,42	81,80	0,17	70,99	70,36	84,88
16,0	110,0	5,4	1,1	12,3	756,9	68,3	151,7	732,1	159,4	236,8	72,6	0,17	69,74	69,52	81,58	0,17	71,31	70,49	84,75
17,0	111,0	5,0	1,2	13,2	776,7	68,6	153,5	797,3	182,1	276,9	73,5	0,17	69,86	69,61	83,24	0,17	71,45	70,72	84,62
18,0	112,0	4,6	1,2	13,6	782,7	68,4	151,8	828,9	208,4	315,3	74,5	0,17	70,03	69,77	86,52	0,17	71,73	70,95	84,49
19,0	113,0	4,3	0,9	13,2	777,1	68,6	146,2	839,2	233,9	349,6	75,8	0,17	70,15	69,91	86,62	0,17	72,01	71,14	84,39
20,0	114,0	4,0	0,8	13,1	765,5	68,5	141,5	825,8	258,1	380,9	77,1	0,17	70,32	70,01	86,08	0,17	72,28	71,37	84,30
21,0	115,0	3,6	0,9	13,1	766,7	68,6	141,4	820,6	281,1	411,2	78,9	0,17	70,44	70,10	85,65	0,17	72,40	71,57	84,34
22,0	116,0	3,6	1,2	13,3	804,3	68,8	160,8	815,4	303,0	440,0	80,7	0,17	70,53	70,16	85,23	0,17	72,45	71,73	84,30
23,0	117,0	36,7	0,4	2,2	956,3	68,8	182,3	837,8	324,4	465,0	82,8	0,17	70,65	70,15	85,99	0,17	72,32	71,82	84,72
24,0	118,0	36,7	0,4	3,0	852,6	68,7	168,9	857,6	341,6	480,5	85,4	0,17	70,69	70,17	85,16	0,17	72,41	71,92	84,64
25,0	119,0	36,5	0,6	2,5	819,6	68,6	154,7	872,9	355,0	487,5	88,4	0,17	70,81	70,31	84,91	0,17	72,74	72,10	84,77
26,0	120,0	36,2	0,9	2,0	795,8	68,5	149,4	866,6	364,6	490,1	90,8	0,17	70,95	70,42	84,70	0,17	72,82	72,31	84,83
27,0	121,0	36,0	1,0	8,8	778,0	68,6	146,7	855,5	372,2	490,6	93,9	0,17	71,23	70,65	84,52	0,17	73,29	72,57	84,97
28,0	122,0	35,8	1,6	8,3	754,3	68,5	143,0	830,8	380,4	489,8	97,1	0,17	71,29	70,76	84,34	0,17	73,33	72,84	85,03
29,0	123,0	35,6	2,2	7,1	730,8	68,6	140,8	793,3	387,3	488,0	99,5	0,17	71,31	70,86	84,26	0,17	73,48	73,01	85,10
30,0	124,0	35,4	2,0	7,4	722,9	68,8	139,8	761,2	392,6	485,5	102,7	0,17	71,42	71,11	84,06	0,17	73,96	73,31	85,13
31,0	125,0	35,0	2,3	10,2	758,4	68,7	144,2	770,6	397,2	484,1	105,5	0,17	71,68	71,30	83,94	0,17	74,18	73,64	85,18
32,0	126,0	34,6	1,7	12,7	765,0	68,6	146,5	796,4	402,3	484,5	107,9	0,17	71,68	71,44	83,87	0,17	74,34	73,93	85,20
33,0	127,0	34,2	2,0	13,2	788,1	68,6	149,2	831,3	407,9	487,8	110,7	0,17	71,79	71,60	83,84	0,17	74,62	74,21	85,28
34,0	128,0	33,8	1,8	13,8	803,2	68,7	151,9	816,6	361,4	431,4	114,3	0,17	71,85	71,70	83,83	0,17	74,68	74,42	85,32
35,0	129,0	33,4	1,5	13,6	805,0	68,7	154,3	801,8	333,5	395,0	117,6	0,17	71,74	71,58	83,88	0,17	74,33	74,40	85,40
36,0	130,0	33,0	1,6	13,9	806,6	68,8	154,9	800,9	324,0	383,3	121,5	0,17	71,70	71,62	83,92	0,17	74,34	74,42	85,50
37,0	131,0	32,6	1,8	14,1	804,2	68,9	156,3	803,9	323,2	382,2	125,9	0,17	71,73	71,64	83,95	0,17	74,40	74,53	85,62
38,0	132,0	32,1	2,0	14,2	805,1	68,8	156,7	803,6	326,7	382,5	129,7	0,17	71,68	71,59	84,01	0,17	74,06	74,60	85,70
39,0	133,0	31,7	1,8	14,3	808,0	69,1	156,6	803,3	331,9	384,2	134,4	0,17	71,55	71,52	84,09	0,17	73,81	74,61	85,83
40,0	134,0	31,4	1,4	14,0	807,4	68,8	156,6	798,6	338,3	388,2	136,4	0,17	71,50	71,49	84,12	0,17	73,78	74,58	85,94
41,0	135,0	30,9	1,4	14,0	808,6	69,0	156,1	793,6	343,6	395,8	140,6	0,17	71,51	71,50	84,24	0,17	73,85	74,64	85,96
42,0	136,0	30,5	1,4	14,1	809,0	69,1	156,5	790,6	348,4	403,7	145,4	0,17	71,58	71,54	84,30	0,17	74,06	74,77	85,94
43,0	137,0	30,1	1,4	14,0	808,6	69,0	156,8	787,0	353,4	408,8	147,2	0,14	71,62	71,57	84,08	0,15	73,81	74,85	86,07
44,0	138,0	29,8	1,4	14,0	808,7	69,0	156,8	784,5	358,9	415,8	151,1	0,19	71,76	71,71	84,17	0,15	73,88	74,84	86,17
45,0	139,0	29,4	1,2	13,9	808,4	68,9	156,7	782,2	363,7	422,5	152,9	0,17	71,78	71,61	84,72	0,17	73,88	74,84	86,25
46,0	140,0	29,0	1,1	13,9	808,4	68,9	156,8	781,1	368,2	429,3	156,4	0,17	71,82	71,60	85,16	0,17	73,99	75,00	86,53
47,0	141,0	28,6	1,0	13,8	807,7	68,8	156,9	779,0	374,1	435,7	159,5	0,17	71,87	71,67	85,40	0,17	74,15	75,07	86,85
48,0	142,0	28,2	0,9	13,9	807,8	68,9	156,7	777,7	378,7	442,4	163,5	0,17	71,92	71,70	85,60	0,17	74,17	75,17	87,03
49,0	143,0	27,9	0,9	13,9	807,5	69,2	156,5	777,5	384,4	449,1	166,4	0,17	71,90	71,70	85,78	0,17	74,01	75,25	87,20
50,0	144,0	27,5	0,9	13,9	806,8	69,2	156,6	776,7	389,1	455,8	169,6	0,17	71,95	71,75	86,02	0,17	74,12	75,29	87,33
51,0	145,0	27,2	0,8	13,9	807,7	69,2	156,5	778,2	392,8	462,6	173,2	0,17	72,01	71,77	86,22	0,17	74,11	75,37	87,44
52,0	146,0	26,8	0,8	14,0	807,9	69,2	157,1	778,4	398,2	468,2	176,5	0,17	72,06	71,81	86,40	0,17	74,26	75,45	87,71
53,0	147,0	26,5	0,8	14,0	808,0	69,4	156,8	779,6	402,3	474,5	180,3	0,17	72,18	71,93	86,59	0,17	74,52	75,58	88,00
54,0	148,0	26,1	0,8	13,9	807,1	69,3	156,8	779,1	406,1	480,0	184,0	0,17	72,20	71,96	86,78	0,17	74,45	75,71	88,06
55,0	149,0	25,8	0,7	13,9	806,0	69,3	155,7	778,9	410,5	487,3	188,5	0,17	72,21	72,00	86,87	0,17	74,49	75,79	88,15
56,0	150,0	25,4	0,6	13,8	804,9	69,4	155,7	777,3	414,6	493,1	191,2	0,17	72,13	72,03	87,02	0,17	74,38	75,83	88,33
57,0	151,0	25,1	0,6	13,7	803,7	69,3	156,3	775,0	420,4	498,2	194,4	0,17	72,15	72,06	87,27	0,17	74,47	75,87	88,55
58,0	152,0	24,8	0,6	13,6	801,1	69,3	155,3	773,5	425,5	504,5	198,5	0,17	72,18	72,08	87,35	0,17	74,43	75,94	88,68
59,0	153,0	24,4	0,7	13,7	799,1	69,0	155,3	770,9	429,0	511,0	202,5	0,17	72,25	72,10	86,04	0,17	74,37	75,96	88,89
60,0	154,0	24,0	0,7	13,7	798,7	69,2	155,1	766,5	435,2	516,1	205,2	0,17	72,35	72,20	87,73	0,17	74,49	76,04	89,02

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 4,8 g/hr

Burn Rate : 5,342 Dry kg/hr

Test Duration: 154 min

PRESSURE FACTOR: DGM 1 0,95459
 DGM 2 0,95707
 DGM 3 0,99141

BAROMETRIC PRESSURE
 Average: 29,66287383 in Hg
 Start: 29,70716882 in Hg
 End: 29,61857885 in Hg

TEMPERATURE FACTORS DGM 1 0,99269
 DGM 2 0,98808
 DGM 3 0,99727

DGM CONTROLLER VALUES

DGM 1 Final: 7554,411 Cuft
 Initial: 7526,750 Cuft

VOLUMES SAMPLED DGM 1 26,088 Scft
 DGM 2 26,111 Scft
 DGM 3 21,769 Scft

DGM 2 Final: 5250,005 Cuft
 Initial: 5222,121 Cuft

DGM #3 Final: 813,510 Cuft
 Initial: 791,430 Cuft

TOTAL TUNNEL VOLUME : 47808

TEMPERATURES

SAMPLE RATIOS
 Sample Train 1: 1832,552
 Sample Train 2: 1830,944

DGM 1 531,886 °R
 DGM 2 534,370 °R

Patriculate concentration
 Sample Train 1 **0,000280** g/dscf
 Sample Train 2 **0,000249** g/dscf
 Room **0,000005** g/dscf

CALIBRATION FACTORS

DGM 1 0,9953
 DGM 2 0,9903
 DGM #3 0,9972

TUNNEL FLOW RATE: 310,441 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **13,16** g
 Sample Train 2 **11,68** g

PARTICULATE CATCH
 Total Sample Train 1: 7,30 mg
 Total Sample Train 2: 6,50 mg
 Total Sample Train 1 1st hour: 6,60 mg

EMISSION RATES
 Sample Train 1 **5,13** g/hr
 Sample Train 2 **4,55** g/hr

1st hour emission rate **12,09** g/hr

DEVIATION: 5,94%

Cs Train 1 Train 2
 0,0002798 0,00024894

Table with 20 columns of numerical data. The first column contains a sequence of numbers from 147.0 to 298.0. The second column contains a sequence of numbers from 466.0 to 617.0. The remaining columns contain various numerical values, many with a '0.17' multiplier, representing a wide range of data points.

Table with 13 columns and 935 rows of data. The columns contain numerical values representing various parameters. The rows are indexed from 299.0 to 450.0. The data shows a complex pattern of values across the rows, with some columns exhibiting a clear downward trend (e.g., column 1 decreasing from 299.0 to 450.0) while others fluctuate.

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 1,61 g/hr

Burn Rate : 1,354 Dry kg/hr

Test Duration: 696 min

PRESSURE FACTOR: DGM 1 0,96072
 DGM 2 0,96250
 DGM 3 0,99141

BAROMETRIC PRESSURE
 Average: 29,66287383 in Hg
 Start: 29,70716882 in Hg
 End: 29,61857885 in Hg

TEMPERATURE FACTORS DGM 1 0,99120
 DGM 2 0,98531
 DGM 3 0,99498

DGM CONTROLLER VALUES

DGM 1 Final: 7679,513 Cuft
 Initial: 7554,502 Cuft

VOLUMES SAMPLED DGM 1 118,483 Scft
 DGM 2 118,673 Scft
 DGM 3 98,111 Scft

DGM 2 Final: 5376,539 Cuft
 Initial: 5250,172 Cuft

DGM #3 Final: 913,250 Cuft
 Initial: 813,510 Cuft

TOTAL TUNNEL VOLUME : 235472

TEMPERATURES

SAMPLE RATIOS
 Sample Train 1: 1987,397
 Sample Train 2: 1984,208

DGM 1 532,686 °R
 DGM 2 535,874 °R

Patriculate concentration
 Sample Train 1 **0,000080** g/dscf
 Sample Train 2 **0,000078** g/dscf
 Room **0,000000** g/dscf

CALIBRATION FACTORS

DGM 1 0,9953
 DGM 2 0,9903
 DGM #3 0,9972

TUNNEL FLOW RATE: 338,322 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **18,88** g
 Sample Train 2 **18,45** g

PARTICULATE CATCH
 Total Sample Train 1: 9,50 mg
 Total Sample Train 2: 9,30 mg
 Total Sample Train 1 1st hour: 6,30 mg

EMISSION RATES
 Sample Train 1 **1,63** g/hr
 Sample Train 2 **1,59** g/hr

1st hour emission rate **12,52** g/hr

DEVIATION: 1,14%

Cs Train 1 Train 2
 8,018E-05 7,8367E-05

Manufacturer: FOYER SUPREME
 Model: 38 STD

Run: 1
 Project #: PI 20228
 Test Duration: 132 min

	HHV	LHV
Eff	62,23%	66,96%
Comb Eff	95,60%	95,60%
HT Eff	65,09%	70,04%
Output	64 548	kJ/h
Burn Rate	5,13	kg/h
Grams CO	722	g
Input	103 732	kJ/h
MC wet	17,01	

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

Ultimate CO₂
 CO_{2-ut} 19,86
 F_o
 1,051

	Air Fuel Ratio (A/F)	
Overall Heating Efficiency:	62,23%	Dry Molecular Weight (M _d) 30,03
Combustion Efficiency:	95,60%	Dry Moles Exhaust Gas (N _g): 350,90
Heat Transfer Efficiency:	65,09%	Air Fuel Ratio (A/F) 10,03

Heat Output:	61 231 Btu/h	64 548 kJ/h
Heat Input:	98 401 Btu/h	103 732 kJ/h
Burn Duration:	2,20 h	
Burn Rate:	11,31 lb/h	5,133 kg/h
Stack Temp:	702,2 Deg. F	372,3 Deg. C

Manufacturer: FOYER SUPREME
 Model: 38 STD

Run: 1
 Project #: PI 20228
 Test Duration: 696 min

	HHV	LHV
Eff	66,09%	71,12%
Comb Eff	92,86%	92,86%
HT Eff	71,18%	76,59%
Output	18 474	kJ/h
Burn Rate	1,38	kg/h
Grams CO	1 641	g
Input	27 951	kJ/h
MC wet	17,37	

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

Ultimate CO₂
 CO_{2-ult} 19,86
 F_o
 1,048

	Air Fuel Ratio (A/F)
Overall Heating Efficiency: 66,09%	Dry Molecular Weight (M _d) 29,54
Combustion Efficiency: 92,86%	Dry Moles Exhaust Gas (N _g): 519,70
Heat Transfer Efficiency: 71,18%	Air Fuel Ratio (A/F) 14,84

Heat Output:	17 524 Btu/h	18 474 kJ/h
Heat Input:	26 515 Btu/h	27 951 kJ/h
Burn Duration:	11,60 h	
Burn Rate:	3,05 lb/h	1,383 kg/h
Stack Temp:	290,7 Deg. F	143,7 Deg. C

Date: 2020-04-21 Manufacturer: Foyer Supreme Model: 38 STD
 Project #: PI 20228 Run: 2 Tech: MM Reviewer: DP

- kindling 96 LBS START FIRE
- 20 Sec torch
- close Door
- Fan ON
- At 55 LBS stop Fan
- At 35 LBS insert load
- After 45 sec close Door
- At 847°F open Fan
- At 45 LBS stop Fan
- At 42 LBS insert load
- set air inlet 2/3 Full
- At 775 Floc set air inlet ~~2/3~~ close between Full close
- At 30 min Floc 762 F open Fan

TEST LOAD CONFIGURATION

Date: 2020-04-21 Manufacturer: Foyen Supreme Model: 38 STD
 Project #: PI 20228 Run: 2 Tech: MM Reviewer: DP

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
EM-191	7:51	ok	ok

Pre-Test Post-Test

Facility Conditions:
 Air Velocity from less than 2 feet
 Smoke Capture Check (Tunnel velocity).....
 Picture.....

0 (max50 Fpm)	0 (max50 Fpm)
ok	NA
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.....

2020-04-20
2020-04-20
ok
ok

Temperature System:

Ambient (65°-90°F).....

ok °F

Proportional Checks:

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

ok
ok
ok

Sampling Train ID Numbers:

	High fire test		Medium low fire test			
	1 st hour	Train 1	Train 2	1 st hour	Train 1	Train 2
Probe.....				6	9	15
Filter Front.....				01	3	5
Filter Back.....		NA		02	4	6
Filter Thermocouple.....				11	11	12
Filter (80°F ≥ <90°F).....				✓	✓	✓

SAMPLING EQUIPMENT CHECK OUT

Date: 2020-04-2 Manufacturer: foyer Supreme Model: 38 STD
 Project #: pI 2228 Run: 2 Tech: MM Reviewer: BP

Leakage Checks Tunnel Samplers

High fire test	System 1 st 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.)						
Final 1minute DGM (Liter)						
Initial 1minute DGM (Liter)						
Change © (Liter)						
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)			NA			
Check OK						

Low medium fire test	System 1 st 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	- 18	- 15	- 15	- 15	- 18
Final 1minute DGM (Liter)	27467.00	220423.85	27467.30	220424.25	152251.01	155241.50
Initial 1minute DGM (Liter)	27466.80	220423.81	27467.28	220424.10	152250.80	155241.30
Change © (Liter)	0.20	0.04	0.05	0.15	0.21	0.20
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	OK	OK	OK	OK	OK	OK

SAMPLING EQUIPMENT CHECK OUT

Date: 2020-04-21 Manufacturer: Foyca Supreme Model: 38 STD
 Project #: PI 20228 Run: 2 Tech: MM Reviewer: DO

Leakage Checks Flue Gas Sampler

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

PRE-TEST SCALE AUDIT

Date: 2020-04-21 Manufacturer: Foyer Supreme Model: 38 STD
 Project #: PI 20228 Run: 2 Tech: MM Reviewer: JS

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: 2020-04-21 Manufacturer: Foyen Supreme Model: 38 STD
 Project #: PI 20228 Run: 2 Tech: MM Reviewer: [Signature]

FOR TUNNELS < 12 in

Barometric pressure (P_{bar}) 991 (KPa.) Static pressure (P_q) 0.17 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.080	69.90
B - Centroid	3.00	3.50	4	0.080	69.21
A-1	0.40	0.50	0.50	0.067	69.54
A-2	1.50	1.75	2	0.085	69.74
A-3	4.50	5.25	6	0.081	69.27
A-4	5.60	6.5	7.5	0.067	69.27
B-1	0.40	0.50	0.50	0.067	69.04
B-2	1.50	1.75	2	0.072	69.04
B-3	4.50	5.25	6	0.079	68.84
B-4	5.60	6.5	7.5	0.067	68.84
				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.

Δ_p = manometer reading (inches H₂O)

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. H₂O
 { 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)

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

Date: 2020-04-21 Manufacturer: Foxea Supreme Model: 38 STD
 Project #: PT 20228 Run: 2 Tech: MM Reviewer: JD

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2996	3000	0986	1000
Tolerance CO	0	+/- 0.02	0004	+/- 0.15	0014	+/- 0.05
CO ₂	0	0	1797	1800	979	1000
Tolerance CO ₂	0	+/- 0.02	003	+/- 0.5	006	+/- 0.5
O ₂ 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	2989	0990	0	0.02	0007	0.15	0004	0.05	✓	
CO ₂	0	1793	980	0	0.02	004	0.5	006	0.5	✓	

TEST DATA LOG

Date: 2020-04-21 Manufacturer: Foyer Supreme Model: 38 STD
 Project #: PI 20228 Run: 2 Tech: MM Reviewer: JP

RAW DRY GAS METER READINGS

		System 1	System 2	Blank
High fire test	Final (Liter)	/	/	
	Initial (Liter)			
Low medium fire test	Final (Liter)	220422, 70	155239, 75	096, 45
	Initial (Liter)	217468, 18	152253, 02	91325

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	990	994
Dry Bulb (F):	70.8	67.8
Humidity (%):	21.9	19.6

FUEL DATA

Date: 2020-04-21 Manufacturer: foyer Supreme Model: 38 STD
 Project #: PT 20228 Run: 2 Tech: MM Reviewer: TD

FUEL DESCRIPTION:

Type of wood:

KINDLING AND START-UP LOAD

Piece Size	Weight	Meter Moisture Content (% dry)		
X X 9 in.	0.712 lbs.	9	9	9
X X 9 in.	9.00 lbs.	20	20	20
X X in.	lbs.			
X X in.	lbs.			
X X in.	lbs.			
X X in.	lbs.			
X X in.	lbs.			
X X in.	lbs.			
X X in.	lbs.			

HIGHFIRE TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)		
4.25 x 4.00 x 20 in.	7.12 lbs.	246	186	183
4.50 x 4.75 x 22 in.	5.632 lbs.	126	183	189
4.00 x 5.50 x 12 in.	6.15 lbs.	23	184	191
X X in.	lbs.			
4.00 x 4.00 x 20 in.	7.168 lbs.	25	223	196
4.00 x 3.75 x 24 in.	8.128 lbs.	186	184	189
X X in.	lbs.			
X X in.	lbs.			
X X in.	lbs.			

FUEL DATA

Date: 2020-04-21 Manufacturer: foyer supreme Model: 38 STD
 Project #: PI 20228 Run: 2 Tech: MM Reviewer: JP

FUEL DESCRIPTION:

Type of wood:

LOW OR MEDIUM TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)		
4.50 x 4.50 x 20 in.	725 lbs.	21.6	26.4	20.9
4.50 x 5.50 x 12 in.	615 lbs.	27.6	27.8	20.3
5.75 x 5.75 x 12 in.	6476 lbs.	24.6	19.1	20.6
x x in.	lbs.			
4.50 x 4.50 x 20 in.	7978 lbs.	24.6	22.1	19.0
3.50 x 3.75 x 12 in.	4520 lbs.	27.6	24.3	22.1
3.25 x 4.00 x 12 in.	4052 lbs.	27.6	23.1	19.3
3.50 x 3.75 x 12 in.	4100 lbs.	25.1	2.8	18.6
x x in.	lbs.			
x x in.	lbs.			
x x in.	lbs.			
x x in.	lbs.			
x x in.	lbs.			
x x in.	lbs.			



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: _____ Manufacturer: _____ Model: _____

Project #: _____ Run: _____ Tech: _____ Reviewer: _____

HIGHFIRE TEST FILTERS									
SYSTEM 1 - 1 st 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	Blank
Date	Time								

HIGHFIRE TEST FILTERS									
SYSTEM 1 - 1 st 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	Blank
Date	Time								



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: _____ Manufacturer: _____ Model: _____

Project #: _____ Run: _____ Tech: _____ Reviewer: _____

HIGH FIRE TEST FILTERS			
SYSTEM 2			
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number
Date			gaskets
Time			

HIGH FIRE TEST FILTERS			
SYSTEM 2			
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number
Date		NA	gaskets
Time			



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-04-20 Model: 38 STD

Manufacturer: fogor supreme

Tech: MM Reviewer: DP

Project #: DI 20228 Run: 2

MEDIUM / LOW FIRE TEST FILTERS

Pre-test Weight Record		SYSTEM 1 - 1 st hour		SYSTEM 1		SYSTEM 1		Blank		
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2020-04-20	17:00	613742	01750	02	347557	614570	03	04	341162	01232
2020-04-20	10:00	613743	01750		347557	614570			341162	01232
		6	01	02	16	9	03	04	18	7

MEDIUM / LOW FIRE TEST FILTERS

Post-test Weight Record		SYSTEM 1 - 1 st hour		SYSTEM 1		SYSTEM 1		Blank		
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2020-04-22	7:00	613753	01817		347591	614573	03	04	341178	01234
2020-04-27	8:00	613743	01802		347558	614570			341162	01233
2020-04-28	8:00	613743	01801		347558	614570			341162	01233
		6	01	02	16	9	03	04	18	7



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-04-20 Model: 38 STD

Project #: PI20228 Run: 2 Manufacturer: foyer Supreme

Tech: MM Reviewer: DP

MEDIUM / LOW FIRE TEST FILTERS					
SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time				
2020-04-20	17:00	158 7832	01756	34	2807
2020-04-20	10:00	108 7833	01757	34	2807

MEDIUM / LOW FIRE TEST FILTERS					
SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time				
2020-04-20	7:00	108 7845	01819	34	2823
2020-04-27	8:00	108 7833	01815	34	2809
2020-04-28	8:00	108 7833	01815	34	2808

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	21-04-2020
Technicien	M.M
Project #	PI 20228

Description de l'unité

Manufacturier	FOYER SUPREME	
Modèle	38 STD	
Combustion system	Non-Cat	
Appliance type	FIREPLACE	
Firebox volume	3,34	cu ft.
Appliance weight empty	n.a	lbs
Fan (no, Standard, Option)	OPTION	

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):	0,995	Dimensionless
Equipment number (DGM #1):	EM 178	
Calibration Factor (DGM #2):	0,990	Dimensionless
Equipment number (DGM #2):	EM 179	
Calibration Factor (DGM #3):	0,997	Dimensionless
Equipment number (DGM #3):	EM 070	Dimensionless

Tunnel

Targeted tunnel flow rate	300	scfm
Tunnel diameter	8	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	PI 20228
Date	21-04-2020
Technicien	<input type="text" value="m.m"/>

Fuel data

Fuel type	Cord
Fuel specie	Oak
HHV	20207,0 kJ/kg
%C	49,5
%H	6,6
%O	43,7
%Ash	0,2
HHV	8689,9 Btu/lb
LHV	7600,4 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	20 207
%C	48,73	49,5
%H	6,87	6,62
%O	43,9	43,7
%Ash	0,5	0,2
HHV (Btu/lb)	8519	8690
LHV (Btu/lb)	7451	7600

Adjunct to ASTM E XXXX Wood Heater Cordwood Test Method - May 10, 2017 Version

Cordwood Fuel Load Calculators - 10 lb/ft³ Nominal Load Density

Core 45-65% of Total Load Weight, Remainder 35-55% of Total Load Weight

Values to be input manually

For All Usable Firebox Volumes - High Fire Test Only									
Nominal Required Load Density (wet basis)	10	lb/ft ³							
Usable Firebox Volume	3,34	ft ³							
Total Nom. Load Wt. Target	33,40	lb							
Total Load Wt. Allowable Range	31,70	to	35,10	lb					
Core Target Wt. Allowable Range	15,00	to	21,70	lb					
Remainder Load Wt. Allowable Range	11,70	to	18,40	lb					
					Mid-Point				
Core Load Pc. Wt. Allowable Range	5,00	to	8,40	lb	6,70				
Remainder Load Pc. Wt. Allowable Range	3,30	to	18,40	lb	10,85				
		Pc. #							
Core Load Piece Wt. Actual	1	7,12	lb	In Range					
	2	5,63	lb	In Range					
	3	6,15	lb	In Range					
Core Load Total. Wt. Actual		18,90	lb	In Range					
		Pc. #							
Remainder Load Piece Wt.	1	7,17	lb	In Range					
(1 to 3 Pcs.)	2	8,13	lb	In Range					
	3		lb	NA					
Remainder Load Tot. Wt. Act		15,30	lb	In Range					
Total Load Wt. Actual		34,20	lb	In Range					
Core % of Total Wt.		55%		In Range	45-65%				
Remainder % of Total Wt.		45%		In Range	35-55%				
Actual Load % of Nominal Target		102%		In Range	95-105%				
Actual Fuel Load Density		10,2	lb/ft ³						
<u>Kindling and Start-up Fuel</u>									
Maximum Kindling Wt. (20% of Tot. Load Wt.)		6,84	lb						
Actual Kindling Wt.		0,71	lb	In Range	2,1%				
Maximum Start-up Fuel Wt. (30% of Tot. Load Wt.)		10,26	lb						
Actual Start-up Fuel Wt.		9,00	lb	In Range	26,3%				
Allowable Residual Start-up Fuel Wt. Range	3,4	to	6,8	lb	Mid-Point				
Actual Residual Start-up Fuel Wt.		3,5	lb	In Range	5,1				
Total Wt. All Fuel Added (wet basis)		43,91	lb						
<u>High Fire Test Run End Point Range</u>									
	Low		High		Mid-Point				
Based on Fuel Load Wt. (w/tares)	3,1	to	3,8	lb	3,4				
Actual Fuel Load Ending Wt.		3,1	lb	In Range					

Fuel Piece Moisture Reading (%-dry basis)									
	1	2	3	Ave.		Pc. Wt. Dry Basis			
	24,6	18,6	18,3	20,5	In Range	5,91	lb	2,68	kg
	19,6	18,3	18,9	18,9	In Range	4,74	lb	2,15	kg
	23,1	18,4	19,1	20,2	In Range	5,12	lb	2,32	kg
	25,1	22,3	19,6	22,3	In Range	5,86	lb	2,66	kg
	18,6	18,4	18,9	18,6	In Range	6,85	lb	3,11	kg
				NA	NA	NA	lb	NA	kg
Total Load Ave. MC (%-dry basis)				20,1	In Range				
Total Load Ave. MC % (wet basis)				16,7					
Total Test Load Weight (dry basis)						28,47	lb	12,91	kg
<u>Kindling Moisture (%-dry basis)</u>									
	9	9	9	9,0	In Range	0,65	lb	0,30	kg
<u>Start-up Fuel Moisture Readings (%-dry basis)</u>									
	20	20	20	20,0	In Range	7,50	lb	3,40	kg
Total Wt. All Fuel Added (dry basis)						36,62	lb	16,61	kg
Total Wt. All Fuel Burned (dry basis)						30,0	lb	13,6	kg

Load pieces Length in. **12 20 24** in.

Adjunct to ASTM E XXXX Wood Heater Cordwood Test Method - May 10, 2017 Version

Cordwood Fuel Load Calculators - 12 lb/ft³ Nominal Load Density
Core 45-65% of Total Load Weight, Remainder 35-55% of Total Load Weight

Values to be input manually

For Usable Firebox Volumes up to 3.0 ft ³ - Low and Medium Fire				
Nominal Required Load Density (wet basis)	12	lb/ft ³		
Usable Firebox Volume		ft ³		
Total Nom. Load Wt. Target	0	lb		
Total Load Wt. Allowable Range	0,00	to 0,00	lb	
Core Target Wt. Allowable Range	0	to 0,00	lb	
Remainder Load Wt. Allowable Range	0,00	to 0,00	lb	
				Mid-Point
Core Load Fuel Pc. Wt. Allowable Range	0,00	to 0,00	lb	0,00
Remainder Load Pc. Wt. Allowable Range	0,00	to 0,00	lb	0,00
	Pc. #			
Core Load Piece Wt. Actual	1		lb	In Range
	2		lb	In Range
	3		lb	In Range
Core Load Total. Wt. Actual		0,00	lb	In Range
	Pc. #			
Remainder Load Piece Wt.	1		lb	In Range
(2 or 3 Pcs.)	2		lb	In Range
	3		lb	NA
Remainder Load Piece Weight Ratio - Small/Large	#NOMBRE!	#NOMBRE!	≤ 67%	
Remainder Load Tot. Wt. Act	0,00	lb	In Range	
Total Load Wt. Actual	0,00	lb	In Range	
Core % of Total Wt.	#DIV/0!	#DIV/0!	45-65%	
Remainder % of Total Wt.	#DIV/0!	#DIV/0!	35-55%	
Actual Load % of Nominal Target	#DIV/0!	#DIV/0!	95-105%	
Actual Fuel Load Density	#DIV/0!	lb/ft ³		
Allowable Charcoal Bed Wt. Range (lb)	0,1	to -0,1	lb	Mid-Point
Actual Charcoal Bed Wt.			lb	Out of Range
Actual Fuel Load Ending Wt.			lb	Valid Test
Total Wt. of Fuel Burned During Test Run lb.			0,0	≥ 90%
Load pieces Length in.	12	20	in.	

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Fuel Piece Moisture Reading (%-dry basis)					
1	2	3	Ave.	#DIV/0!	Pc. Wt. Dry Basis
			#DIV/0!	#DIV/0!	#DIV/0! lb
			#DIV/0!	#DIV/0!	#DIV/0! kg
			#DIV/0!	#DIV/0!	#DIV/0! lb
			#DIV/0!	#DIV/0!	#DIV/0! kg
			NA	NA	NA lb
			NA	NA	NA kg
Total Load Ave. MC % (dry basis)			#DIV/0!	#DIV/0!	
Total Load Ave. MC % (wet basis)			#DIV/0!	#DIV/0!	
Total Test Load Weight (dry basis)			#DIV/0!	#DIV/0!	lb
Total Fuel Weight Burned During Test Run (dry basis)			#DIV/0!	#DIV/0!	lb

For Usable Firebox Volumes above 3.0 ft ³ - Low and Medium Fire				
Nominal Required Load Density (wet basis)	12	lb/ft ³		
Usable Firebox Volume	3,34	ft ³		
Total Nom. Load Wt. Target	40,08	lb		
Total Load Wt. Allowable Range	38,08	to 42,08	lb	
Core Target Wt. Allowable Range	18,04	to 26,05	lb	
Remainder Load Wt. Allowable Range	14,03	to 22,04	lb	
				Mid-Point
Core Load Fuel Pc. Wt. Allowable Range	6,01	to 10,02	lb	8,02
Remainder Load Pc. Wt. Allowable Range	4,01	to 8,02	lb	6,01
	Pc. #			
Core Load Piece Wt. Actual	1	7,25	lb	In Range
	2	6,15	lb	In Range
	3	6,48	lb	In Range
Core Load Total. Wt. Actual		19,88	lb	In Range
	Pc. #			
Remainder Load Piece Wt.	1	7,98	lb	In Range
(3 or 4 Pcs.)	2	4,52	lb	In Range
	3	4,05	lb	In Range
	4	4,10	lb	In Range
Remainder Load Piece Weight Ratio - Small/Large	51%		≤ 67%	
Remainder Load Tot. Wt. Act	20,65	lb	In Range	
Total Load Wt. Actual	40,53	lb	In Range	
Core % of Total Wt.	49%		In Range	45-65%
Remainder % of Total Wt.	51%		In Range	35-55%
Actual Load % of Nominal Target	101%		In Range	95-105%
Actual Fuel Load Density	12,1	lb/ft ³		
Allowable Charcoal Bed Wt. Range (lb)	4,1	to 8,1	lb	Mid-Point
Actual Charcoal Bed Wt.	4,2	lb	In Range	6,1
Actual Fuel Load Ending Wt.	0,0	lb	Valid Test	≥ 90%
Total Wt. of Fuel Burned During Test Run lb.			40,5	

Fuel Piece Moisture Reading (%-dry basis)					
1	2	3	Ave.	#DIV/0!	Pc. Wt. Dry Basis
21,6	26,4	20,9	23,0	In Range	5,90 lb
27,6	27,8	20,3	25,2	In Range	4,91 lb
24,6	19,1	20,6	21,4	In Range	5,33 lb
					2,67 kg
					2,23 kg
					2,42 kg
24,6	22,1	19	21,9	In Range	6,54 lb
27,6	24,3	22,1	24,7	In Range	3,63 lb
27,6	23,1	19,3	23,3	In Range	3,29 lb
25,1	21,8	18,6	21,8	In Range	3,37 lb
					2,97 kg
					1,64 kg
					1,49 kg
					1,53 kg
Total Load Ave. MC % (dry basis)			23,0	In Range	
Total Load Ave. MC % (wet basis)			18,7		
Total Test Load Weight (dry basis)			32,96		lb
Total Fuel Weight Burned During Test Run (dry basis)			33,0		lb

	Start	End
Barometer (kPa):	99	99,4
Barometer (in.Hg):	29,234689	29,35280895
Dry Bulb (F):	70,8	67,8
Humidity (%):	21,9	19,6
Air velocity (ft/min)	0	0

High fire test						
DGM #1	Final:	#VALEUR!	cuft	Final:	na	Liter
	Initial:	#VALEUR!	cuft	Initial:	na	Liter
DGM #2	Final:	#VALEUR!	cuft	Final:	na	Liter
	Initial:	#VALEUR!	cuft	Initial:	na	Liter
DGM room				Final:	na	cuft
				Initial:	na	cuft

min or med burnrate						
DGM #1	Final:	7784,154	cuft	Final:	220422,700	Liter
	Initial:	7679,816	cuft	Initial:	217468,180	Liter
DGM #2	Final:	5482,240	cuft	Final:	155239,750	Liter
	Initial:	5376,765	cuft	Initial:	152253,020	Liter
DGM room				Final:	1096,450	cuft
				Initial:	913,250	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du test commence	299
Numéro de la ligne dans "Raw data" à partir duquel les données du highfire test commence	
Numéro de la ligne dans "Raw data" à partir duquel les données du min ou medium fire test commence	299

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

Project nu.	PI 20228
Date	21-04-2020
Technicien	M.M

Filter set weight Low/ medium fire

	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	6	01 02	16	9	03 04	18	15	05 06	34	7		
Before (1)												
Before (2)												
Before (3)												
Before (4)												
Before (5)	61,3742	0,1750	34,7557	61,4570	0,1752	34,1162	108,7832	0,1756	34,2807	0,1232	2020-04-20	17:00
Before (6)	61,3743	0,1750	34,7557	61,4570	0,1753	34,1162	108,7833	0,1757	34,2807	0,1232	2020-04-21	10:00
After (1)	61,3753	0,1817	34,7591	61,4573	0,1772	34,1178	108,7845	0,1819	34,2823	0,1234	2020-04-22	07:00
After (2)	61,3743	0,1802	34,7558	61,4570	0,1768	34,1162	108,7833	0,1815	34,2809	0,1233	2020-04-27	08:00
After (3)	61,3743	0,1801	34,7558	61,4570	0,1767	34,1162	108,7833	0,1815	34,2808	0,1233	2020-04-28	08:00
After (4)												
After (5)												
After (6)	61,3743	0,1801	34,7558	61,4570	0,1767	34,1162	108,7833	0,1815	34,2808	0,1233	2020-04-28	08:00
Difference	0,0000	0,0051	0,0000	0,0001	0,0000	0,0014	0,0000	0,0000	0,0058	0,0000	0,0001	0,0001
Total (mg)		5,2			6,6			5,9			0,1	
Total ajusté (mg)		5,10			6,50			5,80				

Project nu.	PI 20228
Date	21-04-2020
Technicien	Maxime Martin

*		*	*	*	*1	*2	*3	*4	*6	*7	*8	Mass flow 1	DGM 1	DGM 1	Filter 1	Mass flow 2	DGM 2	DGM 2	Filter 2
Elapsed	Raw data row	Weight Remaining	CO	CO ₂	Flue Gas	Room Temp	Tunnel Dry Bulb	Unit Top	Unit R.Side	Unit L.Side	Unit Bottom	Reading	Inlet T	Outlet T	Temp	Reading	Inlet T	Outlet T	Temp
Time min		lbs	%	%	°F	°F	°F	°F	°F	°F	°F	cuft/min	oF	oF	oF	cuft/min	oF	oF	oF
0,00	299,00	42,4	0,5	3,5	324,0	70,2	110,1	348,2	465,0	454,9	348,6	0,16	69,80	69,90	85,32	0,16	70,02	70,35	83,51
1,0	300,0	40,2	0,3	7,3	355,1	69,9	113,1	341,7	461,8	451,8	348,5	0,16	69,75	69,88	84,81	0,16	69,92	70,33	83,34
2,0	301,0	39,9	0,3	13,4	452,7	70,0	125,4	367,8	457,9	447,2	345,3	0,16	69,78	69,88	84,46	0,16	69,99	70,33	83,25
3,0	302,0	39,0	0,6	7,3	559,0	69,9	139,3	459,0	455,0	442,9	342,7	0,16	69,79	69,86	84,25	0,16	70,03	70,37	83,23
4,0	303,0	38,8	0,9	8,6	581,3	69,9	130,0	561,8	454,7	438,9	340,5	0,16	69,85	69,86	84,06	0,16	70,15	70,40	83,12
5,0	304,0	38,4	0,9	7,9	615,2	70,1	130,4	633,2	456,1	435,6	336,3	0,16	69,89	69,87	83,79	0,16	70,22	70,45	83,08
6,0	305,0	38,0	1,0	10,3	684,8	70,0	138,6	704,6	457,6	433,3	333,8	0,16	69,94	69,89	83,66	0,16	70,35	70,49	83,10
7,0	306,0	37,5	1,2	11,4	730,7	70,3	143,7	753,4	459,6	432,4	330,9	0,16	70,11	69,97	83,68	0,16	70,65	70,60	83,11
8,0	307,0	37,1	1,6	12,4	761,3	70,5	144,0	784,8	462,5	432,3	330,4	0,16	70,31	70,13	83,59	0,16	71,08	70,77	83,14
9,0	308,0	36,9	1,6	13,2	778,1	70,7	141,4	814,0	466,1	433,6	330,6	0,16	70,67	70,35	83,51	0,16	71,58	71,01	83,14
10,0	309,0	36,3	1,5	13,4	779,2	70,4	137,5	840,1	469,8	435,6	325,5	0,16	70,86	70,44	83,39	0,16	71,75	71,16	83,20
11,0	310,0	35,9	1,2	13,2	763,7	70,9	131,3	857,2	473,8	438,1	323,5	0,16	70,84	70,49	83,34	0,16	71,78	71,27	83,25
12,0	311,0	35,7	2,3	11,6	743,5	70,8	127,5	861,0	476,8	440,5	316,0	0,16	70,71	70,49	83,37	0,16	71,60	71,35	83,29
13,0	312,0	35,4	3,5	9,7	726,0	70,8	125,8	843,4	478,3	443,4	315,8	0,16	70,74	70,53	83,43	0,16	71,73	71,48	83,37
14,0	313,0	35,2	3,9	9,4	722,5	70,9	125,7	816,4	478,7	446,3	312,6	0,16	70,73	70,52	83,47	0,16	71,68	71,53	83,41
15,0	314,0	34,9	1,1	10,9	727,3	70,6	127,2	813,3	479,0	449,9	311,1	0,16	70,78	70,57	83,55	0,16	71,95	71,68	83,56
16,0	315,0	34,6	1,7	12,0	737,9	71,0	128,4	827,8	479,3	455,0	305,0	0,16	70,90	70,65	83,52	0,16	72,08	71,84	83,65
17,0	316,0	34,2	2,0	13,0	747,2	71,2	129,6	847,6	479,6	461,3	301,3	0,16	70,89	70,65	83,61	0,16	71,97	71,91	83,77
18,0	317,0	33,9	2,0	13,3	752,9	71,3	131,5	862,1	480,7	468,5	297,3	0,16	70,90	70,66	83,77	0,16	72,02	71,96	83,89
19,0	318,0	33,5	2,3	13,5	759,8	71,3	131,3	872,5	481,9	477,1	298,8	0,16	71,16	70,85	83,83	0,16	72,54	72,11	83,99
20,0	319,0	33,1	2,5	13,8	764,0	71,2	132,4	879,9	483,9	486,2	293,8	0,16	71,46	71,09	83,84	0,16	72,96	72,37	84,11
21,0	320,0	32,8	2,6	13,8	771,1	71,0	133,3	884,5	486,5	495,5	292,7	0,16	71,56	71,24	83,90	0,16	73,24	72,64	84,22
22,0	321,0	32,4	2,7	13,9	765,3	71,3	133,7	880,4	489,6	504,8	289,3	0,16	71,60	71,26	83,92	0,16	73,24	72,82	84,37
23,0	322,0	32,0	2,8	14,1	762,1	71,4	133,8	875,3	492,9	515,8	282,0	0,16	71,58	71,29	83,99	0,16	73,23	72,95	84,52
24,0	323,0	31,7	2,3	13,9	760,7	71,6	133,6	872,0	496,5	528,2	282,1	0,16	71,59	71,34	84,14	0,16	73,26	73,06	84,70
25,0	324,0	31,3	2,1	13,8	761,3	71,7	133,1	869,2	500,1	541,4	278,6	0,16	71,56	71,37	84,25	0,16	73,18	73,17	84,89
26,0	325,0	31,0	2,0	13,7	762,4	71,4	133,6	868,7	503,9	553,5	275,5	0,16	71,55	71,38	84,38	0,16	73,11	73,30	85,07
27,0	326,0	30,6	2,0	13,8	764,8	71,6	132,9	868,5	507,5	564,7	274,3	0,16	71,47	71,40	84,56	0,16	73,01	73,37	85,19
28,0	327,0	30,3	2,0	13,8	763,7	70,9	132,0	869,4	511,4	575,1	271,8	0,16	71,42	71,42	84,70	0,16	72,92	73,42	85,35
29,0	328,0	29,9	2,0	13,8	762,6	71,4	133,2	870,0	515,6	584,0	268,1	0,16	71,45	71,46	84,82	0,16	72,95	73,51	85,53
30,0	329,0	29,6	2,1	13,8	761,5	71,8	133,6	837,1	460,9	533,1	268,5	0,16	71,38	71,49	84,96	0,16	72,82	73,58	85,67
31,0	330,0	29,3	2,0	13,6	757,2	71,2	134,9	800,2	418,3	483,9	270,5	0,16	71,40	71,51	85,06	0,16	72,86	73,73	85,81
32,0	331,0	28,9	2,0	13,6	754,5	71,6	134,8	782,7	404,9	465,2	270,8	0,16	71,42	71,52	85,20	0,16	72,82	73,81	85,86
33,0	332,0	28,6	2,1	13,6	754,0	71,3	135,4	776,3	398,9	458,1	276,3	0,16	71,36	71,55	85,38	0,16	72,69	73,88	85,97
34,0	333,0	28,2	2,1	13,7	751,7	71,2	135,3	770,8	398,8	457,3	275,5	0,16	71,28	71,55	85,55	0,16	72,54	73,97	86,08
35,0	334,0	27,9	2,2	13,7	750,1	71,4	135,7	768,4	400,5	458,7	276,2	0,16	71,20	71,55	85,73	0,16	72,42	74,06	86,21
36,0	335,0	27,5	2,2	13,6	750,6	71,5	136,3	769,6	400,4	460,8	277,3	0,16	71,14	71,58	85,92	0,16	72,34	74,13	86,33
37,0	336,0	27,2	2,0	13,8	750,8	71,9	135,0	770,3	402,0	463,8	281,7	0,16	71,21	71,59	86,10	0,16	72,49	74,26	86,45
38,0	337,0	26,8	2,0	13,8	750,8	71,3	135,4	770,6	404,6	467,6	280,0	0,16	71,25	71,67	86,11	0,16	72,53	74,47	86,51
39,0	338,0	26,4	2,1	13,7	755,7	70,8	135,8	766,9	410,1	471,2	276,8	0,16	71,32	71,72	86,26	0,16	72,77	74,64	86,52
40,0	339,0	26,1	1,9	13,7	762,2	71,4	135,4	764,9	412,8	472,0	276,1	0,16	71,48	71,77	86,42	0,16	73,04	74,81	86,43
41,0	340,0	25,8	1,9	13,7	771,1	71,1	137,0	766,7	417,1	473,9	272,5	0,16	71,62	71,84	86,65	0,16	73,18	74,88	86,40
42,0	341,0	25,5	1,8	13,6	775,0	71,1	137,0	769,2	421,4	474,8	271,5	0,16	71,76	71,96	86,79	0,16	73,51	75,07	86,33
43,0	342,0	25,2	1,3	13,6	771,3	71,1	136,5	773,1	424,5	475,3	271,6	0,16	71,85	72,02	86,87	0,16	73,63	75,25	86,22
44,0	343,0	24,9	1,2	13,7	773,9	71,4	136,6	775,8	427,0	475,4	270,4	0,16	71,74	72,05	86,95	0,16	73,40	75,38	86,18
45,0	344,0	24,5	1,3	13,8	774,0	71,4	136,8	777,8	430,4	476,0	269,6	0,16	71,59	72,08	87,16	0,16	73,24	75,49	86,18
46,0	345,0	24,2	1,3	13,8	777,0	71,7	136,9	778,8	433,7	477,9	268,9	0,16	71,45	72,11	87,35	0,16	73,12	75,61	86,20
47,0	346,0	23,9	1,3	13,9	777,5	72,0	137,0	782,2	437,1	479,0	269,7	0,16	71,38	72,13	87,52	0,16	73,02	75,73	86,17
48,0	347,0	23,6	1,3	13,9	775,6	71,5	136,8	783,1	442,1	481,2	267,5	0,16	71,41	72,17	87,64	0,16	73,18	75,90	86,17
49,0	348,0	23,3	1,2	13,8	773,9	71,8	136,5	782,6	446,4	484,1	266,0	0,16	71,54	72,22	87,74	0,16	73,22	76,00	86,12
50,0	349,0	23,0	1,2	13,8	772,2	71,4	136,7	782,5	450,1	485,5	267,4	0,16	71,61	72,22	87,84	0,16	73,15	75,97	86,12
51,0	350,0	22,7	1,2	13,7	770,7	71,4	136,6	784,6	453,0	486,8	267,3	0,16	71,57	72,26	87,91	0,16	73,08	76,00	86,10
52,0	351,0	22,4	1,1	13,7	768,2	71,5	136,2	783,9	456,9	489,2	265,5	0,16	71,51	72,27	87,97	0,16	73,04	76,05	86,12
53,0	352,0	22,1	1,1	13,7	767,0	71,4	135,4	786,3	459,6	492,7	268,1	0,16	71,49	72,28	88,10	0,16	73,01	76,07	86,14
54,0	353,0	21,8	1,0	13,7	764,7	72,0	135,3	788,5	461,6	494,6	269,1	0,16	71,74	72,41	88,07	0,16	73,46	76,22	86,12
55,0	354,0	21,5	0,9	13,6	765,2	72,1	135,2	789,9	463,8	496,3	269,6	0,16	71,73	72,46	87,72	0,16	73,33	76,29	86,13
56,0	355,0	21,2	0,9	13,6	763,1	72,3	134,7	789,1	466,1	497,4	268,4	0,16	71,68	72,54	87,22	0,16	73,36	76,42	86,09
57,0	356,0	20,9	0,9	13,6	760,8	72,1	134,1	789,7	468,8	500,6	268,4	0,16	71,71	72,65	86,69	0,16	73,45	76,52	86,09
58,0	357,0	20,6	0,8	13,3	753,5	72,3	133,7	786,0	470,6	502,7	268,7	0,16	71,79	72,73	86,00	0,16	73,53	76,63	86,02
59,0	358,0	20,3	0,9	13,3	750,7	72,4	133,3	781,8	473,3	504,4	268,4	0,16	71,90	72,81	83,71	0,16	73,67	76	

79,0	378,0	15,2	0,5	12,4	708,4	73,2	127,1	741,8	507,6	528,9	272,6	0,16	72,16	73,44	82,67	0,16	73,93	77,34	83,80
80,0	379,0	15,0	0,4	12,5	708,2	73,1	126,2	739,0	510,7	528,5	266,8	0,16	72,07	73,46	81,69	0,16	73,86	77,38	83,73
81,0	380,0	14,8	0,5	12,5	707,5	73,1	126,5	735,5	511,8	531,6	271,4	0,16	71,89	73,43	84,28	0,16	73,70	77,39	83,70
82,0	381,0	14,6	0,4	12,4	705,6	71,8	125,4	733,6	514,0	534,3	270,0	0,16	71,89	73,41	85,88	0,16	73,79	77,37	83,79
83,0	382,0	14,4	0,4	12,0	700,7	72,6	124,8	730,9	516,8	535,8	267,3	0,16	72,08	73,46	84,46	0,16	73,92	77,36	83,71
84,0	383,0	14,1	0,4	11,8	697,2	72,7	124,4	729,9	518,8	536,2	269,5	0,16	72,09	73,44	83,09	0,16	73,85	77,33	83,59
85,0	384,0	13,9	0,4	11,7	694,6	73,0	124,5	730,5	517,5	535,6	270,0	0,16	72,04	73,43	81,97	0,16	73,76	77,36	83,50
86,0	385,0	13,7	0,3	12,1	693,2	72,1	123,8	730,8	522,5	536,4	273,2	0,16	71,87	73,42	83,54	0,16	73,62	77,39	83,44
87,0	386,0	13,5	0,4	11,7	689,9	72,8	124,7	730,7	523,2	535,4	275,1	0,16	71,82	73,40	86,07	0,16	73,61	77,40	83,41
88,0	387,0	13,3	0,4	11,6	687,1	72,2	123,3	728,8	527,6	535,9	271,9	0,16	71,80	73,37	84,71	0,16	73,55	77,40	83,34
89,0	388,0	13,1	0,4	11,6	684,9	72,6	122,8	728,6	527,5	535,1	273,9	0,16	71,75	73,36	83,26	0,16	73,44	77,39	83,23
90,0	389,0	12,9	0,4	11,6	682,9	73,1	123,2	727,2	531,5	534,3	274,7	0,16	71,65	73,31	82,03	0,16	73,38	77,39	83,15
91,0	390,0	12,7	0,4	11,5	680,2	72,2	121,8	723,0	538,6	534,3	275,8	0,16	71,64	73,30	83,08	0,16	73,36	77,40	83,07
92,0	391,0	12,5	0,4	11,6	677,6	72,3	121,7	723,3	543,8	534,8	273,8	0,16	71,76	73,30	86,01	0,16	73,43	77,39	83,04
93,0	392,0	12,4	0,4	11,4	675,1	72,4	121,7	722,8	545,4	533,5	274,8	0,16	71,83	73,36	84,79	0,16	73,54	77,41	83,00
94,0	393,0	12,2	0,2	11,1	669,1	72,5	121,0	716,5	545,4	533,3	272,5	0,16	71,88	73,36	83,31	0,16	73,53	77,42	82,90
95,0	394,0	12,0	0,2	10,9	666,4	72,4	120,6	715,1	543,1	532,8	277,4	0,16	71,88	73,35	82,14	0,16	73,50	77,43	82,75
96,0	395,0	11,8	0,2	10,8	662,1	71,9	119,1	707,8	542,5	533,0	279,4	0,16	71,78	73,33	83,03	0,16	73,45	77,45	82,89
97,0	396,0	11,7	0,2	10,7	658,0	72,1	117,8	701,7	542,1	532,6	280,0	0,16	71,70	73,29	85,85	0,16	73,39	77,46	84,23
98,0	397,0	11,5	0,1	10,5	653,3	72,6	119,2	697,9	539,5	531,5	277,7	0,16	71,66	73,30	84,62	0,16	73,38	77,49	85,79
99,0	398,0	11,4	0,1	10,3	647,8	72,3	117,7	691,1	538,8	530,5	278,1	0,16	71,65	73,29	83,11	0,16	73,39	77,52	86,79
100,0	399,0	11,3	0,1	10,0	640,9	72,2	116,9	683,0	539,3	530,8	279,2	0,16	71,62	73,30	81,84	0,16	73,35	77,51	86,43
101,0	400,0	11,1	0,1	9,6	633,0	70,9	116,5	673,0	537,0	530,6	281,5	0,16	71,75	73,37	83,97	0,16	73,49	77,57	86,18
102,0	401,0	11,0	0,1	9,3	623,8	71,6	115,4	660,2	538,7	529,7	278,6	0,16	71,83	73,35	86,02	0,16	73,53	77,50	85,95
103,0	402,0	10,9	0,1	9,2	616,6	71,8	115,5	651,1	534,0	528,1	281,1	0,16	71,62	73,33	84,53	0,16	73,30	77,45	85,55
104,0	403,0	10,7	0,1	9,0	608,5	71,5	113,7	639,9	533,1	525,9	281,2	0,16	71,30	73,28	82,84	0,16	73,07	77,39	85,18
105,0	404,0	10,6	0,1	8,9	601,2	71,7	113,3	629,5	531,9	524,1	280,4	0,16	71,18	73,24	81,73	0,16	73,02	77,39	84,89
106,0	405,0	10,5	0,2	8,9	594,5	71,3	111,9	619,7	529,9	523,7	283,8	0,16	71,22	73,24	85,11	0,16	73,07	77,39	84,69
107,0	406,0	10,4	0,2	8,8	587,2	71,7	112,2	610,7	526,8	522,4	283,1	0,16	71,31	73,25	85,76	0,16	73,12	77,40	84,54
108,0	407,0	10,3	0,2	8,7	579,9	71,9	110,3	601,6	525,5	521,4	280,7	0,16	71,40	73,23	84,07	0,16	73,36	77,43	84,36
109,0	408,0	10,2	0,2	8,6	574,4	71,8	109,6	593,8	524,6	519,2	279,7	0,16	71,67	73,22	82,57	0,16	73,54	77,42	83,98
110,0	409,0	10,1	0,2	8,5	569,1	71,7	109,3	585,6	522,6	517,9	281,6	0,16	71,73	73,20	82,16	0,16	73,46	77,35	83,62
111,0	410,0	9,9	0,2	8,5	563,0	71,2	107,7	577,7	518,1	517,0	286,4	0,16	71,83	73,18	85,56	0,16	73,56	77,36	83,36
112,0	411,0	9,8	0,3	8,4	558,3	70,4	106,9	575,0	511,4	514,8	288,4	0,16	70,91	73,04	84,77	0,16	72,79	77,19	83,07
113,0	412,0	9,8	0,3	8,3	552,8	70,7	105,6	565,7	511,2	511,7	286,9	0,16	70,29	72,90	82,84	0,16	72,34	77,01	82,81
114,0	413,0	9,7	0,3	8,3	546,7	70,5	105,9	557,1	510,6	510,2	287,1	0,16	70,19	72,80	81,61	0,16	72,16	76,87	82,91
115,0	414,0	9,6	0,3	8,2	541,4	70,8	104,2	550,0	509,6	510,0	287,0	0,16	70,27	72,73	84,65	0,16	72,09	76,79	84,14
116,0	415,0	9,5	0,3	8,2	538,3	70,9	106,1	547,2	506,6	507,5	283,0	0,16	70,56	72,78	86,25	0,16	72,41	76,85	85,61
117,0	416,0	9,4	0,4	8,3	535,7	71,0	106,4	545,9	501,7	505,8	284,0	0,16	70,87	72,87	86,07	0,16	72,68	76,94	86,61
118,0	417,0	9,3	0,3	8,5	534,7	70,5	107,0	547,8	501,5	503,8	283,0	0,16	71,17	72,88	85,83	0,16	73,12	77,04	86,91
119,0	418,0	9,1	0,3	8,5	532,6	70,5	106,1	551,0	498,4	503,1	284,4	0,16	71,37	72,87	85,69	0,16	73,22	77,12	86,95
120,0	419,0	9,1	0,3	8,6	533,1	70,5	106,8	555,0	496,8	501,6	283,5	0,16	71,44	72,85	85,59	0,16	73,12	77,13	86,92
121,0	420,0	8,9	0,3	8,8	535,7	70,2	105,9	561,6	491,8	501,6	287,7	0,16	70,94	72,76	85,43	0,16	72,70	77,09	86,87
122,0	421,0	8,8	0,3	9,2	538,0	70,8	106,3	570,6	491,3	501,4	286,4	0,16	70,50	72,69	85,37	0,16	72,45	77,09	86,71
123,0	422,0	8,7	0,3	9,5	540,0	70,8	106,6	577,9	489,4	501,7	285,6	0,16	70,54	72,64	85,23	0,16	72,49	77,19	86,62
124,0	423,0	8,6	0,3	9,4	540,7	69,5	105,3	582,1	485,4	503,0	288,7	0,16	70,18	72,54	85,14	0,16	72,16	77,21	86,52
125,0	424,0	8,5	0,3	9,0	539,2	70,1	105,6	581,3	484,8	501,3	286,3	0,16	69,80	72,45	84,97	0,16	71,84	77,11	86,30
126,0	425,0	8,4	0,3	9,4	535,8	69,4	105,8	576,9	483,7	500,3	285,2	0,16	69,84	72,37	84,88	0,16	71,85	77,11	86,12
127,0	426,0	8,3	0,4	9,3	533,2	70,5	105,2	572,4	480,2	498,2	285,7	0,16	70,09	72,33	84,86	0,16	71,92	77,13	86,04
128,0	427,0	8,2	0,4	9,2	530,5	70,3	105,0	567,3	480,9	496,5	285,0	0,16	70,35	72,31	84,80	0,16	72,06	77,23	85,94
129,0	428,0	8,1	0,4	9,1	527,9	71,1	104,5	561,0	479,4	494,8	287,3	0,16	70,60	72,31	84,81	0,16	72,20	77,39	85,88
130,0	429,0	8,1	0,4	8,9	524,4	71,2	104,7	552,9	477,7	492,9	286,8	0,16	70,77	72,34	84,91	0,16	72,27	77,45	85,86
131,0	430,0	7,9	0,3	8,6	520,2	70,9	104,0	543,7	476,7	491,9	287,1	0,16	70,90	72,35	85,03	0,16	72,35	77,45	85,81
132,0	431,0	7,9	0,3	8,5	516,5	71,0	103,4	536,8	476,0	490,8	285,7	0,16	71,08	72,39	85,08	0,16	72,59	77,42	85,75
133,0	432,0	7,8	0,4	8,5	513,4	71,5	103,1	530,5	474,6	489,9	289,0	0,17	71,25	72,42	85,15	0,16	72,73	77,48	85,69
134,0	433,0	7,7	0,3	8,5	509,9	70,8	102,7	524,9	473,5	488,0	287,9	0,16	71,33	72,42	85,17	0,16	72,75	77,44	85,66
135,0	434,0	7,7	0,4	8,2	505,1	71,2	102,5	520,9	472,8	486,2	289,3	0,16	71,33	72,46	85,26	0,16	72,73	77,38	85,61
136,0	435,0	7,6	0,5	7,9	499,2	71,5	102,0	515,6	471,2	483,8	289,7	0,16	71,34	72,50	85,32	0,16	72,68	77,35	85,56
137,0	436,0	7,5	0,5	7,7	493,5	71,4	101,3	508,4	470,0	481,3	289,2	0,16	71,33	72,55	85,45	0,16	72,68	77,34	85,51
138,0	437,0	7,5	0,6	7,5	486,8	71,0	101,1	501,7	468,3	479,2	289,6	0,16	71,36	72,57	85,47	0,16	72,71	77,35	85,44
139,0	438,0	7,5	0,6	7,5	480,9	71,1	100,4	495,3	466,8	477,1	289,9	0,16	71,36	72,57	85,48	0,16	72,69	77,37	85,35
140,0	439,0	7,4	0,7	7,4	474,5	70,9	99,8	487,0	465,4	473,7	289,3	0,16	71,37	72,60	85,46	0,16	72,72	77,34	85,27
141,0	440,0	7,3	0,7	7,3	468,4	70,8	99,2	479,3	462,8	471									

163.0	462.0	6,3	0,8	6,5	371,4	70,3	89,7	363,4	415,6	411,3	299,9	0,16	71,76	73,07	83,61	0,16	73,53	77,66	86,65
164.0	463.0	6,3	0,8	6,5	367,9	70,6	89,5	358,4	413,5	409,3	300,3	0,16	71,78	73,07	83,55	0,16	73,57	77,61	87,11
165.0	464.0	6,2	0,8	6,5	365,0	70,4	88,9	353,6	413,2	406,1	299,4	0,16	71,85	73,09	83,43	0,16	73,79	77,68	87,14
166.0	465.0	6,2	0,8	6,5	361,5	70,5	88,7	349,8	411,3	402,7	299,7	0,16	71,98	73,11	83,33	0,16	73,97	77,80	86,93
167.0	466.0	6,1	0,8	6,5	358,8	70,4	88,3	346,4	408,9	400,1	299,2	0,16	71,99	73,10	83,32	0,16	73,91	77,84	86,70
168.0	467.0	6,1	0,8	6,4	355,1	70,2	88,1	342,9	407,6	398,3	300,9	0,16	71,99	73,11	83,20	0,16	73,92	77,82	86,54
169.0	468.0	6,1	0,8	6,5	352,1	70,2	88,0	339,8	406,3	395,8	300,5	0,16	71,85	73,05	83,13	0,16	73,73	77,68	86,35
170.0	469.0	6,1	0,8	6,5	349,7	70,2	87,6	337,1	403,8	393,1	301,2	0,16	71,83	73,00	83,05	0,16	73,76	77,63	86,10
171.0	470.0	6,0	0,8	6,4	347,2	70,2	87,6	334,5	402,3	390,6	301,4	0,16	71,73	72,98	82,90	0,16	73,53	77,53	85,84
172.0	471.0	6,0	0,8	6,4	345,0	70,2	87,0	332,2	401,7	388,1	302,5	0,16	71,67	72,93	82,83	0,16	73,53	77,48	85,59
173.0	472.0	6,0	0,8	6,4	342,7	70,5	87,0	330,0	399,0	385,9	303,6	0,16	71,66	72,92	82,75	0,16	73,50	77,50	85,42
174.0	473.0	6,0	0,8	6,4	340,7	70,1	86,8	328,5	396,6	383,8	303,3	0,16	71,60	72,88	82,68	0,16	73,32	77,45	85,18
175.0	474.0	5,9	0,8	6,4	338,2	70,3	86,6	326,4	395,1	381,2	303,0	0,16	71,56	72,86	82,62	0,16	73,23	77,35	85,02
176.0	475.0	5,9	0,8	6,5	335,8	70,5	86,2	324,7	393,7	379,6	305,0	0,16	71,56	72,87	82,55	0,16	73,19	77,34	84,80
177.0	476.0	5,9	0,8	6,4	334,2	70,3	86,8	322,8	391,9	377,2	302,7	0,16	71,74	72,99	82,48	0,16	73,65	77,51	84,59
178.0	477.0	5,8	0,8	6,4	332,2	70,5	86,0	320,3	391,4	374,6	303,3	0,16	71,88	73,06	82,44	0,16	74,05	77,71	84,32
179.0	478.0	5,8	0,8	6,4	330,5	70,6	85,6	319,3	390,3	372,8	302,8	0,16	71,92	73,05	84,23	0,16	73,92	77,80	84,01
180.0	479.0	5,8	0,8	6,4	328,6	70,8	86,0	317,7	388,6	371,2	303,6	0,16	71,89	73,03	86,15	0,16	73,82	77,78	83,73
181.0	480.0	5,7	0,8	6,4	327,0	70,2	85,4	316,4	386,6	368,7	304,7	0,16	71,82	73,00	86,29	0,16	73,71	77,71	83,44
182.0	481.0	5,7	0,8	6,4	324,7	70,8	85,5	315,2	385,5	367,6	307,1	0,16	71,78	72,97	86,28	0,16	73,55	77,66	83,28
183.0	482.0	5,7	0,9	6,3	322,2	70,9	85,5	313,2	383,8	365,4	306,2	0,16	71,73	72,97	86,13	0,16	73,44	77,61	83,17
184.0	483.0	5,6	1,0	6,1	320,1	71,1	85,4	312,5	382,6	363,3	307,5	0,16	71,72	72,96	85,89	0,16	73,40	77,58	83,05
185.0	484.0	5,6	1,0	6,2	318,6	70,8	85,3	311,3	380,9	361,7	306,3	0,16	71,69	72,91	85,57	0,16	73,36	77,55	82,97
186.0	485.0	5,6	1,0	6,2	317,7	71,3	84,7	310,2	379,2	359,7	306,7	0,16	71,71	72,91	85,35	0,16	73,29	77,54	84,07
187.0	486.0	5,6	1,0	6,2	316,1	71,1	84,8	309,6	378,1	358,0	305,7	0,16	71,71	72,89	85,05	0,16	73,24	77,59	85,68
188.0	487.0	5,6	0,9	6,2	314,8	70,8	84,5	308,5	377,2	355,6	305,3	0,16	71,68	72,88	84,77	0,16	73,23	77,62	86,93
189.0	488.0	5,6	0,9	6,3	313,3	70,8	84,6	307,6	375,7	353,2	306,7	0,16	71,72	72,88	84,48	0,16	73,30	77,62	87,26
190.0	489.0	5,5	0,9	6,3	312,0	70,9	84,8	306,9	374,6	351,7	306,9	0,16	71,75	72,87	84,27	0,16	73,27	77,61	87,22
191.0	490.0	5,5	0,9	6,3	311,8	71,1	84,5	306,3	372,9	350,6	306,8	0,16	71,77	72,88	84,11	0,16	73,32	77,62	87,11
192.0	491.0	5,4	0,9	6,3	309,8	70,8	84,1	305,0	372,6	348,9	306,5	0,16	71,77	72,92	83,88	0,16	73,35	77,67	86,95
193.0	492.0	5,4	0,9	6,3	308,4	70,7	84,1	304,1	371,3	347,1	305,8	0,16	71,92	73,01	83,67	0,16	73,61	77,76	86,73
194.0	493.0	5,4	0,9	6,2	306,8	70,8	83,5	303,0	370,2	345,4	306,0	0,16	72,03	73,10	83,51	0,16	73,84	77,85	86,47
195.0	494.0	5,4	0,9	6,2	305,7	70,4	83,7	301,7	369,5	342,8	303,8	0,16	72,04	73,17	83,33	0,16	73,94	77,92	86,20
196.0	495.0	5,3	0,9	6,2	304,3	71,0	83,6	300,9	368,7	341,4	305,3	0,16	72,14	73,23	83,09	0,16	74,30	78,04	85,88
197.0	496.0	5,3	0,9	6,1	303,1	70,7	83,7	300,5	366,8	340,5	305,5	0,16	72,14	73,25	82,93	0,16	74,15	78,14	85,58
198.0	497.0	5,3	0,9	6,2	301,7	70,9	83,5	299,2	366,9	337,8	303,2	0,16	72,21	73,27	82,76	0,16	74,44	78,24	85,28
199.0	498.0	5,2	0,9	6,2	300,2	70,4	83,3	298,6	365,8	336,1	303,0	0,16	72,24	73,28	82,59	0,16	74,35	78,28	84,92
200.0	499.0	5,2	0,9	6,2	299,6	70,3	83,5	297,7	364,6	334,9	304,7	0,16	72,23	73,28	82,40	0,16	74,28	78,24	84,65
201.0	500.0	5,2	0,9	6,1	298,4	70,3	83,4	297,4	363,5	332,9	303,2	0,16	72,22	73,24	82,26	0,16	74,35	78,25	84,36
202.0	501.0	5,1	0,9	6,1	297,5	70,3	82,7	296,2	363,0	331,7	301,7	0,16	72,20	73,27	83,87	0,16	74,46	78,28	84,03
203.0	502.0	5,1	0,9	6,1	296,5	70,3	82,9	295,5	360,9	330,7	304,2	0,16	72,17	73,27	85,89	0,16	74,28	78,31	83,66
204.0	503.0	5,1	0,9	6,1	295,6	70,8	82,6	294,9	359,4	329,1	304,1	0,16	72,00	73,24	86,11	0,16	73,99	78,26	83,40
205.0	504.0	5,1	0,9	6,2	295,1	70,4	82,9	294,2	358,9	328,3	304,6	0,16	71,87	73,22	85,90	0,16	73,75	78,19	83,21
206.0	505.0	5,1	0,9	6,2	294,3	70,4	82,8	294,0	357,5	327,6	305,3	0,16	71,85	73,21	85,70	0,16	73,79	78,17	83,00
207.0	506.0	5,0	0,9	6,2	294,1	70,3	82,3	293,6	356,4	326,5	304,0	0,16	71,89	73,21	85,38	0,16	73,90	78,16	82,74
208.0	507.0	5,0	0,9	6,2	293,3	70,2	82,5	292,9	355,9	324,8	302,3	0,16	71,92	73,20	85,09	0,16	73,84	78,10	83,26
209.0	508.0	5,0	0,9	6,2	292,4	70,0	82,6	292,4	354,9	324,1	302,9	0,16	71,92	73,21	84,72	0,16	73,79	78,00	84,80
210.0	509.0	5,0	0,9	6,2	291,9	70,3	82,2	291,8	354,7	321,4	304,4	0,16	71,95	73,24	84,35	0,16	73,93	78,01	86,36
211.0	510.0	4,9	0,9	6,2	291,5	70,6	82,4	291,0	353,3	319,8	301,3	0,16	72,08	73,29	84,10	0,16	74,23	78,15	87,08
212.0	511.0	4,9	0,9	6,2	290,6	70,3	82,5	290,2	352,2	318,9	302,4	0,17	72,04	73,26	83,84	0,16	73,99	78,18	87,04
213.0	512.0	4,8	0,9	6,2	290,0	69,8	81,9	289,8	349,9	318,1	301,1	0,16	72,04	73,24	83,60	0,16	74,11	78,16	86,89
214.0	513.0	4,8	0,9	6,2	289,4	70,0	82,2	289,0	349,2	317,0	301,8	0,17	71,94	73,21	83,39	0,16	73,95	78,05	86,66
215.0	514.0	4,8	0,9	6,2	288,6	70,2	82,2	288,0	346,8	316,7	301,1	0,17	71,87	73,16	83,13	0,16	73,82	77,97	86,40
216.0	515.0	4,8	0,8	6,1	288,3	70,4	82,1	286,8	347,6	314,6	300,7	0,16	71,92	73,17	82,90	0,16	73,85	77,96	86,16
217.0	516.0	4,8	0,8	6,1	287,4	70,2	82,2	285,9	346,5	313,6	300,3	0,16	71,91	73,18	82,65	0,16	73,95	78,04	85,79
218.0	517.0	4,7	0,9	6,1	286,7	70,3	82,2	285,2	345,5	312,2	300,7	0,16	71,86	73,15	82,41	0,16	73,78	77,96	85,44
219.0	518.0	4,7	0,9	6,1	286,3	69,8	81,9	284,8	343,8	311,6	300,3	0,16	71,84	73,12	82,26	0,16	73,80	77,92	85,19
220.0	519.0	4,7	0,9	6,1	285,8	70,0	82,0	283,6	342,6	311,0	299,1	0,16	71,85	73,13	82,09	0,16	73,82	77,86	84,96
221.0	520.0	4,6	0,9	6,1	285,6	69,9	82,0	283,3	342,6	310,4	298,9	0,16	71,91	73,18	82,40	0,16	74,03	77,94	84,65
222.0	521.0	4,6	0,9	6,1	284,6	69,9	81,7	282,6	341,7	309,5	297,7	0,16	71,94	73,19	84,50	0,16	74,23	78,07	84,22
223.0	522.0	4,6	0,9	6,2	284,3	70,0	81,6	282,1	340,8	308,9	297,8	0,16	71,94	73,18	86,09	0,16	74,29	78,14	83,77
224.0	523.0	4,6	0,9	6,1	283,6	70,4	81,7	281,0	338,8	308,8	299,1	0,16	71,89	73,14	86,10	0,16	74,08	78,15	83,44
225.0	524.0	4,6	0,9	6,1	282,6	70,5	81,7	281,2	338,3	308,5	300,8	0,16	71,79	73,10	85,83	0,16	73,88	78,08	83,17</

247,0	546,0	4,1	0,9	5,7	267,7	70,2	80,7	265,3	321,5	292,2	292,1	0,16	71,92	73,11	84,63	0,16	74,13	78,17	82,81
248,0	547,0	4,1	0,9	5,7	266,8	70,6	80,4	264,3	319,8	291,6	291,4	0,16	72,02	73,13	84,28	0,16	74,17	78,25	83,33
249,0	548,0	4,0	0,9	5,7	265,9	70,9	80,5	262,7	318,8	290,9	291,9	0,16	71,98	73,11	83,92	0,16	73,97	78,22	84,78
250,0	549,0	4,0	0,8	5,6	264,9	70,3	80,3	261,4	317,8	290,0	291,4	0,16	71,88	73,09	83,61	0,16	73,76	78,10	86,25
251,0	550,0	4,0	0,8	5,6	264,3	70,6	80,6	260,5	316,8	289,4	293,2	0,16	71,80	73,08	83,25	0,16	73,65	77,99	86,94
252,0	551,0	3,9	0,8	5,6	263,4	70,5	80,4	259,4	315,5	289,0	292,8	0,16	71,77	73,03	82,92	0,16	73,59	77,91	86,97
253,0	552,0	4,0	0,8	5,6	262,5	70,7	80,4	258,1	314,6	288,1	293,2	0,16	71,74	73,02	82,58	0,16	73,63	77,87	86,82
254,0	553,0	3,9	0,8	5,6	261,9	70,3	80,1	257,6	313,7	287,3	292,5	0,16	71,70	72,98	82,28	0,16	73,54	77,83	86,53
255,0	554,0	3,9	0,8	5,6	259,6	70,2	80,2	256,1	313,1	287,0	291,0	0,16	71,66	73,00	82,18	0,16	73,53	77,83	86,25
256,0	555,0	3,8	0,9	5,1	257,8	70,4	79,9	254,4	311,9	286,7	291,2	0,16	71,65	72,96	83,90	0,16	73,43	77,82	85,86
257,0	556,0	3,8	0,8	5,1	256,7	70,5	79,8	252,6	310,5	286,5	291,7	0,16	71,64	72,97	85,93	0,16	73,35	77,77	85,47
258,0	557,0	3,8	0,8	5,1	255,0	70,4	80,0	251,4	309,6	285,3	291,5	0,16	71,67	72,94	86,15	0,16	73,37	77,75	85,03
259,0	558,0	3,8	0,8	5,1	252,9	70,6	79,9	249,8	309,2	284,5	291,1	0,16	71,67	72,93	85,89	0,16	73,41	77,77	84,69
260,0	559,0	3,8	0,8	5,0	251,9	70,5	79,7	248,7	307,9	283,6	290,8	0,16	71,67	72,93	85,59	0,16	73,38	77,76	84,41
261,0	560,0	3,8	0,8	5,0	250,5	70,5	79,6	247,9	307,2	282,9	289,9	0,16	71,67	72,93	85,23	0,16	73,46	77,76	84,09
262,0	561,0	3,8	0,8	5,0	249,0	70,4	79,5	246,3	305,9	281,9	290,2	0,16	71,69	72,92	84,83	0,16	73,60	77,80	83,78
263,0	562,0	3,8	0,8	5,0	247,8	70,6	79,6	245,4	304,5	281,4	289,2	0,16	71,72	72,92	84,45	0,16	73,67	77,83	83,49
264,0	563,0	3,7	0,8	5,0	246,5	70,7	79,5	244,6	303,5	280,7	288,9	0,16	71,76	72,96	84,08	0,16	73,77	77,90	83,16
265,0	564,0	3,7	0,8	5,0	245,6	70,7	79,6	243,6	302,0	279,9	288,6	0,16	71,78	72,97	83,70	0,16	73,82	77,92	82,87
266,0	565,0	3,7	0,8	5,0	244,3	70,3	79,4	242,7	301,0	278,2	286,4	0,16	71,77	72,97	83,38	0,16	73,84	77,94	82,67
267,0	566,0	3,7	0,8	5,1	242,9	70,3	79,1	241,4	299,9	277,8	286,4	0,16	71,78	72,96	83,02	0,16	73,69	77,96	84,11
268,0	567,0	3,7	0,8	5,1	241,9	70,5	79,1	240,5	298,6	276,8	286,8	0,16	71,73	72,98	82,67	0,16	73,54	77,96	85,63
269,0	568,0	3,6	0,8	5,1	241,1	70,3	79,2	239,9	297,5	275,7	286,0	0,16	71,70	72,98	82,38	0,16	73,52	77,97	86,63
270,0	569,0	3,6	0,8	5,1	240,0	70,4	79,3	239,1	296,8	275,9	285,2	0,16	71,74	72,99	82,13	0,16	73,60	77,96	86,83
271,0	570,0	3,6	0,8	5,1	239,0	70,7	79,3	238,3	295,5	275,3	285,3	0,16	71,76	72,97	83,12	0,16	73,75	77,98	86,60
272,0	571,0	3,6	0,8	5,1	238,1	70,7	78,9	237,3	294,1	274,8	284,5	0,16	71,76	72,97	85,25	0,16	73,70	77,95	86,23
273,0	572,0	3,6	0,8	5,0	237,3	70,8	78,9	236,5	293,4	273,9	283,6	0,16	71,78	72,97	86,35	0,16	73,70	77,96	85,85
274,0	573,0	3,5	0,8	5,1	236,6	70,8	78,9	236,0	292,7	273,2	284,5	0,16	71,79	72,97	86,19	0,16	73,72	77,96	85,46
275,0	574,0	3,6	0,8	5,1	236,1	70,5	79,0	235,6	291,4	271,8	283,2	0,16	71,81	72,98	85,80	0,16	73,90	77,99	85,11
276,0	575,0	3,5	0,8	5,1	235,4	70,5	78,9	235,2	290,4	270,6	282,1	0,16	71,83	72,98	85,44	0,16	73,94	78,01	84,79
277,0	576,0	3,5	0,8	5,1	234,4	70,5	79,0	234,4	288,9	270,0	282,8	0,16	71,81	73,00	85,08	0,16	74,02	78,06	84,49
278,0	577,0	3,5	0,8	5,1	233,6	70,4	79,0	234,6	288,3	269,4	281,9	0,16	71,80	72,99	84,65	0,16	73,98	78,05	84,17
279,0	578,0	3,5	0,8	5,1	233,2	70,3	78,7	234,6	287,5	268,6	280,8	0,16	71,79	72,99	84,24	0,16	73,99	78,08	83,87
280,0	579,0	3,5	0,8	5,2	232,4	70,5	78,8	234,1	286,7	267,5	279,9	0,16	71,84	73,02	83,88	0,16	74,15	78,14	83,54
281,0	580,0	3,4	0,8	5,1	231,8	70,5	78,6	232,9	285,7	267,5	280,5	0,16	71,86	73,04	83,50	0,16	74,29	78,18	83,26
282,0	581,0	3,4	0,9	5,0	231,3	70,6	78,6	232,1	285,0	266,3	280,2	0,16	71,84	73,04	83,16	0,16	74,27	78,22	82,90
283,0	582,0	3,4	0,9	5,0	230,3	70,3	78,5	231,0	284,0	265,9	279,0	0,16	71,84	73,05	82,85	0,16	74,29	78,24	82,58
284,0	583,0	3,4	0,9	5,0	229,9	70,5	78,3	230,6	283,5	264,8	277,7	0,16	71,82	73,02	82,52	0,16	74,21	78,24	82,81
285,0	584,0	3,3	0,9	5,0	228,7	70,4	78,1	230,0	282,8	264,5	277,8	0,16	71,80	73,04	82,15	0,16	73,89	78,20	84,24
286,0	585,0	3,3	0,9	5,0	228,5	70,2	78,1	229,3	281,8	263,6	277,9	0,16	71,79	73,02	82,01	0,16	73,77	78,20	85,80
287,0	586,0	3,3	0,9	5,0	227,8	70,2	77,9	229,4	281,4	263,8	278,0	0,16	71,77	73,01	83,68	0,16	73,73	78,14	86,77
288,0	587,0	3,3	0,9	5,0	227,1	70,3	78,1	228,5	279,3	263,2	276,0	0,16	71,72	72,98	85,79	0,16	73,60	78,09	86,76
289,0	588,0	3,3	0,9	5,0	226,3	70,2	77,8	228,0	279,0	262,2	276,0	0,16	71,66	72,97	86,19	0,16	73,57	78,04	86,42
290,0	589,0	3,3	0,9	5,0	225,5	70,2	78,0	227,2	278,0	261,8	275,9	0,16	71,65	72,94	85,95	0,16	73,50	77,97	86,17
291,0	590,0	3,3	0,9	5,0	225,1	70,0	78,0	227,2	277,6	260,7	273,5	0,16	71,65	72,96	85,56	0,16	73,58	77,93	85,88
292,0	591,0	3,2	0,9	5,0	224,7	70,2	78,0	226,0	276,4	259,9	273,8	0,16	71,63	72,93	85,19	0,16	73,58	77,92	85,55
293,0	592,0	3,2	0,9	5,0	224,2	70,2	77,9	225,8	275,7	259,8	273,1	0,16	71,64	72,93	84,80	0,16	73,53	77,88	85,26
294,0	593,0	3,2	0,9	5,0	223,7	70,2	77,8	224,8	275,8	259,4	272,6	0,16	71,61	72,92	84,44	0,16	73,56	77,86	84,94
295,0	594,0	3,2	0,9	5,0	223,1	70,2	77,7	224,5	275,1	258,3	272,0	0,16	71,58	72,89	84,03	0,16	73,49	77,80	84,59
296,0	595,0	3,2	0,9	5,0	222,6	70,1	77,7	224,1	274,7	257,3	270,5	0,16	71,56	72,87	83,71	0,16	73,43	77,76	84,25
297,0	596,0	3,2	0,9	5,1	222,2	70,3	77,7	223,7	273,5	257,2	270,4	0,16	71,49	72,85	83,31	0,16	73,41	77,70	83,91
298,0	597,0	3,2	0,9	5,0	221,8	70,4	77,6	223,2	272,3	256,4	270,7	0,16	71,48	72,82	82,94	0,16	73,35	77,64	83,56
299,0	598,0	3,1	0,9	5,0	221,7	70,1	77,6	223,3	271,5	255,9	269,1	0,16	71,46	72,82	82,49	0,16	73,22	77,55	83,22
300,0	599,0	3,1	0,9	5,0	221,1	69,6	77,6	222,6	271,2	255,1	267,7	0,16	71,44	72,78	82,13	0,16	73,22	77,50	82,90
301,0	600,0	3,1	0,9	5,0	220,6	69,8	77,4	222,2	270,5	255,0	269,0	0,16	71,36	72,78	82,85	0,16	73,08	77,43	82,55
302,0	601,0	3,0	0,9	5,0	220,2	70,0	77,1	222,8	268,9	255,6	270,2	0,16	71,34	72,76	84,76	0,16	73,02	77,37	82,67
303,0	602,0	3,0	0,9	5,0	219,9	69,8	77,1	222,8	269,0	254,2	268,8	0,16	71,32	72,74	86,17	0,16	72,97	77,31	83,80
304,0	603,0	3,0	0,9	5,0	219,5	69,5	77,2	221,9	268,8	253,7	266,0	0,16	71,28	72,75	86,04	0,16	72,85	77,23	85,27
305,0	604,0	3,0	0,9	5,0	219,2	69,6	77,2	220,8	268,3	253,0	266,4	0,16	71,26	72,72	85,69	0,16	72,81	77,17	86,52
306,0	605,0	3,0	0,9	5,0	218,5	69,6	77,1	221,1	267,3	252,1	264,5	0,16	71,21	72,72	85,22	0,16	72,74	77,15	86,79
307,0	606,0	3,0	0,9	5,0	217,7	69,5	77,3	220,4	266,9	251,7	263,8	0,16	71,19	72,70	84,80	0,16	72,76	77,17	86,65
308,0	607,0	2,9	0,9	4,7	217,2	69,5	77,1	219,0	266,0	251,5	263,4	0,16	71,18	72,66	84,30	0,16	72,74	77,13	86,32
309,0	608,0	2,9	0,9	4,7	217,1	69,3	77,0	218,8	266,1	250,4	262,8	0,16	71,14	72,66	83,84	0,16	72,67	77,07	86,03</

331,0	630,0	2,6	0,8	4,5	205,0	69,0	75,9	206,8	251,1	236,2	249,0	0,16	71,02	72,36	86,06	0,16	72,54	76,47	83,62
332,0	631,0	2,6	0,8	4,5	204,4	69,1	75,9	206,4	250,9	235,7	248,4	0,16	70,96	72,37	85,72	0,16	72,44	76,40	83,27
333,0	632,0	2,6	0,8	4,5	203,8	69,0	75,9	206,1	250,1	235,3	247,3	0,16	70,98	72,35	85,21	0,16	72,56	76,37	82,93
334,0	633,0	2,6	0,8	4,5	203,4	68,9	75,7	205,3	249,8	234,7	246,6	0,16	70,98	72,34	84,65	0,16	72,53	76,32	82,59
335,0	634,0	2,6	0,8	4,5	202,9	69,0	75,5	204,6	249,3	233,8	245,8	0,16	71,08	72,36	84,18	0,16	72,84	76,39	82,26
336,0	635,0	2,5	0,8	4,5	202,1	68,9	75,5	204,6	248,7	233,2	245,4	0,16	71,15	72,38	83,64	0,16	72,84	76,41	83,00
337,0	636,0	2,5	0,8	4,5	201,6	68,9	75,4	204,6	248,5	233,1	244,9	0,16	71,18	72,37	83,11	0,16	72,95	76,39	84,27
338,0	637,0	2,5	0,8	4,5	201,3	68,9	75,4	203,6	247,4	232,1	244,9	0,16	71,11	72,37	82,58	0,16	72,80	76,34	85,57
339,0	638,0	2,5	0,8	4,3	200,8	68,8	75,5	203,5	245,9	231,4	245,2	0,16	71,01	72,36	82,10	0,16	72,59	76,31	86,45
340,0	639,0	2,5	0,8	4,3	200,1	68,8	75,7	202,8	245,5	231,1	244,4	0,16	70,89	72,30	82,18	0,16	72,50	76,26	86,55
341,0	640,0	2,5	0,8	4,3	199,5	68,8	75,4	202,3	244,8	230,6	243,6	0,16	70,85	72,29	83,78	0,16	72,47	76,26	86,23
342,0	641,0	2,5	0,8	4,3	199,1	68,9	75,3	201,6	243,8	230,0	244,4	0,16	70,80	72,26	85,42	0,16	72,39	76,21	85,83
343,0	642,0	2,4	0,8	4,3	198,2	68,7	75,4	200,8	243,1	228,6	243,4	0,16	70,76	72,24	85,66	0,16	72,26	76,17	85,39
344,0	643,0	2,4	0,8	4,3	197,6	68,8	75,4	200,7	242,3	227,9	242,3	0,16	70,70	72,20	85,30	0,16	72,19	76,10	84,99
345,0	644,0	2,4	0,9	4,3	197,0	68,7	75,3	200,6	241,6	227,3	241,2	0,16	70,71	72,18	84,84	0,16	72,19	76,06	84,58
346,0	645,0	2,4	0,9	4,3	196,3	68,7	75,0	199,8	240,5	227,6	240,2	0,16	70,74	72,17	84,32	0,16	72,29	76,04	84,15
347,0	646,0	2,4	0,9	4,3	195,7	68,7	75,0	199,5	239,2	227,0	239,7	0,16	70,81	72,16	83,80	0,16	72,36	76,01	83,79
348,0	647,0	2,4	0,9	4,3	195,3	68,7	75,0	199,7	239,1	226,5	239,8	0,16	70,89	72,15	83,29	0,16	72,41	76,01	83,44
349,0	648,0	2,4	0,9	4,3	194,7	68,7	75,1	199,1	238,5	225,9	240,3	0,16	70,86	72,13	82,76	0,16	72,37	75,98	83,06
350,0	649,0	2,4	0,8	4,3	194,0	68,7	75,2	198,7	238,1	225,1	239,5	0,16	70,79	72,11	82,27	0,16	72,25	75,92	82,68
351,0	650,0	2,3	0,8	4,3	193,7	68,7	75,0	199,4	237,5	224,6	238,8	0,16	70,74	72,08	81,97	0,16	72,17	75,92	82,39
352,0	651,0	2,3	0,8	4,3	193,2	68,7	74,9	198,8	236,0	224,4	239,3	0,16	70,70	72,07	83,23	0,16	72,13	75,88	83,17
353,0	652,0	2,3	0,8	4,3	192,5	68,7	74,8	198,6	234,9	224,4	239,8	0,16	70,72	72,07	84,84	0,16	72,30	75,85	84,39
354,0	653,0	2,3	0,8	4,3	192,2	68,6	74,7	198,8	234,9	223,2	237,7	0,16	70,74	72,03	85,92	0,16	72,25	75,84	85,60
355,0	654,0	2,3	0,8	4,3	191,7	68,6	74,6	198,1	235,0	222,9	235,1	0,16	70,72	72,05	85,75	0,16	72,20	75,79	86,51
356,0	655,0	2,3	0,8	4,3	191,4	68,6	74,7	197,7	234,2	222,3	235,6	0,16	70,77	72,04	85,34	0,16	72,35	75,81	86,58
357,0	656,0	2,3	0,8	4,3	190,8	68,5	74,8	197,1	233,7	221,2	235,3	0,16	70,71	72,00	84,80	0,16	72,24	75,79	86,31
358,0	657,0	2,3	0,8	4,4	190,4	68,8	74,8	196,7	233,4	221,1	233,7	0,16	70,79	72,00	84,23	0,16	72,46	75,82	85,89
359,0	658,0	2,2	0,8	4,4	190,1	68,6	74,7	196,6	232,1	221,0	234,3	0,16	70,84	72,00	83,62	0,16	72,46	75,85	85,49
360,0	659,0	2,2	0,8	4,4	189,5	68,5	74,9	196,2	232,2	220,3	233,5	0,16	70,83	71,98	83,08	0,16	72,43	75,85	85,09
361,0	660,0	2,2	0,8	4,4	189,5	68,5	74,6	196,2	231,2	219,6	232,6	0,16	70,80	71,96	82,59	0,16	72,36	75,83	84,68
362,0	661,0	2,2	0,8	4,3	189,0	68,6	74,6	195,9	230,6	219,3	232,1	0,16	70,76	71,95	82,09	0,16	72,33	75,81	84,26
363,0	662,0	2,2	0,8	4,3	188,7	68,7	74,6	195,8	230,1	219,0	231,9	0,16	70,70	71,93	82,32	0,16	72,21	75,76	83,83
364,0	663,0	2,2	0,8	4,3	188,4	68,5	74,6	195,5	229,6	218,7	230,8	0,16	70,61	71,94	83,95	0,16	72,11	75,73	83,33
365,0	664,0	2,2	0,8	4,3	187,7	68,5	74,5	194,9	229,1	217,9	230,1	0,16	70,60	71,92	85,59	0,16	72,09	75,72	82,85
366,0	665,0	2,1	0,8	4,4	187,5	68,6	74,5	195,5	228,4	217,4	229,7	0,16	70,56	71,92	85,86	0,16	72,00	75,72	82,39
367,0	666,0	2,1	0,8	4,4	187,5	68,5	74,5	195,0	228,1	217,2	229,3	0,16	70,50	71,90	85,50	0,16	71,91	75,71	82,66
368,0	667,0	2,1	0,8	4,4	187,4	68,5	74,6	195,2	227,9	216,4	228,2	0,16	70,49	71,91	85,05	0,16	71,91	75,70	83,86
369,0	668,0	2,1	0,8	4,4	187,1	68,5	74,5	195,2	227,4	216,2	228,6	0,16	70,54	71,90	84,52	0,16	71,96	75,72	85,14
370,0	669,0	2,1	0,8	4,4	186,8	68,6	74,4	194,9	227,1	215,7	228,1	0,16	70,52	71,91	83,98	0,16	71,88	75,74	86,27
371,0	670,0	2,1	0,8	4,4	186,6	68,6	74,6	194,7	226,5	215,2	227,6	0,16	70,47	71,89	83,46	0,16	71,86	75,70	86,73
372,0	671,0	2,0	0,8	4,4	186,3	68,5	74,4	193,8	226,0	214,7	227,3	0,16	70,51	71,88	83,00	0,16	71,88	75,68	86,60
373,0	672,0	2,1	0,8	4,4	186,5	68,6	74,4	194,4	225,3	214,9	226,4	0,16	70,53	71,86	82,51	0,16	72,01	75,65	86,25
374,0	673,0	2,0	0,8	4,4	186,1	68,4	74,4	194,5	224,8	214,4	226,7	0,16	70,56	71,83	81,97	0,16	72,02	75,67	85,89
375,0	674,0	2,0	0,8	4,4	185,9	68,7	74,2	194,3	224,2	214,0	225,8	0,16	70,61	71,86	82,01	0,16	72,15	75,69	85,45
376,0	675,0	2,0	0,8	4,3	185,6	68,6	74,1	194,2	224,2	214,4	225,8	0,16	70,67	71,85	83,55	0,16	72,30	75,78	84,90
377,0	676,0	2,0	0,8	4,3	185,3	68,5	74,0	194,0	223,5	213,8	225,3	0,16	70,64	71,84	85,36	0,16	72,17	75,81	84,39
378,0	677,0	2,0	0,8	4,3	185,1	68,5	74,1	193,7	223,2	213,0	225,3	0,16	70,61	71,83	85,94	0,16	72,08	75,77	83,95
379,0	678,0	2,0	0,8	4,4	185,0	68,4	74,1	193,6	222,7	211,8	224,1	0,16	70,56	71,82	85,57	0,16	72,04	75,73	83,52
380,0	679,0	2,0	0,8	4,3	184,9	68,5	73,9	193,0	222,3	211,5	223,9	0,16	70,60	71,80	85,12	0,16	72,28	75,77	83,08
381,0	680,0	2,0	0,8	4,3	184,6	68,8	74,0	193,2	221,8	211,9	224,1	0,16	70,65	71,83	84,54	0,16	72,30	75,79	82,64
382,0	681,0	1,9	0,8	4,3	184,3	68,5	73,8	192,8	220,9	211,3	223,8	0,16	70,70	71,83	83,97	0,16	72,28	75,78	82,26
383,0	682,0	1,9	0,8	4,3	183,8	68,6	74,1	192,3	220,7	210,4	222,3	0,16	70,70	71,85	83,45	0,16	72,31	75,75	82,98
384,0	683,0	1,9	0,8	4,3	184,1	68,5	73,7	192,4	220,4	210,2	221,6	0,16	70,68	71,83	82,94	0,16	72,22	75,71	84,35
385,0	684,0	1,9	0,8	4,3	184,0	68,6	73,7	192,1	220,0	209,6	220,9	0,16	70,65	71,85	82,41	0,16	72,26	75,72	85,68
386,0	685,0	1,9	0,8	4,3	183,8	68,5	73,8	192,1	219,5	209,7	221,6	0,16	70,61	71,83	81,88	0,16	72,18	75,72	86,46
387,0	686,0	1,9	0,8	4,3	183,9	68,3	73,8	191,8	219,1	209,5	219,9	0,16	70,58	71,84	82,85	0,16	72,28	75,73	86,37
388,0	687,0	1,9	0,8	4,3	183,5	68,5	73,9	191,4	218,5	209,4	220,3	0,16	70,62	71,84	84,62	0,16	72,45	75,80	85,94
389,0	688,0	1,8	0,8	4,3	183,3	68,3	73,8	191,3	218,8	209,3	220,2	0,16	70,58	71,82	85,82	0,16	72,28	75,80	85,50
390,0	689,0	1,8	0,8	4,3	183,3	68,3	73,9	191,4	218,6	208,1	219,3	0,16	70,52	71,79	85,70	0,16	72,16	75,78	85,03
391,0	690,0	1,8	0,9	4,3	183,3	68,3	73,9	191,3	217,8	207,7	219,8	0,16	70,52	71,80	85,34	0,16	72,25	75,75	84,61
392,0	691,0	1,8	0,8	4,3	182,9	68,6	73,9	191,3	217,6	207,6	218,9	0,16	70,56	71,79	84,82	0,16	72,37	75,78	84,18
393,0	692,0	1,8	0,8	4,2	182,6	68,4	73,8	190,6	217,0	207,6	219,0	0,16	70,58	71,78	84,30	0,16	72,38	75,79	83,73

415,0	714,0	1,5	0,7	4,2	177,9	68,0	73,3	186,2	209,7	201,1	210,0	0,16	70,44	71,64	85,03	0,16	72,32	75,75	85,82
416,0	715,0	1,5	0,7	4,2	177,8	68,1	73,4	185,6	209,2	200,7	209,6	0,16	70,34	71,64	84,53	0,16	72,17	75,69	86,42
417,0	716,0	1,5	0,7	4,2	177,8	68,2	73,3	185,4	208,8	200,3	209,4	0,16	70,33	71,61	83,99	0,16	72,13	75,63	86,34
418,0	717,0	1,5	0,7	4,2	177,8	68,0	73,3	185,2	208,6	200,4	209,0	0,16	70,34	71,61	83,44	0,16	72,14	75,60	86,00
419,0	718,0	1,5	0,8	4,2	178,0	68,2	73,3	185,4	208,3	199,9	209,4	0,16	70,38	71,59	82,93	0,16	72,31	75,64	85,60
420,0	719,0	1,5	0,8	4,2	177,5	68,1	73,2	184,8	207,9	199,2	208,4	0,16	70,37	71,59	82,40	0,16	72,19	75,69	85,17
421,0	720,0	1,4	0,8	4,2	177,1	68,4	73,1	185,3	207,8	199,1	208,5	0,16	70,35	71,59	81,93	0,16	72,29	75,70	84,70
422,0	721,0	1,4	0,8	4,2	176,9	68,4	73,1	184,8	207,3	199,1	207,9	0,16	70,38	71,59	82,20	0,16	72,21	75,71	84,22
423,0	722,0	1,5	0,8	4,2	176,8	68,3	73,1	184,6	207,3	198,4	207,9	0,16	70,36	71,57	83,63	0,16	72,20	75,68	83,68
424,0	723,0	1,5	0,8	4,2	176,9	68,0	73,1	184,8	207,0	198,2	206,6	0,16	70,36	71,57	85,16	0,16	72,13	75,65	83,16
425,0	724,0	1,4	0,8	4,2	176,4	68,1	73,1	184,3	206,6	198,1	206,4	0,16	70,31	71,55	85,85	0,16	72,09	75,62	82,66
426,0	725,0	1,4	0,8	4,2	176,4	68,2	73,2	183,8	206,8	197,5	206,4	0,16	70,31	71,55	85,59	0,16	72,12	75,60	82,22
427,0	726,0	1,4	0,8	4,2	176,0	68,1	73,1	183,9	206,5	197,8	206,5	0,16	70,31	71,54	85,16	0,16	72,10	75,58	82,33
428,0	727,0	1,4	0,8	4,1	176,2	68,1	73,0	183,5	206,2	197,4	206,3	0,16	70,28	71,52	84,66	0,16	72,03	75,54	83,36
429,0	728,0	1,4	0,7	4,0	176,0	68,2	73,1	183,5	205,7	196,8	205,9	0,16	70,28	71,52	84,14	0,16	72,01	75,52	84,49
430,0	729,0	1,3	0,7	3,9	175,5	68,1	73,0	183,0	205,2	196,0	205,0	0,16	70,27	71,53	83,59	0,16	72,02	75,48	85,46
431,0	730,0	1,4	0,7	3,9	175,3	68,3	72,9	182,6	204,9	195,9	204,9	0,16	70,28	71,52	83,03	0,16	72,05	75,46	86,22
432,0	731,0	1,3	0,7	4,0	175,4	68,3	72,9	182,1	204,2	195,8	205,2	0,16	70,27	71,51	82,49	0,16	72,04	75,51	86,27
433,0	732,0	1,3	0,7	4,0	175,1	68,3	72,8	182,0	203,7	195,5	205,1	0,16	70,28	71,48	81,95	0,16	72,01	75,48	85,98
434,0	733,0	1,3	0,7	3,9	174,9	68,1	72,9	181,5	203,6	194,9	205,0	0,16	70,26	71,46	82,33	0,16	71,96	75,42	85,55
435,0	734,0	1,3	0,7	4,0	174,5	68,2	72,7	181,0	203,0	194,7	204,4	0,16	70,23	71,46	83,79	0,16	72,05	75,50	84,99
436,0	735,0	1,3	0,7	4,0	174,4	68,2	72,7	180,5	202,4	194,1	203,7	0,16	70,21	71,45	85,32	0,16	72,09	75,54	84,43
437,0	736,0	1,3	0,7	3,9	173,8	68,0	72,7	180,0	202,4	194,0	204,0	0,16	70,23	71,44	85,75	0,16	72,12	75,58	83,90
438,0	737,0	1,3	0,7	3,9	173,3	68,1	72,8	179,5	202,4	193,4	203,7	0,16	70,22	71,44	85,38	0,16	72,17	75,56	83,48
439,0	738,0	1,3	0,7	3,9	172,9	68,2	72,6	179,4	201,5	192,9	204,2	0,16	70,21	71,42	84,94	0,16	72,19	75,62	83,05
440,0	739,0	1,3	0,7	3,9	172,7	67,9	72,7	179,0	201,2	192,5	203,5	0,16	70,20	71,41	84,43	0,16	72,06	75,59	82,62
441,0	740,0	1,3	0,7	3,9	172,5	68,1	72,6	178,5	201,0	191,9	203,3	0,16	70,15	71,42	83,90	0,16	72,08	75,61	82,20
442,0	741,0	1,3	0,7	3,9	172,1	67,9	72,4	178,0	201,0	191,6	202,9	0,16	70,12	71,40	83,39	0,16	71,95	75,55	82,79
443,0	742,0	1,2	0,7	3,9	171,7	68,1	72,4	178,1	200,4	191,4	203,1	0,16	70,11	71,38	82,82	0,16	71,86	75,51	83,66
444,0	743,0	1,2	0,7	3,9	171,7	68,1	72,3	177,8	200,3	190,5	203,0	0,16	70,09	71,35	82,26	0,16	71,77	75,47	84,58
445,0	744,0	1,2	0,7	3,9	171,4	68,2	72,3	177,2	200,1	190,4	202,6	0,16	70,03	71,31	81,72	0,16	71,66	75,42	85,34
446,0	745,0	1,2	0,7	3,9	170,9	67,9	72,4	177,1	199,6	190,6	202,1	0,16	70,03	71,32	82,58	0,16	71,78	75,38	85,98
447,0	746,0	1,2	0,7	3,9	170,8	68,1	72,2	176,8	199,1	190,0	202,1	0,16	70,03	71,32	84,18	0,16	71,87	75,45	86,01
448,0	747,0	1,1	0,7	3,8	170,7	68,1	72,4	176,3	198,7	189,6	202,3	0,16	70,02	71,30	85,54	0,16	71,85	75,44	85,65
449,0	748,0	1,2	0,7	3,8	170,0	68,2	72,2	176,0	198,5	188,9	201,9	0,16	69,98	71,28	85,73	0,16	71,71	75,41	85,20
450,0	749,0	1,1	0,7	3,9	169,6	68,1	72,2	175,6	198,3	188,3	202,1	0,16	69,92	71,22	85,35	0,17	71,61	75,33	84,76
451,0	750,0	1,2	0,7	3,9	169,4	68,1	72,1	175,4	198,0	187,3	201,9	0,16	69,92	71,23	84,87	0,16	71,63	75,32	84,30
452,0	751,0	1,1	0,7	3,9	169,4	68,0	72,2	174,9	197,6	186,9	201,3	0,16	69,91	71,21	84,34	0,16	71,69	75,31	83,81
453,0	752,0	1,1	0,7	3,9	169,1	68,0	72,1	174,5	197,0	187,1	201,4	0,16	69,90	71,19	83,80	0,17	71,61	75,31	83,35
454,0	753,0	1,1	0,7	3,9	169,0	67,9	72,2	174,1	196,8	186,8	200,6	0,16	69,89	71,17	83,27	0,16	71,61	75,25	82,93
455,0	754,0	1,1	0,7	3,9	168,6	67,9	71,8	174,0	196,6	185,9	200,8	0,16	69,86	71,13	82,73	0,16	71,58	75,25	82,48
456,0	755,0	1,1	0,7	3,9	168,3	67,9	72,1	173,4	196,2	185,8	200,6	0,16	69,84	71,11	82,19	0,16	71,53	75,23	82,16
457,0	756,0	1,1	0,7	3,9	168,5	68,0	71,8	173,5	195,8	185,6	200,6	0,16	69,84	71,12	81,85	0,16	71,49	75,18	82,82
458,0	757,0	1,1	0,7	3,9	168,1	68,1	72,0	173,1	195,4	185,6	198,9	0,16	69,82	71,15	82,98	0,17	71,75	75,29	83,81
459,0	758,0	1,1	0,6	3,9	167,6	67,9	71,9	172,6	195,0	185,8	198,3	0,16	69,88	71,18	84,43	0,16	72,06	75,48	84,56
460,0	759,0	1,0	0,6	3,8	167,2	68,0	72,0	172,2	194,8	185,7	198,2	0,16	69,93	71,19	85,65	0,16	72,27	75,70	85,22
461,0	760,0	1,1	0,6	3,9	166,8	68,0	71,8	171,8	194,9	184,4	199,3	0,16	69,94	71,18	85,61	0,16	72,16	75,75	85,82
462,0	761,0	1,0	0,6	3,8	166,6	67,9	71,9	171,8	194,6	184,0	198,7	0,16	69,87	71,12	85,19	0,16	71,96	75,67	86,22
463,0	762,0	1,0	0,7	3,9	166,4	68,0	72,0	171,3	194,4	183,4	199,1	0,16	69,83	71,08	84,64	0,16	71,80	75,58	86,11
464,0	763,0	1,0	0,7	3,9	166,2	67,9	71,9	171,2	194,0	183,5	199,1	0,16	69,83	71,08	84,11	0,16	71,68	75,48	85,76
465,0	764,0	1,0	0,7	3,8	166,0	67,9	71,8	171,2	193,9	183,5	198,9	0,16	69,80	71,06	83,54	0,16	71,65	75,45	85,31
466,0	765,0	1,0	0,7	3,8	165,8	67,8	71,8	171,1	193,4	182,5	198,7	0,16	69,74	71,01	82,98	0,16	71,49	75,40	84,82
467,0	766,0	1,0	0,7	3,8	165,7	67,9	71,6	170,5	193,4	182,1	198,0	0,16	69,69	70,99	82,42	0,16	71,37	75,34	84,30
468,0	767,0	1,0	0,7	3,8	165,5	68,0	71,6	170,6	193,4	181,9	198,3	0,16	69,66	70,97	81,91	0,16	71,28	75,26	83,80
469,0	768,0	1,0	0,7	3,8	165,2	67,9	71,7	170,6	193,2	181,7	197,8	0,16	69,63	70,94	82,45	0,16	71,29	75,23	83,30
470,0	769,0	1,0	0,7	3,9	165,1	67,8	71,6	170,2	192,5	182,1	197,3	0,16	69,64	70,93	83,80	0,16	71,29	75,22	82,68
471,0	770,0	0,9	0,7	3,8	164,7	67,7	71,7	170,5	192,7	181,5	197,0	0,16	69,64	70,91	85,11	0,16	71,25	75,24	82,12
472,0	771,0	0,9	0,7	3,8	164,4	67,8	71,4	170,3	192,8	181,4	197,4	0,16	69,65	70,91	85,50	0,16	71,26	75,23	82,15
473,0	772,0	1,0	0,7	3,7	164,3	67,9	71,5	170,0	192,4	181,1	196,8	0,16	69,62	70,88	85,18	0,16	71,17	75,14	83,02
474,0	773,0	0,9	0,7	3,8	164,0	67,9	71,7	170,0	192,4	181,2	196,8	0,16	69,64	70,87	84,69	0,16	71,16	75,10	83,96
475,0	774,0	0,9	0,7	3,8	163,8	67,9	71,6	169,8	192,2	180,8	197,0	0,16	69,59	70,86	84,14	0,16	71,15	75,05	84,74
476,0	775,0	0,9	0,7	3,8	163,6	67,9	71,6	169,5	192,1	180,8	196,7	0,16	69,56	70,83	83,54	0,16	71,05	74,97	85,39
477,0	776,0	0,9	0,7	3,8	163,1	67,8	71,6	169,0	191,8	180,3	196,4	0,16	69,56	70,83	82,97	0,16	71,06	74,94	85,95</

499,0	798,0	0,7	0,6	3,5	157,9	67,6	71,1	164,7	187,2	173,8	192,9	0,16	69,33	70,52	83,40	0,16	70,86	74,68	82,89
500,0	799,0	0,7	0,6	3,5	157,5	67,7	70,9	163,8	186,8	172,8	192,9	0,16	69,32	70,51	82,87	0,16	70,80	74,65	82,41
501,0	800,0	0,7	0,6	3,5	157,1	67,7	70,9	163,5	186,8	172,9	193,2	0,16	69,30	70,48	82,28	0,16	70,76	74,61	82,15
502,0	801,0	0,7	0,6	3,5	156,9	67,6	70,9	163,7	186,2	172,3	192,7	0,16	69,29	70,49	81,76	0,16	70,72	74,56	82,75
503,0	802,0	0,7	0,6	3,5	156,6	67,5	71,1	163,6	186,0	173,0	191,5	0,16	69,32	70,50	82,54	0,16	71,04	74,62	83,59
504,0	803,0	0,6	0,6	3,5	156,3	67,6	71,0	163,4	185,7	173,1	190,3	0,16	69,39	70,57	83,92	0,16	71,38	74,83	84,27
505,0	804,0	0,6	0,6	3,5	155,9	67,6	71,1	163,2	185,6	172,6	190,5	0,16	69,47	70,63	85,21	0,16	71,69	75,06	84,90
506,0	805,0	0,6	0,6	3,5	155,8	67,6	71,0	163,3	185,5	172,1	191,4	0,16	69,52	70,64	85,59	0,16	71,74	75,23	85,36
507,0	806,0	0,6	0,6	3,5	155,6	67,6	71,0	163,1	185,3	171,4	191,6	0,16	69,48	70,61	85,18	0,16	71,50	75,22	85,88
508,0	807,0	0,6	0,6	3,5	155,2	67,6	70,9	162,1	185,0	170,5	191,3	0,16	69,43	70,56	84,64	0,16	71,34	75,09	85,96
509,0	808,0	0,6	0,6	3,5	154,9	67,7	71,0	161,4	184,5	170,0	192,0	0,16	69,41	70,55	84,05	0,16	71,23	75,01	85,66
510,0	809,0	0,6	0,6	3,5	154,5	67,6	70,8	161,4	184,2	169,7	191,7	0,16	69,37	70,53	83,48	0,16	71,15	74,97	85,21
511,0	810,0	0,6	0,6	3,5	154,4	67,6	70,7	161,0	183,9	169,1	191,1	0,16	69,30	70,48	82,89	0,16	71,03	74,88	84,71
512,0	811,0	0,6	0,6	3,4	154,2	67,5	70,8	160,8	183,6	169,1	190,6	0,16	69,27	70,45	82,28	0,16	71,06	74,86	84,19
513,0	812,0	0,5	0,6	3,4	154,1	67,7	70,8	160,6	183,3	168,4	190,9	0,16	69,24	70,44	81,75	0,16	71,03	74,81	83,71
514,0	813,0	0,6	0,6	3,4	154,1	67,5	70,6	160,5	183,1	167,8	190,8	0,16	69,26	70,44	82,65	0,16	71,01	74,79	83,14
515,0	814,0	0,6	0,6	3,4	153,8	67,5	70,6	160,4	182,8	168,0	190,3	0,16	69,22	70,42	84,08	0,16	71,07	74,81	82,57
516,0	815,0	0,6	0,6	3,4	153,8	67,5	70,6	160,2	182,5	168,0	190,1	0,16	69,21	70,41	85,19	0,16	71,08	74,82	82,14
517,0	816,0	0,5	0,6	3,4	153,5	67,4	70,4	160,0	182,3	167,8	189,6	0,16	69,25	70,41	85,39	0,16	71,21	74,91	82,56
518,0	817,0	0,5	0,6	3,4	153,2	67,5	70,4	160,1	182,0	167,6	189,1	0,16	69,20	70,37	84,93	0,16	71,14	74,91	83,38
519,0	818,0	0,6	0,6	3,3	153,2	67,4	70,4	159,8	181,7	166,9	189,4	0,16	69,18	70,35	84,35	0,16	71,09	74,86	84,18
520,0	819,0	0,5	0,5	3,3	153,0	67,4	70,5	159,9	181,3	166,2	189,7	0,16	69,17	70,33	83,81	0,16	71,00	74,78	84,83
521,0	820,0	0,5	0,5	3,2	152,8	67,4	70,2	159,5	181,1	166,3	189,1	0,16	69,16	70,32	83,16	0,16	71,19	74,82	85,33
522,0	821,0	0,5	0,5	3,2	152,5	67,3	70,1	159,4	180,5	165,8	188,7	0,16	69,14	70,28	82,52	0,16	71,16	74,86	85,66
523,0	822,0	0,5	0,5	3,2	152,4	67,3	70,3	159,2	180,1	165,2	188,8	0,16	69,12	70,27	81,88	0,16	71,06	74,84	85,89
524,0	823,0	0,5	0,5	3,2	152,2	67,3	70,1	158,8	179,8	165,0	188,3	0,16	69,09	70,22	82,23	0,16	71,09	74,83	85,62
525,0	824,0	0,5	0,5	3,2	151,9	67,3	70,2	158,6	179,3	165,2	187,7	0,16	69,08	70,21	83,42	0,16	71,18	74,87	85,09
526,0	825,0	0,5	0,5	3,2	151,6	67,2	70,2	158,1	178,7	164,7	188,1	0,16	69,07	70,18	84,61	0,16	71,29	74,95	84,47
527,0	826,0	0,5	0,5	3,2	151,5	67,1	70,1	157,7	178,2	164,2	187,9	0,16	69,12	70,22	85,52	0,16	71,48	75,08	83,87
528,0	827,0	0,5	0,5	3,2	151,1	67,2	70,2	157,8	177,9	164,3	187,5	0,16	69,29	70,34	85,31	0,16	71,78	75,28	83,30
529,0	828,0	0,5	0,5	3,2	150,7	67,1	70,2	157,1	177,2	163,9	187,5	0,16	69,26	70,29	84,84	0,16	71,59	75,34	82,75
530,0	829,0	0,5	0,5	3,2	150,2	67,1	70,1	156,7	176,9	163,4	187,3	0,16	69,18	70,25	84,24	0,16	71,53	75,28	82,24
531,0	830,0	0,5	0,5	3,2	149,9	67,1	70,1	155,9	176,6	163,4	186,7	0,16	69,20	70,29	83,65	0,16	71,77	75,38	82,13
532,0	831,0	0,4	0,5	3,2	149,7	67,1	69,9	156,0	176,1	163,1	186,3	0,16	69,25	70,34	83,02	0,16	71,95	75,50	82,84
533,0	832,0	0,4	0,5	3,1	149,3	67,2	69,9	155,4	175,9	162,3	186,6	0,16	69,33	70,35	82,36	0,16	72,07	75,65	83,58
534,0	833,0	0,4	0,5	3,2	148,9	67,2	70,0	155,1	175,5	162,2	186,4	0,16	69,41	70,43	81,72	0,16	72,25	75,83	84,29
535,0	834,0	0,4	0,5	3,1	148,5	67,1	70,1	154,7	174,8	162,4	186,1	0,16	69,50	70,50	82,05	0,16	72,39	76,00	84,81
536,0	835,0	0,4	0,5	3,1	147,8	67,1	69,9	154,5	174,2	162,4	186,0	0,16	69,67	70,73	83,20	0,16	72,72	76,21	85,14
537,0	836,0	0,4	0,5	3,1	147,3	67,0	69,9	153,8	174,2	162,3	185,0	0,16	69,68	70,85	84,39	0,16	72,84	76,41	85,37
538,0	837,0	0,4	0,5	3,1	146,9	67,1	70,1	153,7	173,9	161,9	184,9	0,16	69,70	70,91	85,33	0,16	72,95	76,52	85,57
539,0	838,0	0,4	0,5	3,0	146,7	67,1	70,0	153,1	173,5	160,9	185,8	0,16	69,62	70,89	85,47	0,16	72,82	76,60	85,76
540,0	839,0	0,4	0,5	3,1	146,5	67,1	69,9	153,0	172,8	160,3	185,6	0,16	69,40	70,74	84,97	0,16	72,40	76,40	85,73
541,0	840,0	0,4	0,5	3,0	145,9	67,1	69,8	152,1	172,2	160,0	185,5	0,16	69,29	70,62	84,38	0,16	72,28	76,24	85,40
542,0	841,0	0,4	0,5	3,0	145,6	67,1	69,9	152,2	172,0	159,6	184,8	0,16	69,22	70,57	83,74	0,16	72,31	76,21	84,89
543,0	842,0	0,3	0,5	3,0	145,4	67,0	69,8	152,2	171,5	159,0	184,9	0,16	69,11	70,42	83,08	0,16	72,07	76,11	84,31
544,0	843,0	0,3	0,5	3,0	145,1	67,0	69,7	152,1	171,2	158,9	184,7	0,16	69,03	70,33	82,45	0,16	71,82	75,93	83,79
545,0	844,0	0,3	0,5	3,0	144,9	67,0	69,8	151,8	170,5	158,5	184,7	0,16	68,98	70,28	81,84	0,16	71,76	75,78	83,25
546,0	845,0	0,3	0,5	3,0	144,6	67,0	69,6	151,4	170,3	158,4	184,0	0,16	68,93	70,22	82,03	0,16	71,75	75,72	82,69
547,0	846,0	0,3	0,5	3,0	144,3	66,9	69,6	151,5	170,2	158,4	183,6	0,16	68,90	70,18	83,19	0,16	71,80	75,69	82,15
548,0	847,0	0,3	0,5	3,0	144,3	66,9	69,7	151,2	169,9	158,4	182,6	0,16	69,17	70,43	84,31	0,16	72,26	75,86	82,34
549,0	848,0	0,3	0,5	3,0	144,0	66,9	69,8	151,0	169,3	158,4	181,0	0,16	69,42	70,67	85,31	0,16	72,54	76,12	82,90
550,0	849,0	0,3	0,5	3,0	143,8	66,9	69,6	150,5	168,9	157,3	182,7	0,16	69,60	70,79	85,28	0,16	72,76	76,34	83,49
551,0	850,0	0,3	0,5	3,0	143,5	66,9	69,6	150,0	168,5	156,9	182,8	0,16	69,55	70,69	84,83	0,16	72,59	76,41	84,16
552,0	851,0	0,3	0,5	3,0	143,3	66,8	69,5	150,0	168,4	156,7	181,8	0,16	69,49	70,68	84,22	0,16	72,61	76,46	84,75
553,0	852,0	0,3	0,5	3,0	143,0	66,8	69,5	149,5	168,0	156,3	181,9	0,16	69,48	70,61	83,58	0,16	72,57	76,50	85,19
554,0	853,0	0,3	0,5	3,0	142,7	66,9	69,5	149,2	167,7	155,4	182,1	0,16	69,41	70,56	82,89	0,16	72,51	76,53	85,53
555,0	854,0	0,3	0,5	3,0	142,3	66,8	69,2	148,9	167,3	155,2	182,1	0,16	69,48	70,67	82,24	0,16	72,76	76,66	85,74
556,0	855,0	0,3	0,5	2,9	142,1	66,8	69,3	148,6	166,8	155,1	181,4	0,16	69,40	70,59	81,82	0,16	72,53	76,73	85,54
557,0	856,0	0,3	0,5	2,9	141,6	66,7	69,3	148,4	166,3	154,9	181,5	0,16	69,19	70,42	82,66	0,16	72,21	76,57	85,04
558,0	857,0	0,3	0,5	2,9	141,7	66,7	69,3	148,2	166,3	155,1	180,8	0,16	69,17	70,45	83,82	0,16	72,36	76,54	84,47
559,0	858,0	0,3	0,5	2,9	141,4	66,7	69,3	147,9	165,8	154,9	180,5	0,16	69,14	70,42	84,85	0,16	72,32	76,49	83,79
560,0	859,0	0,3	0,5	3,0	140,9	66,6	69,4	147,8	165,7	154,5	179,9	0,16	69,21	70,44	85,48	0,16	72,46	76,54	83,17
561,0	860,0	0,3	0,5	3,0	140,8	66,7	69,3	147,7	165,4	153,9	179,7	0,16	69,32	70,48	85,16	0,16	72,51	76,60	82,63

583,0	882,0	0,1	0,5	3,0	136,4	67,3	71,0	143,0	159,0	150,1	173,6	0,16	68,78	70,90	84,93	0,16	74,06	75,49	82,71
584,0	883,0	0,1	0,5	2,9	136,2	67,3	70,7	142,7	158,8	149,9	173,1	0,16	68,68	70,88	84,39	0,16	74,52	75,28	83,51
585,0	884,0	0,1	0,5	2,9	136,0	67,3	70,5	142,8	158,8	150,0	173,2	0,16	68,61	70,84	83,89	0,16	74,96	75,18	84,24
586,0	885,0	0,1	0,5	2,9	135,9	67,3	70,4	142,4	158,4	149,7	173,6	0,16	68,52	70,78	83,28	0,16	74,97	75,13	84,85
587,0	886,0	0,1	0,5	2,9	135,5	67,2	70,4	142,3	158,1	149,4	173,2	0,16	68,49	70,70	82,76	0,16	74,93	75,10	85,37
588,0	887,0	0,1	0,5	2,8	135,3	67,4	70,3	142,3	157,7	149,1	173,0	0,16	68,47	70,64	82,24	0,16	75,14	75,06	85,70
589,0	888,0	0,1	0,5	2,7	135,1	67,3	70,2	141,8	157,5	148,6	173,1	0,16	68,42	70,58	81,74	0,16	75,29	74,98	85,58
590,0	889,0	0,1	0,5	2,6	135,1	67,2	70,0	141,8	157,1	148,0	172,2	0,16	68,37	70,51	82,53	0,16	75,28	74,93	85,16
591,0	890,0	0,1	0,5	2,6	134,9	67,3	69,9	141,4	156,9	147,7	172,1	0,16	68,29	70,41	83,85	0,16	75,22	74,86	84,60
592,0	891,0	0,1	0,5	2,5	134,4	67,2	69,8	140,6	156,4	147,2	171,7	0,16	68,22	70,31	85,11	0,16	75,13	74,79	84,06
593,0	892,0	0,1	0,4	2,5	134,0	67,1	69,7	140,3	155,9	146,7	171,5	0,16	68,18	70,22	85,38	0,16	75,07	74,72	83,52
594,0	893,0	0,1	0,4	2,5	133,4	67,1	69,5	139,6	155,3	146,0	171,0	0,16	68,08	70,10	85,08	0,16	74,96	74,62	83,04
595,0	894,0	0,1	0,4	2,5	133,2	67,0	69,4	139,0	154,9	146,0	170,4	0,16	68,03	70,03	84,66	0,16	74,84	74,52	82,57
596,0	895,0	0,1	0,4	2,5	132,8	67,1	69,4	138,4	154,5	145,9	169,9	0,16	67,96	69,95	84,16	0,16	74,73	74,40	82,13
597,0	896,0	0,1	0,4	2,4	132,4	67,0	69,3	137,8	154,1	145,4	169,9	0,16	67,89	69,85	83,61	0,16	74,70	74,28	82,36
598,0	897,0	0,0	0,4	2,4	132,0	67,0	69,4	137,5	153,5	144,8	169,4	0,16	67,82	69,75	83,07	0,16	74,50	74,17	83,06

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 1,38 g/hr

Burn Rate : 1,500 Dry kg/hr

Test Duration: 598 min

PRESSURE FACTOR: DGM 1 0,95104
 DGM 2 0,95554
 DGM 3 0,97907

BAROMETRIC PRESSURE
 Average: 29,29374897 in Hg
 Start: 29,234689 in Hg
 End: 29,35280895 in Hg

TEMPERATURE FACTORS DGM 1 0,99361
 DGM 2 0,98777
 DGM 3 0,99722

DGM CONTROLLER VALUES

DGM 1 Final: 7784,154 Cuft
 Initial: 7679,816 Cuft

VOLUMES SAMPLED DGM 1 98,130 Scft
 DGM 2 98,583 Scft
 DGM 3 178,366 Scft

DGM 2 Final: 5482,240 Cuft
 Initial: 5376,765 Cuft

DGM #3 Final: 1096,450 Cuft
 Initial: 913,250 Cuft

TOTAL TUNNEL VOLUME : 218789

TEMPERATURES

SAMPLE RATIOS
 Sample Train 1: 2229,582
 Sample Train 2: 2219,348

DGM 1 531,395 °R
 DGM 2 534,537 °R

Patriculate concentration
 Sample Train 1 **0,000067** g/dscf
 Sample Train 2 **0,000060** g/dscf
 Room **0,000001** g/dscf

CALIBRATION FACTORS

DGM 1 0,9953
 DGM 2 0,9903
 DGM #3 0,9972

TUNNEL FLOW RATE: 365,868 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **14,59** g
 Sample Train 2 **12,97** g

PARTICULATE CATCH
 Total Sample Train 1: 6,60 mg
 Total Sample Train 2: 5,90 mg
 Total Sample Train 1 1st hour: 5,20 mg

EMISSION RATES
 Sample Train 1 **1,46** g/hr
 Sample Train 2 **1,30** g/hr

1st hour emission rate **11,59** g/hr

DEVIATION: 5,88%

Cs Train 1 6,726E-05 Train 2 5,9848E-05

Manufacturer: FOYER SUPREME
 Model: 38 STD

Run: 2
 Project #: PI 20228
 Test Duration: 598 min

	HHV	LHV
Eff	65,25%	70,21%
Comb Eff	92,96%	92,96%
HT Eff	70,20%	75,53%
Output	20 692	kJ/h
Burn Rate	1,57	kg/h
Grams CO	1 581	g
Input	31 710	kJ/h
MC wet	18,67	

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

Ultimate CO₂
 CO_{2-ult} 19,86
 F_o
 1,048

	Air Fuel Ratio (A/F)
Overall Heating Efficiency: 65,25%	Dry Molecular Weight (M _d) 29,55
Combustion Efficiency: 92,96%	Dry Moles Exhaust Gas (N _g): 514,63
Heat Transfer Efficiency: 70,20%	Air Fuel Ratio (A/F) 14,70

Heat Output:	19 628 Btu/h	20 692 kJ/h
Heat Input:	30 080 Btu/h	31 710 kJ/h
Burn Duration:	9,97 h	
Burn Rate:	3,46 lb/h	1,569 kg/h
Stack Temp:	322,1 Deg. F	161,1 Deg. C

APPENDIX 2: Proportionality results

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	101,24	101,03	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
17,028	528,5	528,7			0,168	0,167	0	0,2645206
17,254	528,5	528,8	90,27	90,43	0,168	0,167	1	0,2676057
17,166	528,6	528,9	91,00	91,13	0,168	0,167	2	0,265876
16,916	528,6	529,0	92,85	93,19	0,168	0,167	3	0,2612026
16,838	528,7	529,1	94,23	94,82	0,168	0,168	4	0,2588369
16,810	528,8	529,3	95,37	95,63	0,168	0,168	5	0,2570461
17,061	528,9	529,5	95,08	95,22	0,168	0,167	6	0,2592825
17,032	529,0	529,6	96,76	96,71	0,168	0,167	7	0,2570439
16,947	529,0	529,7	98,42	98,69	0,168	0,167	8	0,254035
16,644	529,1	529,9	101,38	101,50	0,168	0,167	9	0,2480129
16,922	529,1	529,9	100,95	101,17	0,168	0,167	10	0,2507092
16,890	529,2	530,1	101,96	102,17	0,168	0,167	11	0,249143
17,091	529,3	530,3	101,40	101,56	0,168	0,167	12	0,2511897
16,638	529,4	530,4	105,29	105,36	0,168	0,167	13	0,2433107
16,693	529,5	530,6	105,58	105,63	0,168	0,167	14	0,2433194
16,285	529,5	530,7	109,23	109,37	0,168	0,167	15	0,2362388
16,617	529,6	530,9	107,81	107,96	0,168	0,167	16	0,2403426
16,641	529,7	531,1	107,88	107,94	0,168	0,167	17	0,2403414
16,720	529,9	531,3	107,08	107,16	0,168	0,167	18	0,2418269
16,741	530,0	531,6	105,85	106,16	0,168	0,167	19	0,2432263
16,649	530,2	531,8	105,80	105,62	0,168	0,167	20	0,2428339
16,679	530,3	532,0	105,45	105,37	0,168	0,166	21	0,2432957
16,666	530,3	532,1	109,04	108,80	0,168	0,166	22	0,2392778
16,396	530,4	532,1	114,57	114,39	0,168	0,166	23	0,2314313
16,704	530,4	532,2	110,12	109,68	0,168	0,166	24	0,2382623
16,375	530,6	532,4	109,87	109,74	0,168	0,166	25	0,2362566
16,761	530,7	532,6	106,29	106,36	0,168	0,166	26	0,2428904
16,901	530,9	532,9	105,02	104,77	0,168	0,166	27	0,24545
16,803	531,0	533,1	104,99	104,86	0,168	0,166	28	0,2447848
17,015	531,1	533,2	103,18	103,22	0,168	0,166	29	0,2483189
16,930	531,3	533,6	103,33	103,27	0,168	0,166	30	0,2472846
16,895	531,5	533,9	104,37	104,06	0,168	0,166	31	0,2458745
16,751	531,6	534,1	105,84	105,67	0,168	0,166	32	0,2433147
16,961	531,7	534,4	104,90	104,49	0,168	0,166	33	0,2458298
17,100	531,8	534,6	104,46	104,04	0,168	0,166	34	0,2472862
16,858	531,7	534,4	106,53	106,27	0,168	0,166	35	0,2433153
16,764	531,7	534,4	107,09	106,76	0,168	0,166	36	0,2418354
16,782	531,7	534,5	107,22	106,89	0,168	0,166	37	0,2418353
16,914	531,6	534,3	106,46	106,23	0,168	0,166	38	0,2436551
16,872	531,5	534,2	106,94	106,55	0,168	0,166	39	0,2430624
16,992	531,5	534,2	105,96	105,79	0,168	0,166	40	0,2447846
16,956	531,5	534,2	106,08	105,54	0,168	0,166	41	0,2443664
17,020	531,6	534,4	106,00	105,52	0,168	0,166	42	0,2452047
16,864	531,6	534,3	106,78	106,62	0,168	0,166	43	0,2428933
17,168	531,7	534,4	104,84	104,70	0,168	0,166	44	0,2472815
16,964	531,7	534,4	106,34	103,25	0,168	0,164	45	0,2443702
16,965	531,7	534,5	106,04	105,96	0,168	0,164	46	0,2443688
17,169	531,8	534,6	104,90	104,59	0,168	0,166	47	0,2472877
16,995	531,8	534,7	105,87	105,66	0,168	0,166	48	0,2448021
16,962	531,8	534,6	106,08	105,76	0,168	0,166	49	0,2443692
17,147	531,8	534,7	104,99	104,71	0,168	0,166	50	0,2470232
17,166	531,9	534,7	104,87	104,48	0,168	0,166	51	0,247313
17,245	531,9	534,9	104,69	104,04	0,168	0,166	52	0,2483243
17,240	532,1	535,0	104,37	104,22	0,168	0,166	53	0,248325
17,340	532,1	535,1	103,88	103,68	0,168	0,166	54	0,2497667
17,326	532,1	535,1	103,53	103,38	0,168	0,166	55	0,2497741

17,424	532,1	535,1	103,22	102,82	0,168	0,166	56	0,2512007
17,234	532,1	535,2	104,48	104,04	0,168	0,166	57	0,2483275
17,490	532,1	535,2	102,67	102,42	0,168	0,166	58	0,2522194
17,046	532,2	535,2	105,32	105,06	0,168	0,166	59	0,2458153
17,515	532,3	535,3	102,48	102,04	0,168	0,166	60	0,2526258
17,334	532,3	535,3	103,92	103,54	0,168	0,166	61	0,2497674
17,425	532,3	535,4	103,13	102,85	0,168	0,166	62	0,2512116
17,137	532,4	535,7	104,53	104,30	0,168	0,166	63	0,2473217
17,644	532,5	535,8	101,48	101,26	0,167	0,166	64	0,2546489
17,319	532,5	535,7	103,38	103,14	0,168	0,166	65	0,2501801
17,266	532,4	535,5	103,56	103,36	0,168	0,166	66	0,2494965
17,455	532,3	535,4	102,45	102,09	0,168	0,166	67	0,2522097
17,389	532,3	535,2	102,97	102,73	0,168	0,166	68	0,2512017
17,692	532,3	535,1	101,03	100,98	0,168	0,166	69	0,2557158
17,265	532,3	535,2	103,21	103,17	0,168	0,166	70	0,2499414
17,460	532,4	535,2	102,18	101,73	0,168	0,166	71	0,2526427
17,215	532,4	535,2	103,59	103,39	0,168	0,166	72	0,2491534
17,555	532,4	535,1	101,24	101,01	0,168	0,166	73	0,2544844
17,358	532,3	535,0	102,35	102,28	0,168	0,166	74	0,2516151
17,566	532,3	535,0	101,10	101,02	0,168	0,166	75	0,2546516
17,445	532,3	534,9	101,70	101,29	0,168	0,166	76	0,2532374
17,401	532,2	534,9	101,83	101,50	0,168	0,166	77	0,2526226
17,435	532,2	534,9	101,57	101,37	0,168	0,166	78	0,2532422
17,056	532,2	534,9	103,87	103,67	0,168	0,166	79	0,2477078
17,508	532,2	534,9	100,99	100,58	0,168	0,166	80	0,2544946
17,595	532,2	534,9	100,41	100,38	0,168	0,166	81	0,255751
17,346	532,3	534,9	101,61	101,71	0,167	0,166	82	0,2522218
17,637	532,3	534,9	100,23	99,93	0,168	0,166	83	0,2564577
17,550	532,3	535,0	100,73	100,71	0,168	0,166	84	0,2551323
17,683	532,3	535,0	100,09	99,66	0,168	0,166	85	0,2570679
17,371	532,3	535,0	101,94	101,70	0,168	0,166	86	0,2522208
17,314	532,4	535,1	102,53	102,05	0,168	0,166	87	0,2512402
17,647	532,5	535,3	100,59	100,50	0,168	0,166	88	0,2560297
17,415	532,6	535,4	102,03	101,71	0,168	0,166	89	0,2526295
17,470	532,6	535,4	101,52	101,40	0,168	0,166	90	0,2536424
17,457	532,5	535,3	101,35	100,98	0,168	0,166	91	0,2536429
17,468	532,5	535,3	101,17	100,77	0,168	0,166	92	0,254047
17,462	532,5	535,2	101,11	100,91	0,168	0,166	93	0,2540509
17,402	532,5	535,2	101,31	100,92	0,168	0,166	94	0,2532381
17,646	532,5	535,2	99,86	99,85	0,168	0,166	95	0,2568396
17,349	532,5	535,1	101,54	101,23	0,168	0,166	96	0,2526303
17,493	532,4	535,1	100,72	100,55	0,168	0,166	97	0,2546528
17,546	532,5	535,1	100,57	100,22	0,168	0,166	98	0,2554185
17,669	532,5	535,1	99,93	99,60	0,168	0,166	99	0,2570505
17,502	532,5	535,1	100,92	100,68	0,168	0,166	100	0,2546512
17,754	532,5	535,1	99,31	99,10	0,168	0,166	101	0,2584519
17,750	532,5	535,2	99,21	99,22	0,168	0,166	102	0,2584501
17,446	532,5	535,2	100,96	100,80	0,168	0,166	103	0,2540479
17,538	532,5	535,2	100,44	100,09	0,168	0,166	104	0,2554554
17,535	532,6	535,2	100,29	100,03	0,168	0,166	105	0,2555343
17,360	532,6	535,4	101,07	100,68	0,168	0,166	106	0,2532382
17,490	532,7	535,4	100,50	100,19	0,168	0,166	107	0,2550558
17,673	532,7	535,4	99,41	98,97	0,168	0,166	108	0,2578561
17,526	532,7	535,4	100,34	99,89	0,168	0,166	109	0,2554502
17,489	532,8	535,5	100,25	100,16	0,168	0,166	110	0,25506
17,472	532,8	535,5	100,19	99,92	0,167	0,166	111	0,2550563
17,399	532,8	535,5	100,62	100,45	0,167	0,166	112	0,2540485
17,561	532,8	535,5	99,79	99,29	0,168	0,166	113	0,2564571
17,335	532,8	535,4	100,86	100,58	0,168	0,166	114	0,2532407
17,441	532,8	535,4	100,05	100,06	0,168	0,166	115	0,2550561
17,619	532,7	535,4	98,89	98,74	0,168	0,166	116	0,2578513

17,740	532,7	535,4	98,12	97,72	0,168	0,166	117	0,2598374
17,397	532,7	535,4	99,89	99,67	0,168	0,166	118	0,2550563
17,560	532,7	535,4	98,65	98,44	0,168	0,166	119	0,2577875
17,457	532,7	535,4	99,10	98,64	0,168	0,166	120	0,2564665
17,530	532,7	535,4	98,42	98,04	0,168	0,165	121	0,2578574
17,666	532,7	535,3	97,41	97,13	0,168	0,166	122	0,2602326
17,533	532,7	535,3	97,98	97,87	0,168	0,166	123	0,2584447
17,735	532,7	535,3	96,77	96,51	0,168	0,166	124	0,2616089
17,461	532,7	535,3	97,98	97,79	0,168	0,166	125	0,2578573
17,484	532,7	535,3	97,79	97,45	0,168	0,166	126	0,258453
17,266	532,7	535,4	98,61	98,69	0,168	0,166	127	0,2554583
17,575	532,7	535,4	96,85	96,87	0,167	0,166	128	0,2602327
17,598	532,7	535,4	96,48	96,36	0,167	0,166	129	0,2608237
17,588	532,7	535,4	96,34	96,42	0,167	0,166	130	0,2608279
17,281	532,7	535,4	97,87	97,82	0,167	0,166	131	0,2564604
17,438	532,7	535,4	97,05	97,02	0,167	0,166	132	0,2590267
17,262	532,7	535,4	98,07	97,89	0,168	0,166	133	0,2564621
17,544	532,8	535,5	96,23	95,89	0,168	0,166	134	0,2608138
17,383	532,8	535,6	96,97	96,96	0,167	0,166	135	0,2584521
17,509	532,9	535,7	96,52	96,05	0,168	0,166	136	0,2604354
17,525	532,9	535,9	96,16	96,02	0,168	0,166	137	0,2608252
17,500	533,0	536,1	95,98	95,56	0,168	0,166	138	0,2608249
17,380	533,0	536,0	96,49	96,15	0,167	0,165	139	0,2592469
17,344	533,0	536,1	96,54	96,48	0,167	0,166	140	0,258869
17,361	533,0	536,1	96,54	96,24	0,168	0,166	141	0,2592467
17,498	533,0	536,1	95,45	95,11	0,168	0,166	142	0,2616107
17,332	533,0	536,1	96,36	96,09	0,168	0,166	143	0,2592472
17,363	533,0	536,1	95,89	95,81	0,168	0,166	144	0,2598402
17,548	533,0	536,1	94,93	94,66	0,167	0,166	145	0,2625906
17,440	533,0	536,0	95,45	95,21	0,167	0,166	146	0,2611591
17,432	533,0	536,0	95,43	95,32	0,168	0,166	147	0,2611176
17,244	533,0	536,0	96,40	96,22	0,168	0,166	148	0,2584556
17,551	533,1	536,1	94,62	94,38	0,168	0,166	149	0,2631749
17,263	533,2	536,5	96,19	95,94	0,168	0,166	150	0,2587996
17,394	533,3	536,5	95,55	95,11	0,168	0,166	151	0,2608205
17,501	533,3	536,4	94,65	94,39	0,168	0,165	152	0,262591
17,432	533,3	536,5	94,87	94,86	0,167	0,166	153	0,2616818
17,540	533,3	536,5	94,35	93,84	0,167	0,166	154	0,2634648

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	100,73	100,48	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
17,800	532,1	533,6			0,167	0,166	0	0,2645325
17,440	532,1	533,5	105,61	105,75	0,167	0,166	1	0,2585327
17,736	532,1	533,5	107,08	107,11	0,168	0,166	2	0,2592434
17,888	532,0	533,4	110,52	110,38	0,168	0,166	3	0,2561932
17,538	531,9	533,3	110,33	110,39	0,168	0,166	4	0,2538381
17,374	532,0	533,5	111,49	111,76	0,167	0,166	5	0,2512062
17,553	532,1	533,6	110,19	110,15	0,167	0,166	6	0,2540471
17,419	532,2	533,6	110,22	110,32	0,167	0,166	7	0,2530808
17,647	532,2	533,7	107,79	108,22	0,167	0,166	8	0,2573658
17,551	532,4	534,0	108,05	107,85	0,167	0,166	9	0,2564745
17,429	532,4	534,0	108,91	109,01	0,167	0,166	10	0,2546536
17,617	532,4	534,2	107,49	107,41	0,168	0,166	11	0,2577895
17,617	532,7	534,6	107,45	107,27	0,168	0,166	12	0,2578555
17,544	532,8	534,7	107,98	107,76	0,167	0,166	13	0,2564597
17,290	532,9	534,9	110,06	109,98	0,167	0,166	14	0,252224
17,753	532,8	534,7	107,66	107,61	0,167	0,166	15	0,2584516
17,666	532,7	534,6	108,34	108,24	0,167	0,166	16	0,2570573
17,455	532,7	534,5	109,93	109,87	0,167	0,166	17	0,253644
17,646	532,7	534,6	108,70	108,58	0,168	0,166	18	0,256617
17,708	532,7	534,6	108,22	108,17	0,168	0,166	19	0,2574579
17,563	532,7	534,6	109,08	109,16	0,167	0,166	20	0,2554588
17,700	532,8	534,7	107,96	107,96	0,168	0,166	21	0,2577997
17,651	532,9	535,0	108,10	108,09	0,167	0,166	22	0,2570717
17,645	532,9	534,9	108,29	107,89	0,167	0,166	23	0,2570484
17,624	532,9	535,0	108,02	107,94	0,167	0,166	24	0,2570594
17,716	532,9	535,0	107,36	107,44	0,167	0,166	25	0,2584523
17,625	533,0	535,1	108,22	108,05	0,167	0,166	26	0,2569966
17,680	533,0	535,3	107,65	107,78	0,167	0,166	27	0,2578583
17,611	533,2	535,6	108,22	108,09	0,167	0,166	28	0,2568694
17,770	533,3	535,7	106,96	107,20	0,167	0,166	29	0,2592451
17,665	533,3	535,9	107,77	107,72	0,167	0,166	30	0,2574779
17,628	533,4	536,0	108,42	107,94	0,167	0,165	31	0,2568665
17,725	533,4	536,1	107,58	107,36	0,168	0,166	32	0,2584542
17,687	533,6	536,4	107,71	107,55	0,167	0,166	33	0,2577925
17,409	533,7	536,6	109,61	109,32	0,167	0,165	34	0,2536475
17,662	533,9	536,9	107,86	107,40	0,167	0,165	35	0,2574604
17,586	533,9	537,0	108,27	108,22	0,167	0,165	36	0,2563471
17,690	533,9	537,0	107,79	107,66	0,167	0,166	37	0,257855
17,304	533,9	537,0	110,23	109,95	0,167	0,166	38	0,2522276
17,520	533,8	536,8	108,69	108,43	0,167	0,165	39	0,2554602
17,536	533,8	536,7	108,55	108,57	0,167	0,166	40	0,2556194
17,518	533,7	536,6	108,61	108,36	0,167	0,165	41	0,2554588
17,642	533,6	536,5	107,72	107,68	0,167	0,165	42	0,2574617
17,716	533,6	536,4	107,08	107,08	0,167	0,166	43	0,2585466
17,671	533,6	536,3	107,61	107,75	0,167	0,166	44	0,2578592
17,629	533,6	536,3	107,90	107,66	0,167	0,166	45	0,2573986
17,637	533,6	536,2	107,69	107,47	0,167	0,166	46	0,2574622
17,719	533,6	536,1	107,02	107,20	0,167	0,166	47	0,2588402
17,557	533,6	536,1	108,13	108,06	0,167	0,166	48	0,256464
17,643	533,6	536,1	107,44	107,55	0,167	0,166	49	0,2578595
17,386	533,6	536,1	109,17	109,26	0,167	0,166	50	0,2540558
17,681	533,6	536,1	107,18	106,97	0,167	0,166	51	0,2584563
17,700	533,6	536,0	107,07	107,05	0,167	0,166	52	0,2588311
17,692	533,6	536,1	107,02	106,88	0,167	0,166	53	0,2587062
17,657	533,7	536,2	107,14	106,87	0,167	0,166	54	0,2584566
17,317	533,7	536,2	109,18	108,98	0,167	0,165	55	0,2532448
17,661	533,6	536,3	107,19	106,90	0,167	0,165	56	0,2584568

17,665	533,6	536,2	107,08	106,98	0,167	0,166	57	0,2584566
17,693	533,6	536,2	106,82	106,54	0,167	0,165	58	0,2588539
17,476	533,6	536,2	108,11	108,19	0,167	0,166	59	0,2558979
17,533	533,6	536,3	107,58	107,21	0,167	0,166	60	0,2570635
17,648	533,7	536,4	106,60	106,26	0,167	0,165	61	0,2588543
17,726	533,8	536,4	106,22	105,96	0,167	0,165	62	0,2598123
17,624	533,9	536,5	106,85	106,46	0,167	0,165	63	0,2583831
17,626	533,9	536,5	106,77	106,56	0,167	0,165	64	0,2584568
17,417	533,8	536,4	108,21	107,70	0,167	0,165	65	0,2554627
17,769	533,7	536,4	105,81	105,70	0,167	0,165	66	0,260729
17,670	533,7	536,3	106,28	106,17	0,167	0,166	67	0,2593559
17,534	533,5	536,2	107,07	106,76	0,167	0,165	68	0,257457
17,605	533,4	536,0	106,79	106,51	0,167	0,165	69	0,2584569
17,625	533,3	535,9	106,55	106,40	0,167	0,166	70	0,2588538
17,692	533,1	535,8	106,30	105,95	0,168	0,166	71	0,2598879
17,493	533,1	535,7	107,38	107,17	0,168	0,166	72	0,2570633
17,648	533,0	535,6	106,28	106,37	0,168	0,166	73	0,259314
17,528	533,0	535,5	107,18	107,26	0,167	0,166	74	0,2574633
17,332	532,9	535,4	108,36	108,30	0,168	0,166	75	0,2546572
17,544	532,8	535,3	107,03	107,11	0,168	0,166	76	0,2578606
17,510	532,9	535,5	107,30	107,50	0,167	0,166	77	0,2570516
17,607	532,8	535,6	106,91	106,71	0,167	0,166	78	0,2584563
17,555	532,9	535,7	107,09	107,09	0,168	0,166	79	0,2578603
17,470	533,0	535,9	107,77	107,32	0,168	0,166	80	0,2565251
17,368	533,1	536,2	108,04	108,11	0,168	0,166	81	0,2550794
17,394	533,1	536,2	108,05	107,96	0,167	0,166	82	0,2554617
17,389	533,0	536,1	108,14	107,63	0,168	0,166	83	0,2554624
17,452	532,9	536,1	107,78	107,68	0,168	0,166	84	0,2564647
17,519	532,8	536,0	107,27	107,00	0,168	0,166	85	0,2574633
17,492	532,8	536,0	107,50	107,12	0,168	0,166	86	0,2570641
17,604	532,9	536,2	106,63	106,42	0,168	0,166	87	0,2588512
17,506	532,9	536,2	107,09	106,74	0,168	0,166	88	0,2574612
17,366	532,9	536,2	108,05	107,89	0,168	0,166	89	0,2554621
17,614	532,8	536,2	106,43	105,86	0,168	0,166	90	0,2591795
17,426	532,8	536,1	107,48	107,28	0,168	0,166	91	0,2564648
17,581	532,8	536,1	106,51	106,21	0,168	0,166	92	0,2587776
17,487	532,8	536,0	106,94	106,62	0,168	0,166	93	0,2576406
17,402	532,9	536,2	107,26	107,12	0,168	0,166	94	0,2564652
17,319	532,9	536,1	107,72	107,48	0,168	0,166	95	0,2554635
17,302	532,8	536,0	107,75	107,20	0,168	0,166	96	0,2554628
17,601	532,8	535,8	105,62	105,31	0,168	0,165	97	0,2598658
17,528	532,8	535,9	106,11	105,84	0,168	0,166	98	0,2588544
17,543	532,8	535,9	106,01	105,67	0,168	0,166	99	0,2592073
17,493	532,9	535,9	106,18	105,93	0,168	0,166	100	0,2585238
17,585	533,0	536,0	105,57	105,17	0,168	0,165	101	0,2598424
17,635	533,1	536,2	105,29	105,22	0,168	0,166	102	0,2605849
17,245	533,0	536,0	107,80	107,39	0,168	0,166	103	0,254825
17,388	532,9	536,0	106,75	106,59	0,168	0,166	104	0,257064
17,480	532,8	535,8	106,18	105,94	0,168	0,166	105	0,2584577
17,490	532,7	535,7	106,02	105,84	0,168	0,166	106	0,2587594
17,488	532,6	535,7	105,90	105,59	0,168	0,166	107	0,2588566
17,381	532,6	535,6	106,28	106,07	0,168	0,166	108	0,2574631
17,642	532,5	535,5	104,60	104,64	0,168	0,166	109	0,261614
17,446	532,5	535,5	105,66	105,32	0,168	0,166	110	0,2588542
17,405	532,5	535,5	105,75	105,44	0,168	0,166	111	0,2584574
17,387	532,5	535,4	105,52	105,39	0,168	0,166	112	0,2584567
17,649	532,5	535,4	103,90	103,77	0,168	0,166	113	0,2625908
17,358	532,5	535,4	105,47	105,41	0,168	0,166	114	0,2584572
17,457	532,5	535,4	104,71	104,47	0,168	0,166	115	0,2602367
17,402	532,5	535,4	104,87	104,75	0,168	0,166	116	0,2596056
17,307	532,5	535,4	105,17	105,03	0,168	0,166	117	0,2584536
17,294	532,5	535,4	105,16	104,72	0,168	0,166	118	0,2584565

17,460	532,6	535,6	103,88	103,51	0,168	0,166	119	0,2612212
17,609	532,6	535,5	102,71	102,81	0,168	0,166	120	0,2635671
17,376	532,5	535,5	104,11	104,10	0,168	0,166	121	0,2602367
17,365	532,5	535,4	104,19	104,10	0,168	0,166	122	0,2602365
17,417	532,4	535,3	103,68	103,41	0,168	0,166	123	0,2612249
17,500	532,4	535,3	103,03	102,76	0,168	0,166	124	0,2625908
17,306	532,4	535,3	104,08	103,99	0,168	0,166	125	0,2598426
17,322	532,4	535,2	104,04	103,80	0,168	0,166	126	0,2602365
17,220	532,4	535,2	104,36	104,34	0,168	0,166	127	0,2588533
17,546	532,4	535,3	102,42	101,96	0,168	0,166	128	0,2639562
17,385	532,5	535,6	103,26	102,98	0,168	0,166	129	0,2616125
17,395	532,5	535,6	103,08	102,87	0,168	0,166	130	0,2618267
17,194	532,5	535,6	104,30	103,93	0,168	0,166	131	0,2588538
17,332	532,5	535,7	103,16	103,12	0,168	0,166	132	0,2612109
17,305	532,6	535,9	103,11	102,95	0,168	0,166	133	0,2608272
17,140	532,6	535,9	104,22	104,03	0,168	0,166	134	0,2584562
17,450	532,6	535,8	102,48	102,13	0,168	0,166	135	0,263176
17,556	532,5	535,7	101,51	101,41	0,168	0,166	136	0,2649261
17,459	532,4	535,6	101,93	101,83	0,168	0,166	137	0,2635498
17,421	532,4	535,5	102,29	101,85	0,168	0,166	138	0,2631761
17,449	532,5	535,7	101,77	101,54	0,168	0,166	139	0,2638959
17,442	532,6	535,8	101,70	101,32	0,168	0,166	140	0,2638693
17,438	532,6	535,7	101,58	101,43	0,168	0,166	141	0,2639438
17,429	532,4	535,6	101,73	101,32	0,168	0,166	142	0,2639564
17,423	532,4	535,7	101,63	101,38	0,168	0,166	143	0,2639554
17,536	532,4	535,7	100,78	100,33	0,168	0,166	144	0,2658881
17,471	532,4	535,7	100,98	101,00	0,168	0,166	145	0,2649254
17,423	532,4	535,7	101,32	100,81	0,168	0,166	146	0,2643811
17,416	532,3	535,6	101,30	101,00	0,168	0,166	147	0,2643388
17,328	532,4	535,7	101,61	101,18	0,168	0,166	148	0,2631644
17,413	532,3	535,6	100,96	100,89	0,168	0,166	149	0,2645384
17,344	532,5	535,9	101,42	101,17	0,168	0,166	150	0,2635662
17,154	532,5	535,8	102,33	102,16	0,168	0,166	151	0,260831
17,302	532,5	535,8	101,51	101,09	0,168	0,166	152	0,263177
17,074	532,5	535,9	102,73	101,97	0,168	0,165	153	0,2598424
17,532	532,6	536,1	99,94	99,63	0,168	0,165	154	0,2668551
17,460	532,7	536,2	100,09	99,82	0,168	0,166	155	0,2659202
17,235	532,7	536,1	101,37	100,92	0,168	0,165	156	0,2626605
17,379	532,6	536,0	100,60	100,17	0,168	0,166	157	0,264926
17,439	532,6	535,9	100,09	99,89	0,168	0,166	158	0,2658919
17,350	532,5	535,8	100,67	100,30	0,168	0,166	159	0,2645661
17,429	532,5	535,7	100,21	99,75	0,168	0,166	160	0,2658913
17,385	532,5	535,8	100,23	99,91	0,168	0,166	161	0,2653108
16,937	532,6	535,9	102,91	102,63	0,168	0,166	162	0,2584556
17,490	532,8	536,2	99,44	99,41	0,168	0,166	163	0,2670613
17,348	532,6	536,0	100,33	99,86	0,168	0,166	164	0,2649233
17,318	532,5	536,0	100,54	100,11	0,168	0,166	165	0,2645373
17,006	532,5	536,2	102,17	101,95	0,168	0,166	166	0,2598414
16,842	532,1	535,7	103,12	102,97	0,168	0,166	167	0,2574606
16,813	531,8	535,4	103,59	102,95	0,168	0,166	168	0,2570624
17,323	531,7	535,3	100,43	99,92	0,168	0,166	169	0,2649234
17,042	531,8	535,3	101,97	101,58	0,168	0,166	170	0,2607
17,402	531,9	535,4	99,83	99,55	0,168	0,166	171	0,2662594
17,574	532,0	535,5	98,77	98,54	0,168	0,166	172	0,2689596
17,311	532,2	535,7	100,09	99,74	0,168	0,166	173	0,264924
17,071	532,3	535,9	101,52	101,10	0,168	0,166	174	0,2612897
17,215	532,4	536,2	100,59	100,41	0,168	0,166	175	0,2635198
17,239	532,5	536,2	100,42	100,08	0,168	0,166	176	0,2639532
17,478	532,6	536,4	99,05	98,72	0,168	0,166	177	0,2676217
17,379	532,5	536,3	99,45	99,36	0,168	0,166	178	0,2661026
17,508	532,4	536,2	98,83	98,62	0,168	0,166	179	0,2682052
17,423	532,4	536,2	99,38	99,10	0,168	0,166	180	0,2668527

17,390	532,4	536,0	99,62	99,33	0,168	0,166	181	0,2662756
17,299	532,4	535,8	100,20	99,91	0,168	0,166	182	0,264842
17,089	532,4	535,7	101,44	100,98	0,168	0,166	183	0,2616117
17,242	532,4	535,7	100,57	100,41	0,168	0,166	184	0,2639531
17,243	532,4	535,8	100,46	100,23	0,168	0,166	185	0,2639535
17,392	532,4	535,8	99,72	99,52	0,168	0,166	186	0,2662754
17,281	532,5	535,9	100,30	100,10	0,168	0,166	187	0,2645369
17,241	532,6	536,0	100,49	100,31	0,168	0,166	188	0,2639542
17,088	532,6	536,0	101,44	101,06	0,168	0,166	189	0,2616111
17,189	532,6	536,1	100,74	100,36	0,168	0,166	190	0,2631848
17,274	532,7	536,1	100,14	99,88	0,168	0,166	191	0,2645291
17,425	532,7	536,2	99,34	99,05	0,168	0,166	192	0,2668535
17,300	532,8	536,3	99,89	99,81	0,168	0,166	193	0,2649244
17,210	532,8	536,3	100,64	100,26	0,168	0,166	194	0,2635678
17,385	532,8	536,4	99,60	99,00	0,168	0,165	195	0,2662777
17,030	532,9	536,5	101,65	101,24	0,168	0,165	196	0,2608264
17,475	532,9	536,6	98,79	98,67	0,168	0,166	197	0,2676229
17,263	533,0	536,6	100,16	99,67	0,168	0,165	198	0,2644318
17,356	533,0	536,6	99,62	99,26	0,168	0,165	199	0,2658913
17,355	533,0	536,7	99,60	99,21	0,168	0,166	200	0,2658907
17,381	533,0	536,7	99,40	99,00	0,168	0,165	201	0,2662768
17,551	533,1	536,7	98,44	98,24	0,168	0,166	202	0,2689198
17,418	533,1	536,7	99,09	98,73	0,168	0,165	203	0,2668555
17,199	533,1	536,7	100,31	100,22	0,167	0,165	204	0,2635111
16,924	533,1	536,7	102,02	101,76	0,167	0,166	205	0,2593034
17,440	533,1	536,7	98,93	98,65	0,167	0,165	206	0,2672382
17,138	533,1	536,7	100,81	100,46	0,168	0,165	207	0,262591
17,288	533,1	536,7	99,87	99,36	0,168	0,165	208	0,2649252
16,888	533,2	536,7	102,15	101,94	0,168	0,165	209	0,2588102
17,069	533,2	536,8	101,12	100,79	0,167	0,165	210	0,2615928
17,586	533,2	536,8	98,29	97,80	0,168	0,165	211	0,2695341
17,348	533,2	536,7	99,35	99,18	0,168	0,165	212	0,2658933
16,952	533,2	536,8	101,74	101,58	0,167	0,166	213	0,2598424
17,309	533,2	536,8	99,62	99,50	0,167	0,166	214	0,2653125
17,307	533,2	536,8	99,62	99,22	0,167	0,165	215	0,2653143
17,227	533,3	536,8	100,02	99,89	0,167	0,165	216	0,2640688
17,302	533,3	536,8	99,79	99,37	0,168	0,165	217	0,2652556
17,303	533,3	536,9	99,65	99,45	0,168	0,166	218	0,2653149
17,305	533,3	536,9	99,57	99,37	0,167	0,166	219	0,265314
17,367	533,3	536,9	99,24	98,86	0,167	0,165	220	0,2662785
17,015	533,3	536,9	101,30	100,92	0,167	0,165	221	0,2608731
17,457	533,3	536,9	98,95	98,56	0,168	0,165	222	0,2676219
17,342	533,3	536,9	99,27	99,16	0,168	0,166	223	0,2658916
17,036	533,4	536,9	101,30	101,12	0,167	0,166	224	0,2612218
17,361	533,4	536,9	99,21	99,10	0,168	0,166	225	0,2661873
17,491	533,4	536,9	98,57	98,14	0,167	0,165	226	0,2681996
17,492	533,4	536,9	98,47	98,23	0,167	0,165	227	0,2681993
17,446	533,4	536,9	98,77	98,49	0,167	0,165	228	0,2675418
17,343	533,4	536,9	99,37	99,29	0,167	0,166	229	0,2659332
17,339	533,5	536,9	99,47	99,00	0,168	0,166	230	0,2658942
17,339	533,5	536,9	99,39	98,98	0,168	0,165	231	0,2658934
17,277	533,5	536,9	99,93	99,51	0,168	0,165	232	0,2649268
17,253	533,5	536,9	99,89	99,64	0,168	0,165	233	0,2645403
17,251	533,5	536,9	99,88	99,62	0,167	0,165	234	0,2645477
17,425	533,5	536,9	98,72	98,43	0,167	0,165	235	0,2672409
17,309	533,5	536,9	99,63	99,14	0,167	0,165	236	0,2654559
17,423	533,5	536,9	99,00	98,58	0,168	0,165	237	0,267241
17,183	533,6	537,0	100,23	99,98	0,168	0,165	238	0,2635679
17,273	533,5	536,9	99,85	99,28	0,168	0,165	239	0,2649273
17,535	533,6	536,9	98,26	97,96	0,168	0,165	240	0,2689641
17,288	533,6	536,9	99,62	99,36	0,168	0,165	241	0,2651977
17,245	533,6	537,0	99,77	99,47	0,167	0,165	242	0,2645395

17,208	533,6	537,0	99,99	99,84	0,167	0,165	243	0,2639575
17,076	533,6	537,0	100,91	100,43	0,167	0,165	244	0,2619183
17,296	533,6	537,0	99,54	99,22	0,167	0,165	245	0,2653148
17,422	533,6	537,0	98,92	98,59	0,167	0,165	246	0,2672234
17,157	533,6	537,0	100,39	100,04	0,168	0,165	247	0,2631799
17,334	533,6	536,9	99,51	99,29	0,168	0,166	248	0,2658945
16,901	533,6	537,0	101,90	101,52	0,168	0,166	249	0,2592505
17,420	533,6	537,0	98,80	98,71	0,167	0,165	250	0,267241
17,001	533,7	537,0	101,16	100,81	0,167	0,165	251	0,2608282
17,204	533,7	537,0	100,09	99,86	0,167	0,165	252	0,2639573
17,354	533,7	537,0	99,15	98,92	0,167	0,165	253	0,2662295
17,179	533,7	537,0	100,11	99,81	0,167	0,165	254	0,26357
17,328	533,7	537,0	99,20	99,05	0,167	0,165	255	0,265895
17,241	533,7	537,0	99,86	99,57	0,167	0,165	256	0,2645405
17,471	533,7	537,0	98,53	98,13	0,168	0,165	257	0,2680624
17,443	533,7	537,0	98,47	98,36	0,167	0,165	258	0,2676255
17,391	533,7	537,0	98,99	98,57	0,167	0,165	259	0,2668575
17,390	533,7	537,0	98,90	98,48	0,167	0,165	260	0,266858
17,386	533,7	537,0	98,84	98,70	0,167	0,165	261	0,2668577
17,262	533,7	537,0	99,65	99,22	0,167	0,165	262	0,264927
17,200	533,7	537,0	100,08	99,76	0,167	0,165	263	0,2639568
17,287	533,7	537,0	99,39	99,08	0,167	0,165	264	0,2653146
17,527	533,7	537,0	98,02	98,00	0,167	0,165	265	0,2689687
17,474	533,7	537,0	98,40	98,03	0,167	0,165	266	0,2681995
17,524	533,7	537,0	98,00	97,93	0,167	0,165	267	0,2689644
17,260	533,7	537,1	99,51	99,58	0,167	0,166	268	0,2649271
17,160	533,7	537,0	100,16	99,98	0,167	0,166	269	0,263369
17,270	533,7	537,0	99,67	99,25	0,167	0,165	270	0,265038
17,411	533,7	537,0	98,81	98,65	0,168	0,165	271	0,26724
17,559	533,7	537,0	97,76	97,85	0,167	0,166	272	0,2695352
17,234	533,7	537,0	99,75	99,47	0,167	0,166	273	0,2645366
17,283	533,7	537,0	99,45	99,07	0,167	0,165	274	0,2653381
17,194	533,7	537,0	100,07	99,82	0,168	0,165	275	0,2639555
17,417	533,8	537,1	98,71	98,59	0,168	0,166	276	0,2674061
17,419	533,8	537,1	98,67	98,39	0,167	0,166	277	0,2674257
17,343	533,8	537,0	99,16	98,65	0,167	0,165	278	0,2662796
17,253	533,8	537,1	99,52	99,39	0,167	0,165	279	0,264927
17,243	533,8	537,1	99,66	99,29	0,167	0,165	280	0,264725
17,105	533,8	537,1	100,49	100,58	0,167	0,166	281	0,2625934
17,254	533,8	537,0	99,75	99,41	0,168	0,166	282	0,2649159
17,406	533,8	537,0	98,78	98,61	0,168	0,166	283	0,2672415
17,193	533,8	537,1	100,06	99,75	0,168	0,166	284	0,263958
17,342	533,8	537,1	99,15	98,85	0,168	0,165	285	0,2662793
17,163	533,8	537,1	99,99	99,92	0,167	0,166	286	0,2635618
17,327	533,8	537,1	99,08	98,93	0,167	0,166	287	0,2661265
17,188	533,8	537,1	100,04	99,44	0,167	0,165	288	0,2639581
17,313	533,8	537,1	99,34	98,90	0,168	0,165	289	0,2658942
17,339	533,8	537,1	99,16	98,79	0,168	0,165	290	0,26628
17,228	533,8	537,0	99,78	99,51	0,168	0,165	291	0,2645405
17,281	533,9	537,0	99,35	99,10	0,167	0,165	292	0,2653153
17,402	533,8	537,1	98,77	98,47	0,167	0,165	293	0,2672417
17,384	533,8	537,2	98,87	98,44	0,168	0,165	294	0,2669688
17,276	533,8	537,2	99,55	99,22	0,168	0,165	295	0,2653092
17,188	533,8	537,2	99,84	99,59	0,167	0,165	296	0,2639581
17,143	533,9	537,3	100,26	99,98	0,167	0,165	297	0,2632539
17,177	533,9	537,3	99,89	99,39	0,167	0,165	298	0,2638259
17,222	533,9	537,4	99,56	99,40	0,167	0,165	299	0,2645382
17,159	533,9	537,4	100,13	99,68	0,167	0,165	300	0,2635688
17,310	533,9	537,5	99,15	98,83	0,167	0,165	301	0,2658891
17,311	533,9	537,5	99,05	98,70	0,167	0,165	302	0,2658932
17,422	533,9	537,6	98,59	97,85	0,167	0,165	303	0,2676236
17,219	533,9	537,5	99,68	99,14	0,167	0,165	304	0,2645397

17,419	533,9	537,5	98,43	98,33	0,167	0,165	305	0,267626
17,282	533,9	537,5	99,36	98,97	0,167	0,165	306	0,2654567
17,093	533,9	537,5	100,44	100,06	0,167	0,165	307	0,2625934
17,245	533,9	537,6	99,52	99,40	0,167	0,165	308	0,2649264
17,181	533,9	537,6	99,80	99,55	0,167	0,165	309	0,2639737
17,361	533,9	537,6	98,77	98,50	0,167	0,165	310	0,2667758
17,216	533,9	537,6	99,65	99,32	0,167	0,165	311	0,2645393
17,180	533,9	537,5	99,82	99,73	0,167	0,165	312	0,2639573
17,304	533,9	537,5	99,02	98,94	0,167	0,166	313	0,2658947
17,100	533,9	537,4	100,32	99,78	0,167	0,165	314	0,2627604
17,174	533,9	537,5	99,64	99,62	0,167	0,165	315	0,2639501
17,302	534,0	537,5	99,18	98,93	0,167	0,165	316	0,2658948
17,149	533,9	537,5	99,87	99,68	0,167	0,165	317	0,2635693
17,405	534,0	537,5	98,53	98,23	0,167	0,165	318	0,267559
17,238	533,9	537,5	99,40	98,99	0,167	0,165	319	0,2649527
17,237	533,9	537,5	99,39	99,17	0,167	0,165	320	0,2649259
17,209	533,9	537,5	99,50	99,37	0,167	0,165	321	0,2645394
17,169	533,9	537,5	99,75	99,51	0,167	0,165	322	0,2639573
17,231	533,9	537,5	99,29	99,05	0,167	0,165	323	0,2649209
17,417	533,9	537,5	98,55	98,00	0,167	0,165	324	0,2678077
17,444	533,9	537,5	98,24	97,90	0,168	0,165	325	0,2682001
17,206	533,9	537,4	99,63	99,46	0,167	0,165	326	0,2645395
17,230	533,9	537,4	99,38	99,31	0,167	0,166	327	0,2649257
17,255	533,9	537,4	99,31	99,08	0,167	0,166	328	0,2653157
17,229	533,9	537,4	99,42	99,11	0,167	0,165	329	0,2649272
17,378	533,9	537,4	98,65	98,31	0,167	0,165	330	0,2672418
17,165	533,9	537,4	99,87	99,40	0,168	0,165	331	0,263958
17,227	533,9	537,4	99,52	99,15	0,168	0,165	332	0,2649285
17,249	533,9	537,4	99,29	99,13	0,167	0,165	333	0,2652701
17,157	533,8	537,3	99,85	99,47	0,167	0,165	334	0,2638808
17,247	533,8	537,2	99,26	99,14	0,167	0,165	335	0,2653031
17,436	533,8	537,2	98,27	98,03	0,167	0,166	336	0,2682003
17,437	533,8	537,3	98,28	97,95	0,168	0,165	337	0,2682002
17,071	533,9	537,4	100,29	100,08	0,167	0,165	338	0,2625926
17,222	533,9	537,4	99,39	98,94	0,167	0,165	339	0,2649297
17,223	533,9	537,4	99,43	98,94	0,167	0,165	340	0,2649282
17,309	533,9	537,4	98,79	98,52	0,167	0,165	341	0,2662804
17,223	533,9	537,4	99,39	98,99	0,167	0,165	342	0,2649797
17,315	533,9	537,4	98,89	98,39	0,167	0,165	343	0,2663761
17,067	533,8	537,4	100,44	99,81	0,168	0,165	344	0,2625902
17,343	533,9	537,5	98,74	98,17	0,168	0,165	345	0,2668568
17,281	533,9	537,4	99,02	98,69	0,168	0,165	346	0,2658922
17,194	533,8	537,3	99,65	99,19	0,168	0,165	347	0,2645439
17,391	533,8	537,3	98,49	98,07	0,168	0,165	348	0,2676249
17,341	533,8	537,3	98,74	98,19	0,168	0,165	349	0,2668568
17,421	533,8	537,3	98,10	97,93	0,167	0,165	350	0,268063
17,151	533,8	537,3	99,66	99,69	0,167	0,166	351	0,2639553
17,124	533,8	537,4	99,68	99,76	0,167	0,166	352	0,2635687
17,103	533,8	537,4	100,06	99,67	0,167	0,166	353	0,2632353
17,189	533,8	537,4	99,45	99,33	0,167	0,165	354	0,2645993
17,274	533,8	537,3	98,91	98,83	0,167	0,166	355	0,2659012
17,273	533,7	537,2	98,94	98,83	0,167	0,166	356	0,2658939
17,233	533,7	537,1	99,16	99,01	0,167	0,166	357	0,2653135
17,383	533,7	537,1	98,30	98,01	0,167	0,165	358	0,2676249
17,383	533,7	537,2	98,24	98,11	0,167	0,165	359	0,2676192
17,419	533,7	537,2	97,96	97,72	0,167	0,165	360	0,2681996
17,054	533,7	537,2	100,13	99,90	0,167	0,165	361	0,2625799
17,379	533,7	537,3	98,37	98,15	0,167	0,165	362	0,2676229
17,206	533,7	537,3	99,19	99,00	0,167	0,165	363	0,2649432
17,091	533,7	537,3	100,01	99,62	0,167	0,165	364	0,2631775
17,265	533,7	537,3	98,95	98,48	0,167	0,165	365	0,2658928
17,328	533,7	537,1	98,74	98,20	0,168	0,165	366	0,2668562

17,122	533,6	537,1	99,78	99,26	0,168	0,165	367	0,2637094
17,261	533,6	537,2	98,95	98,74	0,167	0,165	368	0,2658891
17,258	533,6	537,2	98,86	98,66	0,167	0,165	369	0,2658229
17,313	533,6	537,2	98,61	98,27	0,167	0,165	370	0,2666842
17,173	533,6	537,2	99,40	99,23	0,167	0,165	371	0,2645383
17,259	533,6	537,1	98,78	98,56	0,167	0,165	372	0,265893
16,956	533,6	537,1	100,70	100,62	0,167	0,166	373	0,261221
17,044	533,6	537,1	100,09	99,90	0,167	0,166	374	0,26259
17,171	533,6	537,0	99,39	99,26	0,167	0,166	375	0,2645413
17,369	533,6	536,9	98,26	98,23	0,167	0,166	376	0,2676242
17,369	533,6	536,9	98,23	98,04	0,167	0,166	377	0,2676234
17,192	533,6	536,8	99,33	98,97	0,168	0,165	378	0,264926
17,060	533,6	536,9	99,98	99,74	0,168	0,165	379	0,2628936
17,217	533,6	536,9	99,24	98,89	0,168	0,165	380	0,2653171
17,317	533,5	536,9	98,58	98,39	0,168	0,166	381	0,2668558
17,191	533,5	536,9	99,15	98,94	0,167	0,166	382	0,2649262
17,127	533,5	536,8	99,52	99,41	0,167	0,165	383	0,2639566
17,451	533,5	536,8	97,65	97,53	0,167	0,166	384	0,2689575
17,274	533,4	536,8	98,60	98,42	0,167	0,165	385	0,2662777
17,161	533,4	536,8	99,36	99,15	0,167	0,165	386	0,2645382
17,362	533,4	536,8	98,41	97,84	0,168	0,165	387	0,2676216
17,211	533,4	536,7	99,24	98,82	0,168	0,165	388	0,265315
17,210	533,4	536,7	99,16	98,80	0,168	0,165	389	0,2653132
17,359	533,4	536,7	98,26	97,97	0,168	0,165	390	0,267624
17,396	533,4	536,7	97,96	97,83	0,167	0,166	391	0,2681979
17,356	533,4	536,7	98,13	98,09	0,167	0,166	392	0,2676077
17,157	533,4	536,7	99,32	99,01	0,167	0,166	393	0,264538
17,393	533,4	536,7	98,04	97,75	0,168	0,165	394	0,2682028
17,223	533,4	536,6	98,96	98,68	0,168	0,165	395	0,2655454
17,244	533,4	536,6	99,01	98,32	0,168	0,165	396	0,265898
17,118	533,4	536,6	99,66	99,35	0,168	0,165	397	0,2639571
17,433	533,4	536,7	97,85	97,33	0,168	0,165	398	0,2688303
17,103	533,4	536,7	99,77	99,35	0,168	0,165	399	0,2637287
17,062	533,4	536,7	99,87	99,50	0,168	0,165	400	0,2631268
17,306	533,3	536,6	98,65	98,16	0,168	0,165	401	0,2668546
17,179	533,3	536,6	99,22	99,10	0,168	0,166	402	0,2649253
17,329	533,3	536,7	98,29	97,96	0,167	0,166	403	0,2672387
17,304	533,3	536,7	98,44	98,20	0,167	0,165	404	0,2668683
17,501	533,3	536,7	97,27	97,07	0,167	0,165	405	0,2699004
17,202	533,3	536,7	99,08	98,89	0,167	0,166	406	0,2653129
17,328	533,3	536,7	98,30	98,14	0,168	0,166	407	0,2672391
17,145	533,3	536,7	99,36	99,24	0,167	0,166	408	0,2644496
16,960	533,3	536,6	100,41	100,10	0,167	0,166	409	0,2616122
16,961	533,3	536,6	100,39	100,26	0,167	0,166	410	0,2616127
17,371	533,3	536,6	98,05	97,89	0,167	0,166	411	0,2679583
17,203	533,3	536,7	99,04	98,68	0,168	0,166	412	0,2653471
17,298	533,3	536,6	98,27	98,26	0,167	0,165	413	0,2668558
17,235	533,2	536,6	98,84	98,65	0,167	0,166	414	0,2658917
17,083	533,3	536,6	99,71	99,33	0,168	0,166	415	0,2635657
17,172	533,3	536,6	99,27	98,54	0,168	0,165	416	0,2649232
17,345	533,3	536,6	98,21	97,88	0,168	0,165	417	0,2676209
17,019	533,3	536,5	99,96	99,68	0,167	0,165	418	0,2625899
17,029	533,3	536,6	100,14	99,69	0,168	0,165	419	0,2627431
17,177	533,2	536,6	99,10	98,89	0,168	0,166	420	0,265032
17,319	533,2	536,6	98,40	97,88	0,168	0,165	421	0,2672377
17,170	533,2	536,6	99,24	98,93	0,168	0,165	422	0,2649241
17,194	533,2	536,5	99,06	98,71	0,168	0,166	423	0,2653115
17,132	533,2	536,6	99,38	99,21	0,168	0,166	424	0,2643584
17,081	533,2	536,6	99,60	99,58	0,167	0,166	425	0,2635648
17,341	533,1	536,6	98,13	97,82	0,167	0,166	426	0,2676225
17,214	533,1	536,6	98,86	98,48	0,168	0,165	427	0,2656451
17,112	533,1	536,5	99,52	99,18	0,168	0,165	428	0,2640845

17,079	533,1	536,5	99,66	99,46	0,168	0,166	429	0,2635861
17,077	533,1	536,6	99,73	99,60	0,168	0,166	430	0,2635662
17,050	533,1	536,6	99,95	99,50	0,168	0,166	431	0,2631748
17,287	533,1	536,5	98,35	98,35	0,168	0,166	432	0,2668538
17,075	533,1	536,5	99,86	99,60	0,168	0,166	433	0,2635639
17,137	533,1	536,4	99,23	99,08	0,168	0,166	434	0,2645369
17,315	533,1	536,4	98,49	98,08	0,168	0,166	435	0,2672371
17,337	533,1	536,4	98,20	97,87	0,168	0,166	436	0,2676215
17,312	533,0	536,4	98,35	98,28	0,168	0,166	437	0,2672372
17,162	533,0	536,4	99,09	99,02	0,168	0,166	438	0,264924
17,187	533,0	536,4	99,00	98,81	0,168	0,166	439	0,2653103
17,336	533,0	536,5	98,07	97,80	0,168	0,166	440	0,2676217
17,311	533,0	536,5	98,24	98,22	0,167	0,166	441	0,2672362
17,335	533,0	536,5	98,27	97,89	0,168	0,166	442	0,2676239
17,335	533,0	536,5	98,21	97,88	0,168	0,166	443	0,2676215
17,111	533,0	536,5	99,51	99,27	0,168	0,166	444	0,2642077
17,070	533,0	536,6	99,63	99,47	0,168	0,166	445	0,2635448
17,157	533,0	536,5	99,13	99,06	0,168	0,166	446	0,2649235
17,459	533,0	536,5	97,38	97,12	0,168	0,166	447	0,2695867
17,245	532,9	536,4	98,73	98,35	0,168	0,166	448	0,2662755
17,332	532,9	536,3	98,24	98,04	0,168	0,166	449	0,267621
17,131	532,9	536,3	99,40	98,90	0,168	0,166	450	0,2645345
17,179	532,9	536,3	99,00	98,66	0,168	0,165	451	0,26531
17,128	532,9	536,2	99,28	98,92	0,168	0,165	452	0,2645347
17,277	532,9	536,2	98,50	98,25	0,168	0,166	453	0,2668308
17,063	532,9	536,1	99,72	99,48	0,168	0,166	454	0,2635613
17,514	532,9	536,1	97,25	96,89	0,168	0,166	455	0,2705194
17,213	532,9	536,1	98,86	98,39	0,168	0,166	456	0,2658899
17,326	532,9	536,1	98,12	97,95	0,168	0,166	457	0,2676209
17,176	532,9	536,2	98,91	98,68	0,168	0,166	458	0,2653073
17,125	532,9	536,4	99,21	99,02	0,168	0,166	459	0,2645359
17,277	532,9	536,4	98,49	97,92	0,168	0,165	460	0,2668898
17,125	532,9	536,3	99,27	98,97	0,168	0,165	461	0,264536
17,037	532,9	536,2	99,82	99,44	0,168	0,166	462	0,2631732
17,062	532,8	536,1	99,64	99,30	0,168	0,166	463	0,2635634
17,173	532,8	536,1	98,96	98,73	0,168	0,166	464	0,26531
17,428	532,7	536,0	97,62	97,37	0,168	0,166	465	0,2692332
17,320	532,8	536,0	98,28	97,99	0,168	0,166	466	0,267604
17,321	532,7	536,0	98,20	98,00	0,168	0,166	467	0,2676207
16,882	532,7	535,9	100,68	100,38	0,168	0,166	468	0,2608248
17,147	532,7	535,9	99,27	98,75	0,168	0,166	469	0,2649222
17,171	532,7	535,8	98,89	98,67	0,168	0,166	470	0,2653092
17,177	532,7	535,8	98,94	98,96	0,168	0,166	471	0,2654179
17,293	532,6	535,8	98,17	98,04	0,168	0,166	472	0,2672362
17,336	532,7	535,8	97,95	97,89	0,168	0,166	473	0,267885
17,168	532,6	535,8	99,01	98,86	0,168	0,166	474	0,2653087
16,929	532,6	535,8	100,26	100,35	0,168	0,166	475	0,2616103
17,143	532,6	535,7	99,05	98,98	0,168	0,166	476	0,2649223
17,062	532,6	535,7	99,61	99,31	0,168	0,166	477	0,2636784
17,203	532,6	535,7	98,72	98,77	0,168	0,166	478	0,2658878
17,228	532,6	535,6	98,59	98,48	0,168	0,166	479	0,2662759
16,990	532,6	535,7	100,05	99,81	0,168	0,166	480	0,2625873
17,314	532,6	535,7	98,11	97,92	0,168	0,166	481	0,26762
17,315	532,6	535,7	98,03	97,93	0,168	0,166	482	0,26762
17,140	532,6	535,7	99,12	98,86	0,168	0,166	483	0,264923
17,314	532,6	535,7	98,28	97,97	0,168	0,166	484	0,2676199
17,236	532,5	535,6	98,69	98,50	0,168	0,166	485	0,2664241
17,135	532,5	535,6	99,07	99,05	0,168	0,166	486	0,2648725
17,313	532,5	535,6	98,21	97,98	0,168	0,166	487	0,2676204
17,262	532,5	535,5	98,32	98,08	0,168	0,166	488	0,2668512
17,053	532,5	535,5	99,47	99,55	0,168	0,166	489	0,2636366
17,311	532,5	535,5	98,03	97,85	0,168	0,166	490	0,2676144

17,201	532,4	535,5	98,83	98,53	0,168	0,166	491	0,2659154
17,285	532,4	535,5	98,34	98,00	0,168	0,166	492	0,2672348
17,160	532,4	535,5	98,84	98,92	0,168	0,166	493	0,2653092
17,326	532,4	535,5	97,95	97,77	0,168	0,166	494	0,267908
17,307	532,4	535,5	98,22	97,98	0,168	0,166	495	0,267621
17,158	532,4	535,4	98,93	98,77	0,168	0,166	496	0,2653086
17,108	532,4	535,4	99,20	98,81	0,168	0,166	497	0,2645348
17,169	532,3	535,4	99,09	98,70	0,168	0,166	498	0,2654974
17,195	532,3	535,4	98,75	98,46	0,168	0,166	499	0,2658811
17,256	532,3	535,3	98,30	98,12	0,168	0,166	500	0,2668513
17,277	532,3	535,3	98,28	98,06	0,168	0,166	501	0,2671562
17,217	532,3	535,3	98,69	98,26	0,168	0,166	502	0,2662728
17,105	532,3	535,2	99,28	98,84	0,168	0,166	503	0,2645665
17,067	532,3	535,2	99,37	99,33	0,168	0,166	504	0,2639519
17,391	532,3	535,2	97,52	97,53	0,168	0,166	505	0,2689584
17,318	532,3	535,2	97,90	97,72	0,168	0,166	506	0,2678692
17,099	532,3	535,2	99,28	98,91	0,168	0,166	507	0,2644956
17,387	532,3	535,2	97,51	97,21	0,168	0,166	508	0,2689579
17,386	532,2	535,2	97,52	97,42	0,168	0,166	509	0,2689587
17,295	532,2	535,2	98,08	97,90	0,168	0,166	510	0,2675591
17,214	532,2	535,2	98,47	98,32	0,168	0,166	511	0,266305
17,249	532,2	535,1	98,30	98,04	0,168	0,166	512	0,2668502
17,248	532,2	535,1	98,34	98,26	0,168	0,166	513	0,2668515
17,271	532,2	535,1	98,25	97,85	0,168	0,166	514	0,267235
17,182	532,1	535,1	98,56	98,27	0,168	0,166	515	0,2658737
17,032	532,1	535,1	99,51	99,26	0,168	0,166	516	0,2635559
17,208	532,1	535,0	98,48	98,41	0,168	0,166	517	0,2662739
17,232	532,1	535,0	98,39	98,04	0,168	0,166	518	0,2666253
17,295	532,1	535,0	97,99	97,92	0,168	0,166	519	0,2676192
16,969	532,1	535,0	99,80	99,83	0,168	0,166	520	0,2625781
17,118	532,1	535,0	98,92	98,85	0,168	0,166	521	0,2649203
17,123	532,1	535,0	99,07	99,14	0,168	0,166	522	0,2649952
17,345	532,1	535,0	97,77	97,65	0,168	0,166	523	0,2684575
16,852	532,0	535,0	100,68	100,50	0,168	0,166	524	0,2608232
17,291	532,0	535,0	97,98	97,95	0,168	0,166	525	0,2676181
17,290	532,0	534,9	98,00	98,07	0,168	0,166	526	0,2676184
17,239	532,0	534,9	98,36	98,17	0,168	0,166	527	0,2668512
17,204	532,0	534,9	98,59	98,45	0,168	0,166	528	0,2662727
17,283	532,0	534,9	98,16	97,69	0,168	0,166	529	0,2675232
17,264	532,0	534,9	98,35	98,07	0,168	0,166	530	0,2672345
17,239	531,9	534,9	98,35	98,21	0,168	0,166	531	0,2668521
17,095	531,9	534,9	99,11	99,02	0,168	0,166	532	0,2646441
17,051	531,9	534,8	99,28	99,29	0,168	0,166	533	0,2639519
17,052	531,9	534,8	99,46	99,39	0,168	0,166	534	0,2639507
17,372	531,9	534,8	97,74	97,36	0,168	0,166	535	0,268903
17,263	531,9	534,8	98,24	98,39	0,168	0,166	536	0,2672343
17,201	531,9	534,8	98,54	98,25	0,168	0,166	537	0,2662761
17,149	531,9	534,8	98,70	98,35	0,168	0,166	538	0,2655457
17,046	531,9	534,8	99,43	99,14	0,168	0,166	539	0,2639502
17,155	531,9	534,7	98,79	98,61	0,168	0,166	540	0,2656147
17,137	531,9	534,7	98,94	98,58	0,168	0,166	541	0,2653399
17,171	531,8	534,7	98,82	98,41	0,168	0,166	542	0,2658871
17,198	531,8	534,7	98,53	98,28	0,168	0,166	543	0,266272
17,148	531,8	534,7	98,94	98,78	0,168	0,166	544	0,2655243
16,843	531,8	534,7	100,52	100,49	0,168	0,166	545	0,2608211
16,741	531,8	534,7	101,20	101,02	0,168	0,166	546	0,2592421
17,110	531,8	534,7	99,04	98,81	0,168	0,166	547	0,2649454
17,404	531,8	534,7	97,31	97,05	0,168	0,166	548	0,2695285
17,017	531,8	534,7	99,69	99,30	0,168	0,166	549	0,2635584
17,254	531,8	534,7	98,22	97,99	0,168	0,166	550	0,2672334
17,279	531,8	534,7	97,97	97,66	0,168	0,166	551	0,2676185
17,141	531,8	534,8	98,79	98,55	0,168	0,166	552	0,2654991

16,866	531,7	534,8	100,27	99,91	0,168	0,166	553	0,2612356
17,099	531,7	534,8	99,01	98,76	0,168	0,166	554	0,26484
17,080	531,7	534,8	99,11	98,76	0,168	0,166	555	0,2645326
17,199	531,7	534,8	98,47	98,25	0,168	0,166	556	0,2663964
17,165	531,7	534,7	98,74	98,29	0,168	0,166	557	0,2658951
17,078	531,7	534,7	99,27	98,85	0,168	0,166	558	0,2645335
17,164	531,7	534,7	98,70	98,50	0,168	0,166	559	0,2658864
17,167	531,7	534,7	98,66	98,54	0,168	0,166	560	0,2659256
17,076	531,7	534,7	99,10	98,95	0,168	0,166	561	0,2645321
16,950	531,7	534,7	99,89	99,95	0,168	0,166	562	0,2625853
16,988	531,7	534,7	99,51	99,52	0,168	0,166	563	0,2631694
17,224	531,7	534,7	98,22	98,36	0,168	0,166	564	0,2668497
16,862	531,7	534,7	100,31	100,34	0,168	0,166	565	0,2612597
17,123	531,7	534,7	98,83	98,71	0,168	0,166	566	0,2652996
17,358	531,7	534,7	97,27	97,28	0,168	0,166	567	0,2689551
17,161	531,7	534,8	98,66	98,44	0,168	0,166	568	0,2658862
17,260	531,6	534,8	98,05	98,18	0,168	0,166	569	0,2673982
17,162	531,6	534,8	98,58	98,28	0,168	0,166	570	0,2658917
17,248	531,6	534,8	98,19	98,04	0,168	0,166	571	0,2672328
16,875	531,6	534,8	100,22	100,28	0,168	0,166	572	0,2614695
16,976	531,6	534,8	99,63	99,33	0,168	0,166	573	0,2630528
17,272	531,6	534,8	97,99	97,67	0,168	0,166	574	0,2676211
17,097	531,6	534,8	99,05	98,82	0,168	0,166	575	0,2649194
17,157	531,6	534,7	98,55	98,36	0,168	0,166	576	0,265885
17,307	531,6	534,7	97,73	97,38	0,168	0,166	577	0,2681913
17,246	531,6	534,7	98,15	98,05	0,168	0,166	578	0,2672331
17,183	531,6	534,7	98,43	98,46	0,168	0,166	579	0,2662699
17,095	531,6	534,7	98,97	98,50	0,168	0,166	580	0,2649187
17,030	531,6	534,7	99,28	99,07	0,168	0,166	581	0,2639261
17,115	531,6	534,8	98,87	98,55	0,168	0,166	582	0,2652521
17,268	531,5	534,8	98,16	97,77	0,168	0,166	583	0,2676168
17,269	531,6	534,8	97,83	97,64	0,168	0,166	584	0,2676163
17,114	531,5	534,8	98,79	98,62	0,168	0,166	585	0,2652276
17,069	531,6	534,8	99,05	98,52	0,168	0,166	586	0,2645308
17,092	531,6	534,8	98,89	98,79	0,168	0,166	587	0,2649207
17,179	531,6	534,8	98,32	98,21	0,168	0,166	588	0,2662698
16,817	531,5	534,9	100,55	100,30	0,168	0,166	589	0,2606524
17,217	531,5	534,9	98,15	98,04	0,168	0,166	590	0,2668474
17,067	531,5	534,9	98,95	98,73	0,168	0,166	591	0,264531
17,267	531,5	534,8	97,87	97,52	0,168	0,166	592	0,2676147
17,243	531,5	534,8	98,21	97,90	0,168	0,166	593	0,2672589
17,029	531,5	534,8	99,25	99,29	0,168	0,166	594	0,2639477
17,115	531,5	534,8	99,02	98,57	0,168	0,166	595	0,2653057
17,116	531,5	534,8	98,98	98,47	0,168	0,166	596	0,2653048
17,091	531,5	534,8	98,90	98,48	0,168	0,166	597	0,2649539
17,257	531,5	534,8	97,95	97,77	0,168	0,166	598	0,2675249
17,087	531,5	534,8	98,83	98,80	0,168	0,166	599	0,2649184
17,151	531,5	534,8	98,66	98,28	0,168	0,166	600	0,2658843
17,152	531,4	534,8	98,70	98,18	0,168	0,166	601	0,265884
16,784	531,4	534,8	100,91	100,41	0,168	0,166	602	0,2601956
17,025	531,4	534,8	99,54	98,94	0,168	0,166	603	0,2639477
16,999	531,4	534,8	99,53	99,32	0,168	0,166	604	0,263559
17,155	531,4	534,8	98,40	98,27	0,168	0,166	605	0,2659504
17,072	531,4	534,7	99,07	98,57	0,168	0,166	606	0,2646655
17,026	531,4	534,7	99,38	98,91	0,168	0,166	607	0,2639688
16,998	531,4	534,8	99,39	99,08	0,168	0,166	608	0,2635605
17,297	531,4	534,7	97,74	97,63	0,168	0,166	609	0,2681888
16,810	531,4	534,7	100,58	100,35	0,168	0,166	610	0,2606526
17,085	531,4	534,7	98,93	98,83	0,168	0,166	611	0,2649163
17,233	531,4	534,7	98,04	97,89	0,168	0,166	612	0,26723
17,233	531,4	534,7	98,12	97,83	0,168	0,166	613	0,2672299
17,060	531,3	534,7	99,10	98,99	0,168	0,166	614	0,2645292

17,321	531,3	534,7	97,58	97,34	0,168	0,166	615	0,2685542
17,211	531,3	534,7	98,22	98,05	0,168	0,166	616	0,2668558
16,972	531,3	534,7	99,68	99,44	0,168	0,166	617	0,2631675
17,294	531,3	534,7	97,71	97,49	0,168	0,166	618	0,2681891
17,083	531,3	534,7	98,86	98,59	0,168	0,166	619	0,2649141
17,020	531,3	534,7	99,28	99,12	0,168	0,166	620	0,2639459
17,230	531,3	534,6	97,98	97,92	0,168	0,166	621	0,2672293
16,816	531,3	534,6	100,43	100,36	0,168	0,166	622	0,2608169
17,012	531,3	534,6	99,14	99,06	0,168	0,166	623	0,2638346
16,931	531,3	534,7	99,79	99,42	0,168	0,166	624	0,2625842
17,292	531,3	534,7	97,73	97,50	0,168	0,166	625	0,2681898
17,016	531,3	534,7	99,36	98,83	0,168	0,166	626	0,2639462
17,292	531,2	534,6	97,65	97,36	0,168	0,166	627	0,2681897
17,139	531,3	534,6	98,63	98,35	0,168	0,166	628	0,2658359
17,081	531,2	534,6	98,83	98,69	0,168	0,166	629	0,2649235
17,255	531,2	534,6	97,87	97,37	0,168	0,166	630	0,2676127
17,270	531,2	534,6	97,88	97,48	0,168	0,166	631	0,267858
16,967	531,2	534,6	99,57	99,39	0,168	0,166	632	0,2631667
17,228	531,2	534,6	98,20	97,90	0,168	0,166	633	0,2672402
17,203	531,2	534,6	98,16	98,05	0,168	0,166	634	0,2668459
17,287	531,2	534,6	97,62	97,53	0,168	0,166	635	0,2681883
17,274	531,2	534,6	97,78	97,47	0,168	0,166	636	0,267954
17,015	531,2	534,6	99,23	99,22	0,168	0,166	637	0,2639459
17,076	531,2	534,6	98,88	98,53	0,168	0,166	638	0,2649156
17,249	531,2	534,5	98,00	97,44	0,168	0,166	639	0,267614
17,223	531,2	534,5	98,08	97,82	0,168	0,166	640	0,2672296
17,182	531,1	534,5	98,26	98,01	0,168	0,166	641	0,2665882
17,198	531,1	534,4	98,12	97,87	0,168	0,166	642	0,2668459
17,196	531,1	534,4	98,26	98,00	0,168	0,166	643	0,2668463
16,924	531,1	534,5	99,90	99,62	0,168	0,166	644	0,2625721
16,860	531,1	534,5	100,19	99,79	0,168	0,166	645	0,2616025
17,048	531,1	534,5	98,90	98,74	0,168	0,166	646	0,26454
16,683	531,1	534,5	101,24	100,85	0,168	0,166	647	0,2588421
17,073	531,1	534,4	98,91	98,67	0,168	0,166	648	0,2649043
17,340	531,1	534,4	97,36	96,94	0,168	0,166	649	0,2690435
17,247	531,0	534,4	98,06	97,76	0,168	0,166	650	0,2676127
17,098	531,1	534,4	98,84	98,57	0,168	0,166	651	0,2653026
17,430	531,1	534,4	96,84	96,49	0,168	0,166	652	0,2704736
17,073	531,0	534,4	98,83	98,71	0,168	0,166	653	0,2649146
16,941	531,0	534,4	99,64	99,53	0,168	0,166	654	0,262925
16,958	531,0	534,3	99,46	99,43	0,168	0,166	655	0,2631671
17,244	531,0	534,3	97,94	97,78	0,168	0,166	656	0,2676154
17,281	531,0	534,3	97,61	97,28	0,168	0,166	657	0,2682154
17,248	531,0	534,2	98,02	97,57	0,168	0,166	658	0,2676916
16,956	531,0	534,2	99,59	99,41	0,168	0,166	659	0,2631645
17,157	531,0	534,3	98,61	98,11	0,168	0,166	660	0,2662666
16,982	531,0	534,3	99,38	99,26	0,168	0,166	661	0,263557
16,957	531,0	534,3	99,57	99,23	0,168	0,166	662	0,2631795
16,857	531,0	534,3	100,24	100,08	0,168	0,166	663	0,2616039
16,957	530,9	534,3	99,63	99,17	0,168	0,166	664	0,2631668
16,677	530,9	534,3	101,36	101,13	0,168	0,166	665	0,258843
17,043	531,0	534,2	99,06	98,84	0,168	0,166	666	0,2645282
17,130	530,9	534,2	98,51	98,36	0,168	0,166	667	0,2658828
17,093	530,9	534,2	98,79	98,58	0,168	0,166	668	0,2653007
17,041	530,9	534,2	99,03	98,75	0,168	0,166	669	0,2645268
17,067	530,9	534,2	98,86	98,56	0,168	0,166	670	0,2649479
16,978	530,9	534,2	99,45	99,26	0,168	0,166	671	0,2635543
17,125	530,9	534,2	98,62	98,24	0,168	0,166	672	0,2658803
17,214	530,9	534,2	97,80	97,59	0,168	0,166	673	0,2672291
17,153	530,9	534,2	98,44	98,02	0,168	0,166	674	0,2662665
17,337	530,9	534,2	97,31	97,02	0,168	0,166	675	0,2691405
16,915	530,9	534,2	99,78	99,58	0,168	0,166	676	0,2625869

16,951	530,8	534,2	99,56	99,40	0,168	0,166	677	0,2631652
17,039	530,8	534,2	99,08	98,72	0,168	0,166	678	0,2645315
16,995	530,8	534,2	99,30	99,09	0,168	0,166	679	0,2638198
17,152	530,8	534,2	98,48	98,21	0,168	0,166	680	0,2662665
17,188	530,8	534,2	98,12	97,78	0,168	0,166	681	0,2668485
17,189	530,8	534,2	98,18	97,94	0,168	0,166	682	0,2668444
17,240	530,8	534,2	98,00	97,67	0,168	0,166	683	0,2676362
17,148	530,8	534,2	98,37	98,16	0,168	0,166	684	0,2662449
17,061	530,8	534,1	98,97	98,78	0,168	0,166	685	0,2649128
16,950	530,8	534,1	99,59	99,28	0,168	0,166	686	0,2631662
16,948	530,8	534,0	99,67	99,24	0,168	0,166	687	0,2631655
17,032	530,7	534,0	98,97	98,88	0,168	0,166	688	0,2644798
17,148	530,8	534,0	98,44	98,22	0,168	0,166	689	0,2662606
16,949	530,8	534,0	99,48	99,41	0,168	0,166	690	0,263166
16,847	530,7	534,0	100,21	99,83	0,168	0,166	691	0,2616002
16,910	530,7	533,9	99,66	99,55	0,168	0,166	692	0,2625795
16,822	530,7	533,9	100,19	100,07	0,168	0,166	693	0,2612113
17,059	530,7	533,9	98,98	98,72	0,168	0,166	694	0,2649131
17,062	530,7	533,9	98,86	98,56	0,168	0,166	695	0,2649138
17,225	530,7	533,8	98,03	97,75	0,168	0,166	696	0,2674781

Average	Average	Average	Proportional Rates Medium/low fire					Average
18,87	Inlet +	Inlet +					0,287	
	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	100,29	99,72	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	
18,817	529,8	530,2			0,159	0,158	0	0,2801684
19,237	529,8	530,1	103,16	102,88	0,159	0,158	1	0,2856728
19,280	529,8	530,2	104,98	105,06	0,159	0,158	2	0,283266
18,988	529,8	530,2	109,15	109,21	0,159	0,158	3	0,2757353
19,072	529,9	530,3	107,13	106,91	0,160	0,158	4	0,279123
18,999	529,9	530,3	107,44	107,29	0,159	0,158	5	0,2779563
18,862	529,9	530,4	109,68	109,60	0,159	0,158	6	0,2740549
19,237	530,0	530,6	108,57	108,27	0,159	0,158	7	0,2783298
19,264	530,2	530,9	108,39	108,28	0,159	0,158	8	0,2786481
19,201	530,5	531,3	108,16	108,31	0,159	0,158	9	0,2783291
19,155	530,7	531,5	107,71	107,72	0,159	0,158	10	0,2785691
19,076	530,7	531,5	107,20	106,92	0,159	0,158	11	0,2788838
19,102	530,6	531,5	106,29	106,02	0,159	0,158	12	0,2801685
18,900	530,6	531,6	107,00	106,78	0,159	0,158	13	0,2775917
19,048	530,6	531,6	106,08	106,19	0,159	0,158	14	0,2798019
19,013	530,7	531,8	106,68	106,30	0,159	0,158	15	0,278922
18,942	530,8	532,0	107,25	107,06	0,159	0,158	16	0,27759
19,162	530,8	531,9	106,37	106,15	0,159	0,158	17	0,2805344
19,142	530,8	532,0	106,68	106,33	0,159	0,158	18	0,2798022
19,140	531,0	532,3	106,69	106,40	0,159	0,158	19	0,2798017
18,980	531,3	532,7	107,81	107,42	0,159	0,158	20	0,2771963
19,134	531,4	532,9	107,09	106,64	0,159	0,158	21	0,2792523
18,989	531,4	533,0	108,14	107,64	0,159	0,158	22	0,2770372
19,117	531,4	533,1	107,17	106,89	0,159	0,158	23	0,2788828
19,120	531,5	533,2	107,16	106,87	0,159	0,158	24	0,2789652
19,219	531,5	533,2	106,43	106,19	0,159	0,158	25	0,280536
19,327	531,5	533,2	106,07	105,83	0,159	0,158	26	0,2819961
19,191	531,4	533,2	106,74	106,32	0,159	0,158	27	0,2801701
19,185	531,4	533,2	106,50	106,17	0,159	0,158	28	0,2802977
19,321	531,5	533,2	106,16	105,60	0,159	0,158	29	0,2820041
19,114	531,4	533,2	107,24	106,88	0,159	0,158	30	0,2788866
19,199	531,5	533,3	106,87	106,80	0,159	0,158	31	0,2798043
19,134	531,5	533,3	107,30	107,14	0,159	0,158	32	0,2788865
19,293	531,5	533,3	106,47	106,24	0,159	0,158	33	0,2810721
19,552	531,4	533,3	105,08	104,93	0,159	0,158	34	0,2848701
19,261	531,4	533,2	106,77	106,48	0,159	0,158	35	0,2805399
19,223	531,4	533,2	107,12	106,97	0,159	0,158	36	0,2798534
18,586	531,4	533,4	110,64	110,08	0,159	0,158	37	0,2708569
19,364	531,5	533,5	106,29	105,78	0,159	0,157	38	0,2821032
19,413	531,5	533,7	106,16	105,40	0,159	0,157	39	0,2827218
18,863	531,6	533,9	108,98	108,45	0,159	0,157	40	0,2748087
19,432	531,7	534,0	106,07	105,57	0,159	0,157	41	0,2827249
19,256	531,9	534,3	106,94	106,48	0,159	0,157	42	0,2801715
19,335	531,9	534,4	106,60	106,17	0,159	0,157	43	0,2814277
19,274	531,9	534,4	106,80	106,50	0,159	0,158	44	0,280524
19,254	531,8	534,4	107,16	106,55	0,159	0,158	45	0,2801736
19,187	531,8	534,4	107,62	106,97	0,159	0,157	46	0,2791877
19,196	531,8	534,4	107,41	106,88	0,159	0,157	47	0,2792711
19,279	531,8	534,5	107,03	106,53	0,159	0,157	48	0,2805385
19,375	531,9	534,6	106,49	105,90	0,159	0,158	49	0,2820018
19,253	531,9	534,6	106,93	106,70	0,159	0,158	50	0,2801732
19,073	531,9	534,5	108,09	107,60	0,159	0,158	51	0,2775961
19,486	531,9	534,5	105,81	105,05	0,159	0,157	52	0,2836866
19,168	531,9	534,5	107,13	106,54	0,159	0,157	53	0,2792535
19,078	532,1	534,8	107,66	107,10	0,159	0,157	54	0,2779655

19,140	532,1	534,8	107,25	106,88	0,159	0,157	55	0,2788868
19,369	532,1	534,9	105,88	105,46	0,159	0,157	56	0,2823632
19,073	532,2	535,0	107,54	107,10	0,159	0,157	57	0,2781573
18,937	532,3	535,1	108,27	107,55	0,159	0,157	58	0,2762949
19,172	532,4	535,2	106,58	106,13	0,159	0,157	59	0,2798067
19,295	532,4	535,2	105,74	105,39	0,159	0,157	60	0,2819993
19,216	532,5	535,3	106,26	105,74	0,159	0,157	61	0,2808674
19,239	532,5	535,3	106,19	105,56	0,159	0,157	62	0,2810886
19,088	532,5	535,2	107,00	106,50	0,159	0,157	63	0,2788901
19,190	532,5	535,1	106,04	105,74	0,159	0,157	64	0,28054
19,185	532,5	535,1	106,19	105,56	0,159	0,157	65	0,2805337
19,338	532,4	535,1	105,32	104,95	0,159	0,157	66	0,2828531
19,407	532,4	535,1	104,78	104,47	0,159	0,157	67	0,2839931
19,246	532,3	535,1	105,58	105,01	0,159	0,157	68	0,2819996
19,425	532,3	535,0	104,68	104,27	0,159	0,157	69	0,2845367
19,424	532,3	535,0	104,42	103,92	0,159	0,157	70	0,2846842
19,140	532,3	535,0	106,02	105,64	0,159	0,157	71	0,2805404
19,178	532,3	535,0	105,78	105,29	0,159	0,157	72	0,2810872
19,249	532,4	535,2	105,24	104,50	0,159	0,157	73	0,2823634
19,423	532,6	535,3	104,16	103,72	0,159	0,157	74	0,2848971
19,323	532,7	535,4	104,91	104,32	0,159	0,157	75	0,2832665
19,366	532,7	535,5	104,60	104,25	0,159	0,157	76	0,2839886
18,836	532,7	535,5	107,46	107,09	0,159	0,157	77	0,2762993
19,244	532,7	535,6	104,94	104,52	0,159	0,157	78	0,282643
19,122	532,8	535,6	105,80	105,07	0,159	0,157	79	0,2805458
19,087	532,8	535,6	105,80	105,45	0,159	0,157	80	0,2802613
19,347	532,7	535,5	104,68	104,13	0,159	0,157	81	0,2839971
19,193	532,6	535,6	105,20	104,72	0,159	0,157	82	0,282
19,319	532,8	535,6	104,32	103,82	0,159	0,157	83	0,2839953
19,373	532,8	535,6	103,91	103,41	0,159	0,157	84	0,2848794
19,368	532,7	535,6	103,98	103,47	0,159	0,157	85	0,2847803
19,018	532,6	535,5	105,82	105,19	0,159	0,157	86	0,2798073
19,033	532,6	535,5	105,93	105,31	0,159	0,157	87	0,2798061
19,154	532,6	535,5	105,15	104,32	0,159	0,157	88	0,2819317
19,189	532,6	535,4	104,71	104,20	0,159	0,157	89	0,2825699
19,244	532,5	535,4	104,54	104,20	0,159	0,157	90	0,283271
19,184	532,5	535,4	104,61	104,15	0,159	0,157	91	0,2827274
19,244	532,5	535,4	104,31	103,97	0,159	0,157	92	0,2836327
19,290	532,6	535,5	104,19	103,52	0,159	0,157	93	0,2843153
19,207	532,6	535,5	104,33	103,72	0,159	0,157	94	0,2832747
19,310	532,6	535,5	103,72	102,98	0,159	0,157	95	0,2848982
19,214	532,6	535,4	103,94	103,52	0,159	0,157	96	0,2838389
19,264	532,5	535,4	103,36	103,03	0,159	0,157	97	0,2848969
18,992	532,5	535,4	105,23	104,46	0,159	0,157	98	0,280539
18,881	532,5	535,5	105,51	104,96	0,159	0,157	99	0,2792634
19,189	532,5	535,4	103,74	103,31	0,159	0,157	100	0,283994
19,242	532,6	535,5	103,44	102,88	0,159	0,157	101	0,2848964
19,077	532,6	535,5	103,94	103,29	0,159	0,157	102	0,2827205
19,116	532,5	535,4	103,85	103,38	0,159	0,157	103	0,2832693
19,195	532,3	535,2	103,15	102,50	0,159	0,157	104	0,284896
19,019	532,2	535,2	104,00	103,47	0,159	0,157	105	0,2823639
19,225	532,2	535,2	102,69	102,09	0,159	0,157	106	0,2857963
19,062	532,3	535,3	103,75	102,86	0,159	0,157	107	0,2832756
19,176	532,3	535,4	102,51	102,27	0,159	0,157	108	0,2854377
19,187	532,4	535,5	102,35	101,49	0,159	0,157	109	0,2857958
19,062	532,5	535,4	102,89	102,48	0,159	0,157	110	0,2839947
19,299	532,5	535,4	101,38	100,77	0,159	0,157	111	0,2879434
19,226	532,0	535,0	101,77	101,25	0,159	0,157	112	0,2870481
19,164	531,6	534,7	101,93	101,26	0,159	0,157	113	0,2864472
19,185	531,5	534,5	101,94	101,34	0,159	0,157	114	0,2866927
19,154	531,5	534,4	101,75	101,17	0,159	0,157	115	0,2866633
19,067	531,7	534,6	102,54	101,99	0,159	0,157	116	0,2848972

18,741	531,9	534,8	104,47	103,88	0,159	0,157	117	0,2799277
19,085	532,0	535,1	102,55	102,09	0,159	0,157	118	0,2849107
19,101	532,1	535,2	102,10	101,78	0,159	0,157	119	0,2853985
19,201	532,1	535,1	101,85	101,41	0,159	0,157	120	0,2866923
19,126	531,9	534,9	102,19	101,78	0,159	0,157	121	0,2857965
19,137	531,6	534,8	102,30	101,68	0,159	0,157	122	0,2858713
19,088	531,6	534,8	102,64	101,98	0,159	0,157	123	0,2850748
19,115	531,4	534,7	102,21	101,51	0,159	0,157	124	0,2857963
19,036	531,1	534,5	102,77	102,12	0,159	0,157	125	0,2845364
19,150	531,1	534,5	102,26	101,70	0,159	0,158	126	0,2861994
19,316	531,2	534,5	101,23	100,52	0,159	0,157	127	0,2888338
19,169	531,3	534,6	101,74	101,49	0,159	0,158	128	0,2866904
19,018	531,5	534,8	102,52	102,17	0,159	0,158	129	0,284535
19,127	531,6	534,9	102,05	101,38	0,159	0,157	130	0,2861324
19,253	531,6	534,9	101,20	100,46	0,159	0,157	131	0,2881788
19,107	531,7	535,0	101,77	101,25	0,159	0,157	132	0,2861551
18,994	531,8	535,1	102,66	101,71	0,159	0,157	133	0,2845359
19,320	531,9	535,1	100,47	99,80	0,159	0,157	134	0,2895441
19,185	531,9	535,1	101,23	100,63	0,159	0,157	135	0,2875485
19,226	531,9	535,0	100,88	100,26	0,159	0,157	136	0,2882958
19,072	531,9	535,0	101,68	101,12	0,159	0,157	137	0,2861563
19,092	532,0	535,0	101,38	101,00	0,159	0,157	138	0,2865141
18,973	532,0	535,0	101,97	101,57	0,159	0,157	139	0,2849048
19,248	532,0	535,0	100,40	99,86	0,159	0,157	140	0,2891908
19,094	532,0	535,0	101,16	100,40	0,159	0,157	141	0,2870509
19,066	532,0	535,1	101,23	100,39	0,159	0,157	142	0,2867769
18,829	532,1	535,1	102,23	101,99	0,159	0,157	143	0,2832725
19,124	532,1	535,1	100,47	100,21	0,159	0,157	144	0,2879446
18,653	532,1	535,2	103,08	102,30	0,159	0,157	145	0,2810525
19,043	532,2	535,4	100,75	100,18	0,159	0,157	146	0,2871605
18,512	532,3	535,5	103,50	102,92	0,159	0,157	147	0,2792538
19,164	532,4	535,8	99,71	99,26	0,159	0,157	148	0,2891904
19,294	532,5	535,9	99,21	98,62	0,159	0,157	149	0,2913121
19,137	532,6	536,0	99,64	99,05	0,159	0,157	150	0,2891897
18,993	532,7	536,2	100,33	99,82	0,159	0,157	151	0,2870523
18,904	532,8	536,3	100,86	100,11	0,159	0,157	152	0,2858194
19,220	532,9	536,6	98,90	98,56	0,159	0,157	153	0,2907836
19,194	532,9	536,6	99,25	98,29	0,159	0,157	154	0,2904283
19,215	532,8	536,3	99,05	98,25	0,159	0,157	155	0,2907824
18,862	532,7	536,2	100,79	100,28	0,159	0,157	156	0,2854374
19,046	532,5	535,9	99,93	99,04	0,159	0,157	157	0,2883206
19,202	532,5	535,9	99,03	98,36	0,159	0,157	158	0,29078
19,093	532,5	535,9	99,59	98,93	0,159	0,157	159	0,2891895
19,071	532,5	535,8	99,62	99,11	0,159	0,157	160	0,2889303
19,024	532,5	535,7	99,81	99,27	0,159	0,157	161	0,2883007
19,052	532,4	535,6	99,56	99,05	0,159	0,157	162	0,2888335
18,825	532,4	535,6	100,72	100,17	0,159	0,157	163	0,2854368
18,679	532,4	535,6	101,45	101,00	0,159	0,157	164	0,2832701
18,894	532,5	535,7	100,32	99,67	0,159	0,157	165	0,2866935
18,832	532,5	535,9	100,51	99,72	0,159	0,157	166	0,2857961
19,145	532,5	535,9	98,71	98,27	0,159	0,157	167	0,2906442
18,594	532,6	535,9	101,71	100,95	0,159	0,157	168	0,2823571
18,511	532,4	535,7	102,22	101,73	0,159	0,157	169	0,2810872
18,837	532,4	535,7	100,35	99,77	0,159	0,157	170	0,2861551
18,966	532,4	535,5	99,57	98,89	0,159	0,157	171	0,288134
19,247	532,3	535,5	98,06	97,43	0,159	0,157	172	0,2925423
19,084	532,3	535,5	98,79	98,18	0,159	0,157	173	0,2900749
19,127	532,2	535,4	98,51	98,09	0,159	0,157	174	0,2907777
19,158	532,2	535,3	98,39	97,83	0,159	0,157	175	0,2913103
18,812	532,2	535,3	99,99	99,60	0,159	0,157	176	0,2861557
18,945	532,4	535,6	99,58	99,07	0,159	0,157	177	0,2880214
19,230	532,5	535,9	97,82	97,27	0,159	0,157	178	0,2925416

19,060	532,5	535,9	98,87	98,16	0,159	0,157	179	0,2900757
18,986	532,5	535,8	99,30	98,65	0,159	0,157	180	0,288833
18,995	532,4	535,7	99,07	98,65	0,159	0,157	181	0,2891368
19,104	532,4	535,6	98,53	97,93	0,159	0,157	182	0,2907825
19,001	532,4	535,5	99,13	98,51	0,159	0,157	183	0,2892218
19,117	532,3	535,5	98,48	98,12	0,159	0,157	184	0,2909782
19,135	532,3	535,5	98,39	97,79	0,159	0,157	185	0,2913125
19,005	532,3	535,4	98,92	98,19	0,159	0,157	186	0,2894812
18,999	532,3	535,4	99,01	98,51	0,159	0,157	187	0,2893503
18,982	532,3	535,4	98,93	98,52	0,159	0,157	188	0,2891949
18,961	532,3	535,5	99,01	98,54	0,159	0,157	189	0,2888351
19,208	532,3	535,4	98,01	97,43	0,159	0,157	190	0,2925434
18,959	532,3	535,5	99,04	98,60	0,159	0,157	191	0,2888348
18,812	532,3	535,5	99,88	99,08	0,159	0,157	192	0,2866945
18,733	532,5	535,7	100,25	99,45	0,159	0,157	193	0,2854964
19,109	532,6	535,8	98,05	97,77	0,159	0,157	194	0,2913783
18,769	532,6	535,9	99,89	99,21	0,159	0,157	195	0,2861582
19,107	532,7	536,2	98,31	97,65	0,159	0,157	196	0,2913126
19,212	532,7	536,1	97,47	97,20	0,159	0,157	197	0,2929078
18,541	532,7	536,3	101,09	100,56	0,159	0,157	198	0,2827269
18,537	532,8	536,3	101,18	100,41	0,159	0,157	199	0,2827257
18,577	532,8	536,3	101,00	100,33	0,159	0,157	200	0,2832697
19,117	532,7	536,3	98,12	97,45	0,159	0,157	201	0,2915317
18,869	532,7	536,4	99,27	98,62	0,159	0,157	202	0,287943
19,151	532,7	536,3	97,78	97,31	0,159	0,157	203	0,2921912
19,008	532,6	536,1	98,54	97,96	0,159	0,157	204	0,2900757
19,117	532,5	536,0	98,04	97,31	0,159	0,157	205	0,2916647
19,035	532,5	536,0	98,40	97,67	0,159	0,157	206	0,2904303
19,049	532,6	536,0	98,27	97,77	0,159	0,157	207	0,2907832
18,811	532,6	536,0	99,48	98,87	0,159	0,157	208	0,2871068
18,870	532,6	535,9	99,29	98,58	0,159	0,157	209	0,2879788
19,001	532,6	536,0	98,33	97,90	0,159	0,157	210	0,2900757
18,606	532,7	536,2	100,68	99,99	0,159	0,157	211	0,2839937
19,075	532,6	536,1	98,32	97,58	0,159	0,157	212	0,2911167
18,879	532,6	536,1	99,05	98,26	0,159	0,157	213	0,2883001
19,024	532,6	536,0	98,57	97,74	0,159	0,157	214	0,2904293
19,218	532,5	535,9	97,55	96,68	0,159	0,157	215	0,2933982
19,160	532,5	535,9	97,53	97,26	0,159	0,157	216	0,292542
18,942	532,5	536,0	98,79	98,02	0,159	0,157	217	0,2891892
18,942	532,5	535,9	98,72	98,14	0,159	0,157	218	0,2892015
19,134	532,5	535,9	97,70	97,22	0,159	0,157	219	0,2921895
19,159	532,5	535,8	97,50	97,09	0,159	0,157	220	0,292543
18,858	532,5	536,0	99,27	98,64	0,159	0,157	221	0,2879437
19,095	532,6	536,2	97,81	97,10	0,159	0,157	222	0,2916576
18,952	532,6	536,2	98,65	98,08	0,159	0,157	223	0,2895065
19,256	532,5	536,1	97,15	96,39	0,159	0,157	224	0,2941219
19,072	532,4	536,0	98,05	97,58	0,159	0,157	225	0,2913088
18,931	532,4	535,9	98,65	98,25	0,159	0,157	226	0,2891884
19,203	532,4	535,9	97,34	96,77	0,159	0,157	227	0,2933391
19,268	532,4	535,9	96,97	96,20	0,159	0,157	228	0,2942922
19,208	532,4	535,9	97,30	96,71	0,159	0,157	229	0,293419
19,202	532,5	535,9	97,33	96,42	0,159	0,157	230	0,2934186
19,142	532,5	535,8	97,62	96,83	0,159	0,157	231	0,292491
18,953	532,5	535,8	98,64	98,16	0,159	0,157	232	0,2895446
18,624	532,5	535,9	100,26	99,84	0,159	0,157	233	0,2845364
19,136	532,4	535,9	97,61	97,02	0,159	0,157	234	0,2923769
19,122	532,5	535,9	97,85	97,03	0,159	0,157	235	0,2921918
18,901	532,4	535,9	98,92	98,22	0,159	0,157	236	0,2888347
19,199	532,4	535,9	97,35	96,82	0,159	0,157	237	0,2934187
18,868	532,4	535,9	98,93	98,49	0,159	0,157	238	0,2883161
18,947	532,4	535,9	98,47	98,03	0,159	0,157	239	0,2895441
18,870	532,4	535,9	98,90	98,46	0,159	0,157	240	0,2883717

18,782	532,4	535,9	99,57	98,87	0,159	0,157	241	0,2870632
18,356	532,4	535,8	101,70	101,43	0,159	0,157	242	0,2805383
18,976	532,4	536,0	98,42	97,74	0,159	0,157	243	0,2900749
18,890	532,4	536,0	98,70	97,95	0,159	0,157	244	0,2887728
19,198	532,5	536,0	97,34	96,70	0,159	0,157	245	0,2934141
19,138	532,5	536,0	97,56	97,18	0,159	0,157	246	0,2925425
18,974	532,5	536,2	98,35	97,84	0,159	0,157	247	0,290075
19,069	532,6	536,2	97,74	97,31	0,159	0,157	248	0,291591
19,108	532,5	536,1	97,63	97,12	0,159	0,157	249	0,2921907
18,679	532,5	535,9	99,83	99,11	0,159	0,157	250	0,2856529
19,110	532,4	535,8	97,54	97,23	0,159	0,157	251	0,2921918
19,016	532,4	535,7	98,15	97,65	0,159	0,157	252	0,2907822
18,992	532,4	535,7	98,26	97,58	0,159	0,157	253	0,2904299
19,067	532,3	535,7	97,80	97,33	0,159	0,157	254	0,2916631
18,907	532,3	535,7	98,60	98,02	0,159	0,157	255	0,2891875
19,099	532,3	535,6	97,76	97,00	0,159	0,157	256	0,2921909
18,252	532,3	535,6	102,05	101,59	0,159	0,157	257	0,2792602
18,986	532,3	535,6	98,23	97,46	0,159	0,157	258	0,2904301
19,121	532,3	535,6	97,43	96,98	0,159	0,157	259	0,2925434
19,140	532,3	535,6	97,24	96,79	0,159	0,157	260	0,2928935
18,955	532,3	535,6	98,31	97,78	0,159	0,157	261	0,2900731
19,273	532,3	535,7	96,59	96,02	0,159	0,157	262	0,2949896
19,253	532,3	535,7	96,85	96,07	0,159	0,157	263	0,294642
19,065	532,4	535,8	97,67	97,05	0,159	0,157	264	0,2917757
18,978	532,4	535,9	98,07	97,65	0,159	0,157	265	0,2904274
19,113	532,4	535,9	97,50	96,78	0,159	0,157	266	0,2925434
18,912	532,4	535,8	98,32	97,71	0,159	0,157	267	0,2895444
19,052	532,4	535,7	97,73	96,98	0,159	0,157	268	0,2916936
19,131	532,3	535,7	97,43	96,53	0,159	0,157	269	0,2928939
18,869	532,4	535,8	98,58	98,19	0,159	0,157	270	0,2888345
18,948	532,4	535,9	98,32	97,46	0,159	0,157	271	0,2900427
19,080	532,4	535,8	97,56	97,03	0,159	0,157	272	0,292192
18,953	532,4	535,8	98,13	97,49	0,159	0,157	273	0,2902371
18,943	532,4	535,8	98,27	97,41	0,159	0,157	274	0,2900751
18,991	532,4	535,9	97,95	97,47	0,159	0,157	275	0,2907829
19,046	532,4	536,0	97,55	96,90	0,159	0,157	276	0,2916641
18,450	532,4	536,0	100,81	100,02	0,159	0,157	277	0,2825047
18,321	532,4	536,0	101,72	101,00	0,159	0,157	278	0,2805386
19,021	532,4	536,0	97,71	97,22	0,159	0,157	279	0,2913115
18,987	532,4	536,1	97,94	97,24	0,159	0,157	280	0,2907832
19,120	532,4	536,2	97,18	96,47	0,159	0,157	281	0,2928825
18,515	532,4	536,2	100,28	99,88	0,159	0,157	282	0,2835982
18,878	532,4	536,3	98,49	97,71	0,159	0,157	283	0,2891892
18,674	532,4	536,2	99,60	98,82	0,159	0,157	284	0,2861121
18,483	532,4	536,0	100,45	99,95	0,159	0,157	285	0,2832657
19,112	532,4	536,0	97,12	96,57	0,159	0,157	286	0,2928931
18,421	532,4	535,9	100,74	100,21	0,159	0,157	287	0,2823622
18,541	532,3	535,8	100,13	99,35	0,159	0,157	288	0,2841489
19,085	532,3	535,8	97,21	96,76	0,159	0,157	289	0,2925434
18,729	532,3	535,7	99,16	98,58	0,159	0,157	290	0,2870518
19,064	532,3	535,8	97,30	96,53	0,159	0,157	291	0,2921917
18,707	532,3	535,7	99,40	98,55	0,159	0,157	292	0,2866909
18,705	532,3	535,7	99,12	98,72	0,159	0,157	293	0,286695
19,078	532,3	535,7	97,34	96,67	0,159	0,157	294	0,2924448
19,077	532,2	535,6	97,27	96,83	0,159	0,157	295	0,2924554
18,887	532,2	535,6	98,47	97,57	0,159	0,157	296	0,2895454
18,643	532,2	535,6	99,58	99,04	0,159	0,157	297	0,2857962
18,581	532,1	535,5	99,91	99,44	0,159	0,157	298	0,2848956
18,965	532,1	535,4	97,90	97,59	0,159	0,158	299	0,2907731
18,862	532,1	535,4	98,33	97,88	0,159	0,157	300	0,2891887
18,578	532,1	535,3	99,83	99,22	0,159	0,157	301	0,2848954
18,562	532,1	535,2	100,01	99,26	0,159	0,157	302	0,28471

18,911	532,0	535,1	98,15	97,54	0,159	0,157	303	0,2900751
18,912	532,0	535,0	98,22	97,64	0,159	0,157	304	0,2900759
18,575	532,0	535,0	100,05	99,44	0,159	0,157	305	0,2848957
18,326	532,0	534,9	101,21	100,73	0,159	0,157	306	0,2810878
18,635	531,9	535,0	99,56	99,15	0,159	0,157	307	0,2857963
18,291	531,9	534,9	101,53	100,96	0,159	0,157	308	0,2805528
19,015	531,9	534,9	97,68	97,01	0,159	0,157	309	0,2916891
19,012	531,9	534,8	97,59	96,91	0,159	0,157	310	0,2916555
18,607	531,9	534,8	99,67	99,28	0,159	0,157	311	0,2854362
18,908	531,8	534,8	98,25	97,58	0,159	0,157	312	0,2900751
19,045	531,8	534,7	97,51	96,94	0,159	0,157	313	0,2921874
18,986	531,8	534,8	97,73	97,26	0,159	0,158	314	0,2913111
18,929	531,8	534,8	98,09	97,52	0,159	0,158	315	0,2904292
18,378	531,8	534,8	100,97	100,65	0,159	0,158	316	0,2819982
19,122	531,8	534,8	97,02	96,33	0,159	0,158	317	0,2934197
19,093	531,8	534,8	97,09	96,64	0,159	0,157	318	0,2928927
18,681	531,8	534,8	99,21	98,49	0,159	0,157	319	0,2866975
18,399	531,8	534,7	100,84	100,09	0,159	0,157	320	0,2823613
19,083	531,8	534,7	96,99	96,64	0,159	0,157	321	0,2928932
18,922	531,7	534,6	98,06	97,34	0,159	0,157	322	0,2904289
18,317	531,7	534,6	101,21	100,55	0,159	0,157	323	0,2810914
18,541	531,7	534,6	99,77	99,40	0,159	0,157	324	0,2845378
18,679	531,7	534,6	99,16	98,61	0,159	0,157	325	0,286692
18,193	531,7	534,7	101,85	101,44	0,159	0,157	326	0,279254
18,644	531,7	534,7	99,44	98,83	0,159	0,157	327	0,2861562
18,778	531,7	534,7	98,60	98,29	0,159	0,157	328	0,2882587
18,472	531,7	534,7	100,28	99,74	0,159	0,158	329	0,283632
18,911	531,7	534,6	97,98	97,40	0,159	0,157	330	0,2903816
18,967	531,7	534,5	97,63	97,03	0,159	0,157	331	0,2912721
19,051	531,7	534,4	97,33	96,86	0,159	0,158	332	0,2925431
19,108	531,7	534,5	96,98	96,43	0,159	0,158	333	0,2934187
19,101	531,7	534,4	96,75	96,32	0,159	0,157	334	0,2933597
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18,905	531,8	534,7	97,82	97,41	0,159	0,157	337	0,2904278
19,059	531,7	534,6	97,01	96,67	0,159	0,158	338	0,2928195
18,262	531,7	534,4	101,36	100,56	0,159	0,157	339	0,2805386
18,443	531,6	534,4	100,28	99,68	0,159	0,157	340	0,283269
18,378	531,6	534,4	100,65	100,20	0,159	0,157	341	0,2823608
18,960	531,5	534,3	97,53	97,04	0,159	0,157	342	0,2913092
19,041	531,5	534,2	97,19	96,47	0,159	0,157	343	0,2925411
18,881	531,4	534,1	97,98	97,63	0,159	0,157	344	0,2900734
18,846	531,4	534,1	98,12	97,54	0,159	0,157	345	0,2895533
19,012	531,5	534,2	97,24	96,98	0,159	0,158	346	0,2921866
19,011	531,5	534,2	97,17	96,76	0,159	0,158	347	0,2921893
19,013	531,5	534,2	97,18	96,76	0,159	0,157	348	0,2921999
18,956	531,5	534,2	97,71	97,11	0,159	0,158	349	0,291304
18,842	531,5	534,1	98,27	97,85	0,160	0,158	350	0,2895404
19,012	531,4	534,0	97,36	96,99	0,159	0,158	351	0,2921881
18,994	531,4	534,0	97,26	96,76	0,159	0,158	352	0,2919547
19,167	531,4	534,1	96,42	96,00	0,159	0,157	353	0,2946277
19,086	531,4	534,0	96,80	96,46	0,159	0,158	354	0,293415
18,785	531,4	534,0	98,39	97,82	0,159	0,158	355	0,2888222
18,788	531,4	534,1	98,37	97,85	0,159	0,157	356	0,2888324
19,053	531,4	534,0	97,00	96,43	0,159	0,157	357	0,2928894
18,530	531,4	534,1	99,89	99,20	0,159	0,157	358	0,284843
18,869	531,4	534,2	97,96	97,51	0,159	0,158	359	0,2900746
18,227	531,4	534,1	101,39	101,02	0,159	0,158	360	0,2801681
19,038	531,4	534,1	97,01	96,34	0,159	0,157	361	0,2927178
18,948	531,4	534,1	97,60	97,08	0,159	0,157	362	0,2913075
18,973	531,3	534,0	97,44	97,04	0,159	0,158	363	0,2917143
18,947	531,3	533,9	97,59	97,18	0,159	0,158	364	0,2913065

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18,910	531,2	533,8	97,69	97,41	0,159	0,158	367	0,2907636
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19,080	531,2	533,8	97,00	96,41	0,160	0,158	373	0,2934092
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19,036	531,2	534,0	97,02	96,48	0,159	0,157	377	0,2928346
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18,991	531,3	534,0	97,13	96,66	0,159	0,157	382	0,2921866
18,579	531,3	534,0	99,28	98,98	0,159	0,158	383	0,2857908
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18,874	531,3	534,0	97,80	97,29	0,159	0,158	385	0,2904239
18,803	531,2	534,0	98,13	97,65	0,159	0,158	386	0,289309
18,967	531,2	534,0	97,25	96,86	0,159	0,158	387	0,2918227
19,150	531,2	534,1	96,24	95,84	0,159	0,158	388	0,2946279
18,956	531,2	534,0	97,28	96,65	0,159	0,157	389	0,2916575
18,853	531,2	534,0	97,85	97,42	0,159	0,157	390	0,2900461
18,957	531,2	534,0	97,34	96,87	0,159	0,158	391	0,291651
18,899	531,2	534,1	97,70	97,20	0,159	0,158	392	0,2907762
18,516	531,2	534,1	99,73	99,12	0,159	0,158	393	0,2848886
18,876	531,2	534,1	97,77	97,23	0,159	0,157	394	0,2904779
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18,846	531,2	534,5	97,70	97,46	0,159	0,158	402	0,290073
18,765	531,2	534,4	98,36	97,82	0,159	0,158	403	0,288826
19,030	531,2	534,3	96,99	96,54	0,159	0,158	404	0,2928872
18,991	531,1	534,2	97,10	96,64	0,159	0,158	405	0,292308
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18,446	531,0	534,1	100,07	99,36	0,160	0,158	412	0,2839968
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18,424	531,1	534,1	100,11	99,68	0,159	0,158	414	0,283624
18,342	531,0	534,0	100,68	100,08	0,160	0,158	415	0,2823548
18,420	531,0	533,9	100,18	99,76	0,160	0,158	416	0,2835292
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18,857	531,0	534,0	97,85	97,26	0,159	0,157	421	0,2903367
18,422	531,0	534,0	100,23	99,53	0,160	0,158	422	0,2836246
18,782	531,0	533,9	98,24	97,68	0,160	0,158	423	0,2891807
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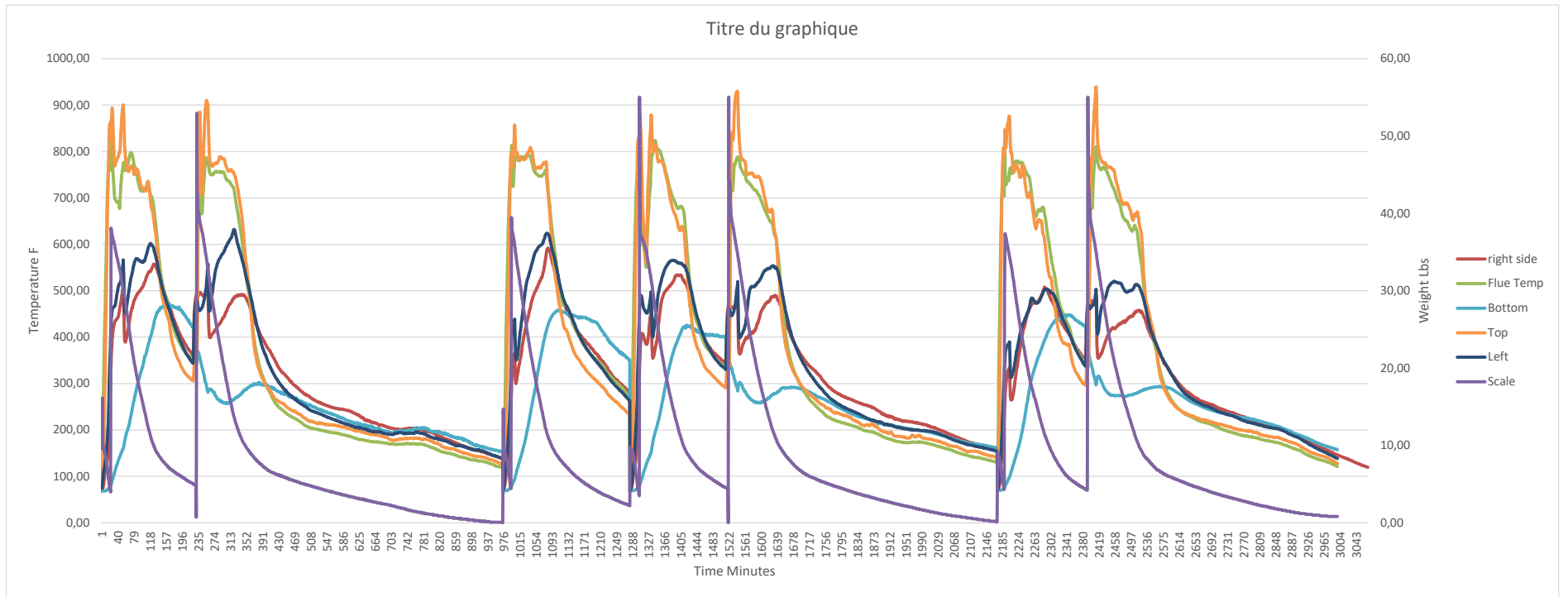
18,398	530,9	533,8	100,27	99,97	0,159	0,158	427	0,2832624
18,537	530,9	533,8	99,44	98,69	0,159	0,158	428	0,2854295
18,503	530,9	533,8	99,69	99,32	0,159	0,158	429	0,2848875
18,417	530,9	533,8	100,13	99,49	0,159	0,158	430	0,2835849
18,077	530,9	533,8	101,90	101,42	0,159	0,157	431	0,2783631
18,252	530,9	533,8	101,07	100,61	0,159	0,158	432	0,2810792
19,109	530,9	533,7	96,38	95,82	0,159	0,158	433	0,294283
18,448	530,9	533,7	100,05	99,42	0,159	0,158	434	0,2840966
19,107	530,8	533,8	96,34	95,87	0,159	0,158	435	0,294283
18,971	530,8	533,8	97,27	96,58	0,159	0,157	436	0,2921808
18,355	530,8	533,9	100,48	99,83	0,160	0,158	437	0,2827172
18,592	530,8	533,9	99,11	98,39	0,159	0,157	438	0,286346
18,751	530,8	533,9	98,37	97,55	0,160	0,157	439	0,2888231
18,913	530,8	533,8	97,43	96,86	0,160	0,157	440	0,2913029
18,991	530,8	533,8	96,93	96,70	0,159	0,158	441	0,2925346
18,941	530,8	533,7	97,22	96,81	0,159	0,158	442	0,2918246
18,850	530,7	533,7	97,58	97,14	0,159	0,158	443	0,2904113
18,383	530,7	533,6	100,09	99,66	0,159	0,158	444	0,2832627
18,489	530,7	533,5	99,60	98,96	0,159	0,158	445	0,2848881
18,386	530,7	533,6	100,18	99,63	0,159	0,158	446	0,2832714
18,845	530,7	533,7	97,81	97,34	0,160	0,158	447	0,2903911
18,490	530,7	533,6	99,55	99,09	0,159	0,158	448	0,2848875
18,429	530,6	533,6	99,93	99,47	0,159	0,158	449	0,2839843
18,301	530,6	533,5	100,75	100,51	0,160	0,158	450	0,2819982
18,982	530,6	533,5	97,03	96,55	0,160	0,158	451	0,292531
18,905	530,6	533,5	97,49	96,99	0,160	0,158	452	0,2913018
18,868	530,5	533,5	97,75	97,52	0,160	0,158	453	0,2907719
19,041	530,5	533,4	96,93	96,31	0,160	0,158	454	0,2934095
18,677	530,5	533,4	98,69	97,90	0,160	0,158	455	0,2879054
18,982	530,5	533,4	96,90	96,60	0,160	0,158	456	0,2925333
18,317	530,5	533,3	100,54	100,15	0,159	0,158	457	0,2823525
18,924	530,5	533,5	97,26	97,17	0,160	0,158	458	0,2916541
18,482	530,5	533,8	99,73	99,19	0,160	0,158	459	0,284886
18,202	530,6	534,0	101,14	100,51	0,160	0,158	460	0,2805287
18,539	530,6	534,0	99,51	98,85	0,160	0,158	461	0,285785
18,818	530,5	533,8	98,07	97,25	0,160	0,158	462	0,2900644
18,461	530,5	533,7	99,82	99,27	0,160	0,158	463	0,2845266
18,865	530,5	533,6	97,55	97,01	0,160	0,158	464	0,2907712
18,316	530,4	533,6	100,46	100,15	0,159	0,158	465	0,2823524
18,457	530,4	533,4	99,90	99,07	0,160	0,158	466	0,2845253
18,371	530,3	533,4	100,22	99,55	0,160	0,158	467	0,2832546
18,290	530,3	533,3	100,58	100,13	0,160	0,158	468	0,281986
18,342	530,3	533,3	100,33	99,72	0,160	0,158	469	0,282768
18,395	530,3	533,3	100,12	99,48	0,160	0,158	470	0,2836223
18,507	530,3	533,2	99,57	98,94	0,160	0,158	471	0,2853152
18,890	530,3	533,2	97,44	96,98	0,160	0,158	472	0,2913003
18,557	530,3	533,2	99,29	98,56	0,160	0,158	473	0,2861438
18,090	530,3	533,1	101,86	101,38	0,160	0,158	474	0,2788977
18,383	530,2	533,1	100,26	99,76	0,160	0,158	475	0,2834413
18,675	530,2	533,0	98,55	97,86	0,160	0,158	476	0,2879328
18,593	530,2	533,0	99,04	98,53	0,160	0,158	477	0,2866829
18,615	530,2	533,0	98,92	98,36	0,160	0,158	478	0,2870392
19,128	530,1	532,9	96,18	95,89	0,160	0,158	479	0,2949787
18,473	530,1	532,9	99,73	98,99	0,160	0,158	480	0,284886
18,286	530,1	532,9	100,75	100,14	0,160	0,158	481	0,2819876
18,084	530,1	532,9	101,77	101,25	0,160	0,158	482	0,2788768
18,512	530,1	532,9	99,36	99,06	0,160	0,158	483	0,2854613
19,164	530,1	532,9	96,12	95,55	0,160	0,158	484	0,2955038
18,447	530,1	532,9	99,88	99,10	0,160	0,158	485	0,2845244
18,447	530,0	532,8	99,80	99,00	0,160	0,158	486	0,2845244
18,350	530,0	532,8	100,19	99,58	0,160	0,158	487	0,2830496
18,310	530,0	532,8	100,47	100,18	0,160	0,158	488	0,2823526

18,412	530,0	532,8	99,77	99,39	0,159	0,158	489	0,2839817
18,389	530,0	532,7	100,00	99,49	0,159	0,158	490	0,2836209
18,306	530,0	532,7	100,58	99,99	0,160	0,158	491	0,2823511
18,458	530,0	532,9	99,66	99,27	0,160	0,158	492	0,284589
18,748	530,0	532,9	98,11	97,56	0,160	0,158	493	0,2891756
18,411	530,0	532,9	99,84	99,28	0,160	0,158	494	0,283983
18,888	530,0	532,9	97,39	96,89	0,160	0,158	495	0,2913008
18,469	530,0	532,9	99,66	99,03	0,160	0,158	496	0,2848863
18,806	530,0	532,8	97,92	97,25	0,160	0,158	497	0,290067
18,911	529,9	532,8	97,47	96,92	0,160	0,158	498	0,291653
18,829	529,9	532,8	97,77	97,26	0,160	0,158	499	0,2904415
18,547	529,9	532,7	99,28	98,62	0,160	0,158	500	0,2861398
18,324	529,9	532,7	100,34	99,63	0,160	0,158	501	0,2827131
18,218	529,9	532,6	100,97	100,44	0,160	0,158	502	0,2810759
18,328	529,9	532,8	100,51	99,85	0,160	0,158	503	0,2827146
18,745	530,0	533,1	98,14	97,56	0,160	0,158	504	0,2891818
18,803	530,0	533,4	97,84	97,21	0,160	0,158	505	0,2900648
18,829	530,1	533,5	97,58	96,95	0,160	0,158	506	0,2904591
18,963	530,0	533,4	97,06	96,40	0,160	0,158	507	0,2925313
18,277	530,0	533,2	100,59	100,12	0,160	0,158	508	0,2819723
18,466	530,0	533,1	99,76	99,04	0,160	0,158	509	0,2848827
18,440	529,9	533,1	99,68	99,19	0,160	0,158	510	0,2845239
18,742	529,9	533,0	98,01	97,66	0,160	0,158	511	0,289195
18,298	529,9	533,0	100,48	99,87	0,160	0,158	512	0,2823509
18,463	529,8	532,9	99,66	98,94	0,160	0,158	513	0,2848837
18,875	529,8	532,9	97,44	96,93	0,160	0,158	514	0,291299
18,875	529,8	532,9	97,44	96,88	0,160	0,158	515	0,291299
18,528	529,8	532,9	99,24	98,83	0,160	0,158	516	0,2859382
18,398	529,8	533,1	99,87	99,25	0,160	0,158	517	0,2839822
18,572	529,8	533,0	99,09	98,43	0,160	0,158	518	0,2866805
18,457	529,8	533,0	99,74	99,01	0,160	0,158	519	0,2848835
18,151	529,7	532,9	101,27	100,46	0,160	0,158	520	0,2801615
18,839	529,7	533,0	97,61	96,89	0,160	0,158	521	0,2908369
18,532	529,7	533,0	99,28	98,66	0,160	0,158	522	0,2861415
18,949	529,7	532,9	97,02	96,51	0,160	0,158	523	0,2925304
18,730	529,7	533,0	98,04	97,51	0,160	0,158	524	0,2891766
18,534	529,6	533,0	99,20	98,44	0,160	0,158	525	0,2861378
18,569	529,6	533,1	98,97	98,33	0,160	0,158	526	0,2866802
18,026	529,7	533,3	102,03	101,36	0,160	0,158	527	0,2783233
18,289	529,8	533,5	100,59	99,75	0,160	0,158	528	0,2823494
18,223	529,8	533,5	100,82	100,09	0,160	0,158	529	0,2813464
18,290	529,7	533,4	100,45	99,94	0,160	0,158	530	0,2823981
19,060	529,7	533,6	96,35	95,67	0,160	0,158	531	0,2942777
18,863	529,8	533,7	97,49	96,53	0,160	0,157	532	0,2912993
18,424	529,8	533,9	99,64	99,04	0,160	0,158	533	0,2845231
18,291	529,9	534,0	100,30	99,78	0,160	0,158	534	0,2824398
18,886	530,0	534,2	97,22	96,50	0,160	0,158	535	0,2916102
18,999	530,2	534,5	96,55	95,86	0,160	0,157	536	0,2934063
18,807	530,3	534,6	97,47	96,81	0,159	0,157	537	0,2904172
18,168	530,3	534,7	101,04	100,21	0,160	0,157	538	0,2805246
18,921	530,3	534,7	96,86	96,06	0,160	0,157	539	0,2921741
18,260	530,1	534,4	100,44	99,66	0,159	0,157	540	0,2819842
18,140	530,0	534,3	101,26	100,29	0,160	0,157	541	0,28016
18,828	529,9	534,3	97,51	96,68	0,160	0,157	542	0,2907682
18,397	529,8	534,1	99,67	98,91	0,160	0,157	543	0,2841332
18,257	529,7	533,9	100,46	99,65	0,160	0,157	544	0,281992
18,584	529,6	533,8	98,78	98,03	0,160	0,157	545	0,2870351
18,607	529,6	533,7	98,72	97,99	0,160	0,158	546	0,2874121
18,428	529,5	533,7	99,82	98,85	0,160	0,158	547	0,2846785
18,584	529,8	534,1	98,79	97,97	0,160	0,157	548	0,2870499
18,919	530,0	534,3	97,16	96,24	0,160	0,157	549	0,2921791
18,777	530,2	534,6	97,67	97,04	0,160	0,157	550	0,2900615

18,891	530,1	534,5	96,89	96,37	0,159	0,158	551	0,2918304
18,695	530,1	534,5	98,05	97,27	0,159	0,157	552	0,2888194
18,475	530,0	534,5	99,31	98,79	0,160	0,158	553	0,2854222
18,417	530,0	534,5	99,66	98,83	0,160	0,158	554	0,2845219
18,975	530,1	534,7	96,62	95,89	0,160	0,157	555	0,2932041
18,658	530,0	534,6	98,31	97,48	0,160	0,157	556	0,288286
18,931	529,8	534,4	96,87	96,08	0,160	0,157	557	0,2925212
18,737	529,8	534,4	97,93	97,05	0,160	0,157	558	0,2895292
18,552	529,8	534,4	98,81	98,19	0,160	0,157	559	0,2866688
18,434	529,8	534,5	99,47	98,42	0,160	0,157	560	0,2848046
18,794	529,9	534,6	97,45	96,62	0,160	0,157	561	0,2904144
18,814	530,0	534,7	97,37	96,91	0,160	0,157	562	0,2907662
18,329	530,1	534,8	99,90	99,09	0,160	0,157	563	0,2832542
18,429	530,1	534,8	99,53	98,68	0,160	0,157	564	0,2847671
18,248	530,1	534,9	100,40	99,56	0,160	0,157	565	0,2819839
18,471	530,1	534,8	99,09	98,42	0,159	0,157	566	0,2854223
18,375	530,1	534,9	99,76	98,86	0,160	0,157	567	0,2839792
18,692	530,2	535,0	98,13	97,12	0,160	0,157	568	0,2888185
18,427	530,3	535,1	99,47	98,71	0,160	0,157	569	0,2847613
18,552	530,4	535,2	98,78	97,75	0,160	0,157	570	0,2866711
18,374	530,4	535,2	99,82	98,72	0,160	0,157	571	0,283979
18,284	530,2	534,9	100,40	99,31	0,160	0,157	572	0,2823474
18,297	530,2	534,9	100,70	99,68	0,160	0,157	573	0,2819828
17,992	530,1	534,8	102,68	101,99	0,160	0,157	574	0,2768316
18,471	530,0	534,7	100,41	99,73	0,160	0,157	575	0,2836064
18,432	530,1	534,7	100,53	99,73	0,160	0,157	576	0,2832547
18,742	530,0	534,6	98,83	98,08	0,160	0,157	577	0,2882848
18,814	530,1	534,6	98,19	97,22	0,160	0,157	578	0,2896231
18,495	530,1	534,7	99,72	98,85	0,160	0,157	579	0,2849217
18,487	530,2	534,7	99,69	98,82	0,160	0,157	580	0,2848822
18,515	530,0	534,6	99,50	98,62	0,160	0,157	581	0,2854237
18,370	529,9	534,7	100,26	99,34	0,160	0,157	582	0,2832568
18,962	529,8	534,8	97,03	96,13	0,160	0,157	583	0,292529
18,545	529,8	534,9	99,17	98,21	0,160	0,157	584	0,2861847
18,931	529,7	535,1	97,13	96,15	0,160	0,157	585	0,2921788
19,302	529,6	535,1	95,27	94,29	0,160	0,157	586	0,2979209
18,833	529,6	535,0	97,63	96,63	0,160	0,157	587	0,2907053
18,431	529,6	535,1	99,76	98,71	0,160	0,157	588	0,2845225
18,970	529,5	535,1	96,91	95,87	0,160	0,157	589	0,2928799
18,888	529,4	535,1	97,31	96,27	0,160	0,157	590	0,2916529
18,308	529,4	535,0	100,40	99,32	0,160	0,157	591	0,2827171
18,306	529,3	535,0	100,40	99,32	0,160	0,157	592	0,2827126
19,074	529,2	534,9	96,34	95,30	0,160	0,157	593	0,2946277
18,802	529,1	534,8	97,72	96,67	0,160	0,157	594	0,2904732
18,936	529,0	534,7	97,04	96,00	0,160	0,157	595	0,2925505
18,659	529,0	534,6	98,48	97,43	0,160	0,157	596	0,2882896
18,495	528,9	534,5	99,36	98,30	0,160	0,157	597	0,2857754
18,739	528,8	534,3	98,09	97,06	0,160	0,157	598	0,289528

APPENDIX 3: Calibration data

APPENDIX 4: Unit pre burn



APPENDIX 5: Participants

Danick Power ing.
v-p operation
Services Polytests inc.
450.741.3636
www.polytests.com

Maxime Martin
Technicien
Services Polytests inc.
450.741.3636
www.polytests.com

APPENDIX 6: Drawings and specifications

APPENDIX 7: Operator's manual



Astra Duo 38

Owner's Manual

Model Number: 38SFC_D

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

Revised: May 2020

IMPORTANT: Keep the owner's manual for future use.

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1 SAFETY

SUPREME FIREPLACES INC. congratulates you on purchasing a Astra Duo 38 wood burning fireplace. This manual describes the installation and operation of the Astra Duo non-catalytic wood heater. This heater meets the 2020 U.S. Environmental Protection Agency's cordwood 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 17,524 to 61,231 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 obtrusions.

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/

2 GENERAL INFORMATION

2.1 Overall Dimensions

2.2 Specifications

Model:	Astra Duo 38
Appliance Type:	Adjustable Burn Rate Wood Heater – Non-Catalytic
Fuel Type:	Dry Cordwood
Maximum Log Length:	24 in (61.0 cm)
Burn Time¹:	6 to 12 hrs
Firebox Volume:	3.8 ft ³ (0.108 m ³)
Heating Area:	1,000 to 2,500 ft ² (93 to 232 m ²)
Average Particulate Emissions Rate²:	2.16 g/hr
Average CO Emissions Rate³:	185.7 g/hr
EPA Protocol:	Method ALT-125
Efficiency:	HHV ⁴ : 64.98% LHV ⁵ : 69.92
Heat Output:	17,524 to 61,231 BTU/hr (5,136 to 17,945 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/registration.php> to ensure full warranty coverage. Proof of purchase is required for all warranty claims.

¹ Depending on combustion air control setting (see Section 5.3 for further details).

² Officially tested and certified by an independent laboratory.

³ Note that rate is smaller for low to medium/low burn rates.

⁴ Higher Heating Value.

⁵ 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 Duo 38 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 Astra Duo 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 Duo 38 fireplace. 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 Astra Duo 38 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 fireplace and void the warranty.

2.6 Door

The Astra Duo 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.

2.7 Certification Label

The certification label contains important information regarding the installation and operation of the Astra Duo 38 fireplace. In addition, the serial number of the unit is permanently embossed onto the top right corner.

2.8 Removable Ash Lip

The Ash Lip is a removable accessory that comes standard with the Astra Duo 38 fireplace. 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 Duo 38 must always remain closed during operation.

2.9 Optional Blower Kit

Two AC centrifugal compact blowers (electrical rating: 115V, 60Hz, and 19W) with a variable speed control is installed into the Astra Duo 38 wood burning fireplace to maximize efficiency. Refer to Section 4.1 for installation instructions.

WARNING: Make certain that the fireplace 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 fireplace. Substituting the blower kit may result in overheating and will void the warranty.

2.10 Optional Hot Air Kit

The Optional Hot Air Kit 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. Note that a 5 inch insulated duct is required for the installation (item ordered separately). Refer to Section 4.2 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 and will void the warranty.

2.11 Optional Fresh Air Kit

The Optional Fresh Air Kit 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 4.3 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 Duo 38.

3.1 Location

Determine the location of the Astra Duo 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.
- 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. 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.

3.2 Chimney Installation

The Astra Duo 38 is approved with a 6" chimney that is listed under the UL 103 / ULC S629 standards (refer to Table). **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; 2" 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' respectively.
4. Only chimneys approved under the UL 103 / ULC S629 standards can be installed onto the unit (refer to Table in Section 3.2.2).
5. A 6" 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.
6. The chimney installed onto the unit cannot be connected to another appliance.
7. Enclose any portion of the chimney that extends to accessible spaces.
8. The clearance of the chimney to any combustible material cannot be less than 2"; the 2" clearance cannot be filled with insulation or any non-combustible material.
9. At least one support is to be incorporated in any chimney installation.
10. A firestop is required in the joists/frames where the chimney goes through (ceilings, floors, walls, and roof).
11. To prevent drafting issues, avoid deviations wherever possible.
12. 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.
13. A secure brace is to be installed if the chimney extends a minimum of 5' above the contact point with the roof.
14. A rain cap must be installed on top of the chimney to avoid internal damage and/or corrosion.
15. Consult the chimney manufacturer for clearances to combustibles when installing a combustible chimney enclosure above the roof.

3.2.2 Listed UL 103 / ULC S629 Approved Chimney Models (Reference Table)

Note that only chimney models certified under the UL 103 / ULC S629 standards can be installed on the Astra Duo 38. The table below serves as a reference for approved chimney models.


<u>Manufacturer</u>	<u>Models</u>
American Metal	<ul style="list-style-type: none"> • HS, AC Triple Wall, 6" inner diameter • HSS, AC Triple Wall, 6" inner diameter
FMI (US only)	<ul style="list-style-type: none"> • AC, AC Triple Wall, 6" inner diameter
ICC	<ul style="list-style-type: none"> • Excel 2100, 1" Solid Pack, 6" inner diameter
Metal Fab	<ul style="list-style-type: none"> • Temp Guard, 1" Solid Pack, 6" inner diameter
Olympia Chimney	<ul style="list-style-type: none"> • Ventis, 1" Solid Pack, 6" inner diameter
Security Chimney	<ul style="list-style-type: none"> • ASHT+, 1" Solid Pack, 6" inner diameter • S-2100+, 2" Solid Pack, 6" inner diameter
Selkirk	<ul style="list-style-type: none"> • Super Pro (SPR), 1" Solid Pack, 6" inner diameter • Super Pro 2100 (ALT), 2" Solid Pack, 6" inner diameter • Hart & Cooley (TLC), 1" Solid Pack, 6" inner diameter • Sure-Temp (ST), 1" Solid Pack, 6" inner diameter • Super Vent (JSC), 1" Solid Pack, 6" inner diameter • Super Vent 2100 (JM), 2" Solid Pack, 6" inner diameter • Ultra-Temp (UT), 1" Solid Pack, 6" inner diameter • UltimateOne, 1" Solid Pack, 6" inner diameter • CF Sentinel (CF), 2" Solid Pack, 6" inner diameter
Simpson Dura-Vent	<ul style="list-style-type: none"> • Dura Tech, 1" Solid Pack, 6" inner diameter • Dura Plus HTC, 2" Solid Pack, 6" inner diameter • Dura Plus, AC Triple Wall, 6" inner diameter

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. 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. Ensure to install the appropriate firestop for ceilings and walls.
3. Install the chimney manufacturer's anchor plate onto the unit.
4. Install the chimney lengths according to the manufacturer's instructions and ensure proper fastening/locking of the joints.
5. Install the roof support once the desired height has been reached.
6. Position the roof flashing. Note that for sloping roofs, position the upper portion of the flashing under the shingles and position the lower portion of the flashing above the shingles. Seal the joint between the roof and the flashing with roofing cement or silicone. Secure the flashing to the roof with roofing nails.
7. Install the storm collar over the 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 when installing a ventilated flashing.**
8. Install the chimney rain cap.

Refer to Figure  and Figure  for typical chimney installations.

3.2.4 Offset Installation

An offset installation (Figure ) 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.
- 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.
- Install a support for the first 15' 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 to 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.

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.

Figure 3-1: Offset Installation

3.2.6 Connecting to a Masonry Chimney

The Astra Duo 38 fireplace 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 the 6CON connector (manufactured by SUPREME FIREPLACES INC.) must be installed to connect the prefabricated chimney to the liner (6CON sold separately).

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" 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.

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 Duo 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" 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.

3.3 Façade Installation

The Astra Duo 38 can be installed with either the traditional façade or the contemporary façade.

3.3.1 Traditional Façade

The traditional façade comprises louvers below (intake) and above (outtake) the door. All components and fasteners are included in the façade kit.

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 bottom bracket to the intake opening and fasten it in place.
3. Align the upper bracket to the outtake opening and fasten it in place.
4. Place the façade within the door holder and secure it in place with 4 black screws (one on each corner). Make sure that the handles of the Primary Air Control pass through the slots of the façade.
5. Place back the door.

3.3.2 Contemporary Façade

The contemporary façade comprises no louvers; however, an intake into the chase and outtake through gravity ducts is required for this façade configuration. The instructions below describe the installation of the contemporary façade, the intake openings, and the gravity ducts/outtakes. Note that in order to connect the gravity ducts, the sides of the chase need to be constructed and the front of the chase needs to remain open (Refer to Figure III).

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 bottom bracket and fasten it in place.
3. Align the upper bracket and fasten it in place.
4. Place the façade within the door holder and secure it in place with 4 black screws (one on each corner). Make sure that the handles of the Primary Air Control pass through the slots of the façade.
5. Place back the door.
6. Remove the two 8" knockouts (2) at the top of the unit using a flat head screwdriver.
7. Using the knockout as a template, cut the exposed insulation. Make sure to remove any pieces of insulation that has fallen into the unit.
8. Install the 8" flange adaptors through the newly cut knockouts and fasten them to the top of the unit. Make sure to bend the tabs of the adaptors before installation.
9. 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 3" is required from the floor.
10. 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 6" is required from the ceiling.
11. From the exterior of the chase, place the duct/louver adaptor into the air outtake hole and secure it onto the wall with screws. Repeat for the other outtake.
12. Within the chase, place the grooved end of the adjustable 45° elbow into the flange of the duct/louver adaptor and secure it using an aluminum tape. Repeat for the other outtake.
13. Measure the distance between the flange on top of the unit and the flange of the duct/louver adaptor and cut the 8" semi-rigid insulated duct (SUPREME part number UCAC8) to the necessary length. Repeat for the other outtake.
14. Complete the connection by sliding the ducts over the flanges and tighten the joints with the worm gear clamps.
15. From the exterior of the chase, fasten the grills over the intake and outtake openings with the white screws.

3.4 Framing

The Astra Duo 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 III for framing design. The framing must be nailed or screwed onto the floor and to the ceiling.

CAUTION: Do not construct the framing with combustible material in front of the chimney; respect the framing design outlined in Figure III.

WARNING: Do not nail or screw framing components onto the fireplace.

3.5 Hearth Extension

The hearth extension of the Astra Duo 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. In addition, the non-combustible hearth extension must be constructed of materials having a **minimum R-Value of \$\$\$**. 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 front of the door (see Figure III for dimensions).

CAUTION: Make sure to remove any carpet or fabric under the hearth extension.

3.5.1 Calculating R-Value

The R-Value is a measurement of a material's insulating properties with respect to a referenced thickness (see Table 3-1). The total R-Value of the hearth extension constructed out of different materials can be calculated by summing the R-Value of each material with respect to the thickness (see equation below).

Table 3-1: Thermal Properties of Materials

Material	Thermal Resistance [R-Value] per Inch	Thermal Conductivity [k-Value] per Inch
Cement Board (Durock)	0.780	1.282
Brick	0.200	5.000
Limestone	0.153	6.536
Slate	0.100	10.000
Concrete	0.095	10.526
Marble	0.090	11.111
Granite	0.083	12.048
Ceramic Tile	0.080	12.500

$$R_{\text{Total}} = (R_1 \times T_1) + (R_2 \times T_2) + (R_3 \times T_3) + \dots$$

Note the k-Value per inch can be converted to an R-Value per inch using the following formula:

$$R = \frac{1}{k}$$

Example:

A hearth extension is constructed out of 4" of concrete with ¼" ceramic tiling. The total R-Value is:

$$R_{\text{Total}} = (R_{\text{con}} \times T_{\text{con}}) + (R_{\text{cer}} \times T_{\text{cer}}) = (0.095 \times 4") + (0.080 \times 0.25") = 0.400$$

As 0.400 is greater than \$\$\$, this hearth extension meets the requirements for the Astra 38.

3.6 Chase Installation

A portion of the front of the chase must be constructed out non-combustible material. Refer to Figure III 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 contemporary façade option, two intake and two outtake openings must be constructed onto the chase. Refer to Figure III for minimum clearances.

3.7 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 3-2: Overall Clearances

Combustible	Clearance	Reference
Side Wall	\$\$\$" (\$\$\$ mm)	Outer edge of fuel door
Side Trim	\$\$\$" (\$\$\$ mm)	Outer edge of fuel door
Ceiling	\$\$\$" (\$\$\$ mm)	Base of unit

Table 3-3: Mantel Clearances

Maximum Mantle Depth	Distance from the Base of the Astra 38 to the Bottom of the Mantle
\$\$" (\$\$ mm)	\$\$" (\$\$ mm)
\$\$" (\$\$ mm)	\$\$" (\$\$ mm)
\$\$" (\$\$ mm)	\$\$" (\$\$ 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 III). Note that a mantel cannot be installed below the minimum clearance of \$\$\$" (from the bottom of the mantle to the base of the unit).

4 OPTIONS

4.1 Blower Kit

The Astra Duo 38 can be installed with two high performance 110 CFM (total of 220 CFM) blower kit, which has an electrical rating of 115 V, 60 Hz, and 19 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 connections are to be performed by a certified electrician. Note that it is recommended that the wiring of the blower kit be done before the installation of the surround kit. The blowers and the electric box are located respectively at the bottom left/right sides and at the bottom center of the unit (Figure ).

For maintenance or replacement purposes, the blowers and the electrical box are accessible from within the bottom of the firebox (Figure 4-3). 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 Duo 38 (refer to Figure  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 black wire connecting the blowers in parallel.
5. Connect the red wire connecting the blowers in parallel 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 blower 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 blower will turn on. Note that the average time it takes for the blower to activate is between 30 to 45 minutes after starting a fire. The blower will turn off once the fireplace has cooled down and the therm-o-disc is 85°F. The speed of the blower can be adjusted with the variable speed control (rheostat) mounted on the wall. It is safe to operate the Astra Duo 38 in the event of a power failure (blower not powered).

Note: The blower sits on a fixture. If the 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 .

WARNING: Make certain that the fireplace is not in operation and the blower is unplugged (breaker off) before accessing the electrical wiring of the blower kit.

4.2 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'. Note that only an insulated flexible duct capable of withstanding a maximum temperature of 210°F can be installed with this kit.

WARNINGS

- Do not install within the casing of the fireplace.
- Respect the minimum distances to combustible materials when the hot air duct passes through the chase of the fireplace. Properly secure the duct to avoid accidental displacement.
- Install the blower a minimum distance of 3 feet away from the fireplace.
- Do not use a speed control for the blower.

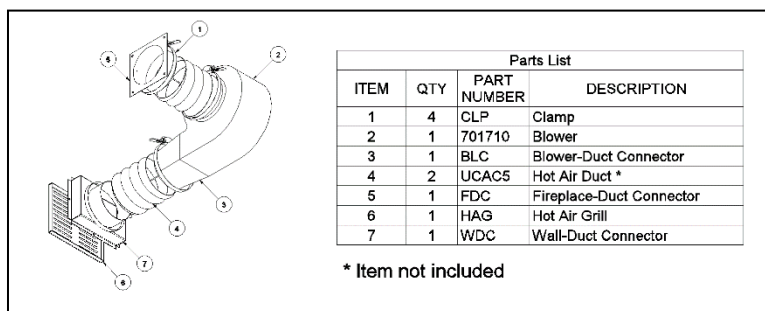


Figure 4-1: Hot Air Kit Parts List

Installation:

1. Remove the 5" knockout on the exterior casing of the fireplace using a flat head screwdriver.
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).
7. Install the wall grill (HAG - #6).
8. Make the electrical connections (Figures 4-2 and 4-3). Note that the power supply to the blower is 115V.

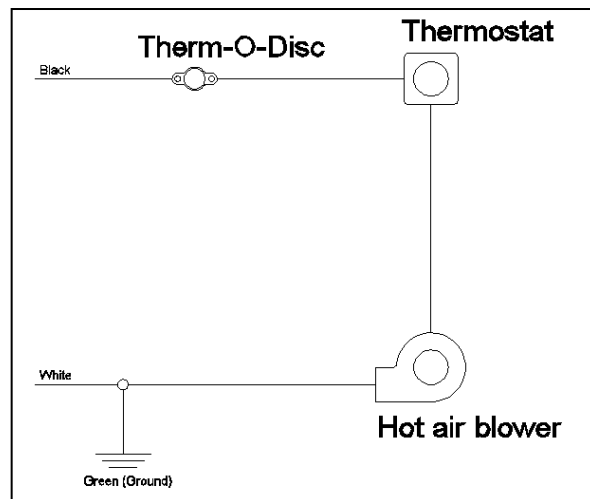


Figure 4-2: Electrical Diagram for Hot Air Kit

4.3 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. Refer to Figure 3-BBB for the location of the fresh air intake of the fireplace.

Note that the Astra Duo 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.**

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 fireplace.
- Use the SUPREME FIREPLACES INC. Fireplace 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 fireplace and secure it with two screws.
5. Install the air duct and secure it with worm gear clamps.

5 OPERATION INSTRUCTIONS

5.1 Fuel

The Astra Duo 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 16-22 inches⁶, 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 Duo 38 fireplace. Over firing will damage the fireplace, is hazardous and will void the warranty. NOTE: Gas logs cannot be installed in the Astra Duo 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 Duo 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 Duo 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 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 fireplace, it is normal to smell an odor for the first fires of the Astra Duo 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 Duo 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

⁶ Refer to Section 2.2 regarding the maximum log length for the Astra Duo 38

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 Duo 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 Fire

The Astra Duo 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 Duo 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.
- 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 fireplace and/or result in fire hazards. The maximum firewood load must not exceed 4 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 Duo 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 Duo 38 slightly unlatched until you see a flame in the firebox. Never leave the Astra Duo 38 door unlatched without constant supervision.
- f) Completely latch the Astra Duo 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 Optional Blower Operation

The blower kit for the Astra Duo 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 3.5 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 this manual (Section 5.4). The fans will turn off once the fireplace 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 Duo 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 Duo 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 Duo 38 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 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 Duo 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 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 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 and chimney connector of a Astra Duo 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 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 fireplaces. 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

Two panels are assembled along the combustion chamber side walls (left and right) 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 Astra Duo 38 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) Slide the left/right side wall panel(s) by tilting the bottom and swivelling them out of the top retainer.
- e) Replace the damaged panel and position the panels back in place by swiveling them behind the top retainer.
- f) 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 $\frac{3}{4}$ " 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 Duo 38 $\frac{3}{4}$ " 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 $\frac{3}{4}$ " 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 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 Astra Duo 38 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 $\frac{3}{4}$ " 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	-	Door frame assembly	1
2	-	Horizontal metallic bracket	4
2	-	Vertical metallic bracket	4
3	-	Pyroceram glass	1
4	GSK_19	Thin gasket	2
5	GSK_25	Thick gasket	1
6	SFC0031	Door latch - Astra	1
7	WP_SFC	Wood pull handle – Astra	1

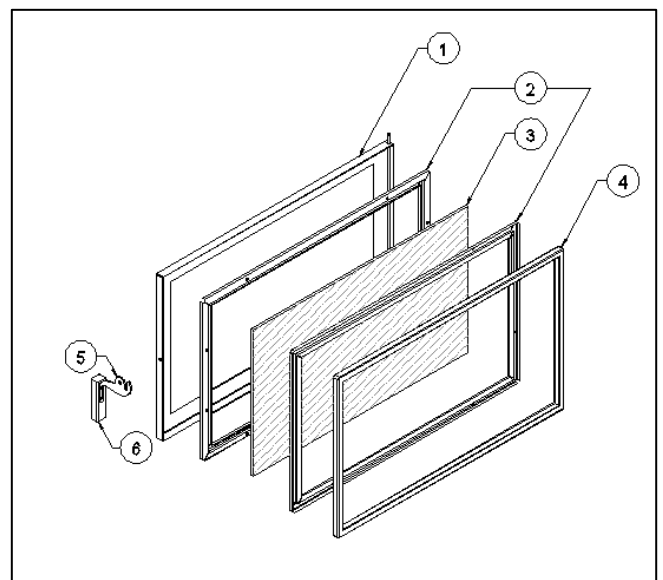


Figure 7-2: Door Assembly Exploded View

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) on a yearly basis to prevent abrasive wear. Note that the door latch can be tightened to the door frame using a $\frac{5}{32}$ " hex key.





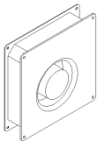
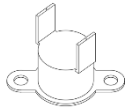
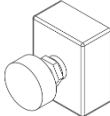
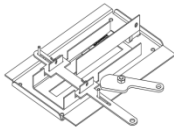

7.8 Paint


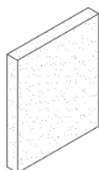
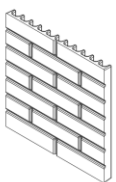
Paint touch-ups can be performed on the unit using a high temperature paint (in aerosol spray can format) by Stove Bright®. Refer to your invoice to determine the precise color of your unit. Contact your local hearth shop for further information on purchasing this paint.

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_24.25_17	Pyroceram III / Keralite 5mm thick glass 24.25" X 17"	
GSK_19_7.5	Graphite coated square gasket, 0.3125" thick, 7.5' length	
GSK_25_7.5	Graphite coated square gasket, 0.75" thick, 7.5' length	
RG 125-19/06	AC centrifugal compact fan <u>Electrical rating:</u> 115VAC, 60Hz, 19W <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	

CPSP0301	Removable Ashlip (specify color)	
32SF1175	Soapstone Panel 15.75" X 15.75" X 1.25"	
32SFC1175	Cast Iron Panel 15.75" X 15.75" 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 90 days: ceramic glass (**thermal breakage ONLY**).

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 10 year: cast iron panels.

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.

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/registration.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
E-mail: info@supremem.com

MODEL NUMBER/NUMERO MODELE: 38SFC_D
JUNE 2018 / JUIN 2018



CERTIFIED TO: ULC S610 : UL 127
ASTRA DUO 38
ELEGANCE ST 42
MONARCH SEE-THROUGH 38

U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using cordwood. Tested with EPA ALT-125 Method at 2.16 gm/hr of emissions. This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual. Certification tests were performed by POLYTESTS SERVICES INC. with PFS-TECO as the third-party-certifier.

WH-38SFC_D



3594 Jarry E., Montreal, QC
H1Z 2G4, Canada

DATE OF FABRICATION / DATE DE FABRICATION

JA	FE	MR	AR	MA	JN	JL	AU	SE	OC	NO	DE
2020		2021		2022		2023		2024		2025	

MINIMUM CLEARANCES TO COMBUSTIBLES
DÉGAGEMENTS MINIMUMS AUX COMBUSTIBLES

- A) ADJACENT SIDEWALL / MUR LATERAL
- B) CHASE WIDTH / LARGEUR DE L'ENCEINTE
- C) CHASE DEPTH / PROFONDEUR DE L'ENCEINTE
- D) CEILING / PLAFOND
- E) MANTEL FROM FLOOR / MANTEAUX DU PLANCHER
- F) HEARTH DEPTH / PROFONDEUR DE L'ÂTRE
- G) HEARTH FROM SIDE DOOR / ÂTRE DE LA PORTE

ELECTRICAL RATING

ALIMENTATION ÉLECTRIQUE

VOLTAGE / TENSION: 120 V
FREQUENCY / FRÉQUENCE 60 Hz
POWER / PUISSANCE 38 W

• FOR USE WITH WOOD ONLY, DO NOT USE OTHER FUELS
• USE ONLY IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION AND OPERATING INSTRUCTIONS.

- USE ONLY WITH 6 IN. (152 MM) DIAMETER CHIMNEY LISTED UL 103/ULC S629
- MINIMUM/MAXIMUM CHIMNEY HEIGHT 15/35 FEET MEASURED FROM THE BASE OF THE FIREPLACE.
- CAN BE CONNECTED TO A MASONRY CHIMNEY. SEE OWNER'S MANUAL FOR INSTALLATION INSTRUCTIONS.
- DO NOT CONNECT THIS UNIT TO A CHIMNEY SERVING ANOTHER APPLIANCE.
- DO NOT INSTALL A FIREPLACE INSERT OR OTHER COMPONENTS NOT LISTED FOR USE WITH THIS PRODUCT.
- FOR CLOSED DOOR OPERATION ONLY.
- DO NOT OVERFIRE THE UNIT. IF HEATER OR CHIMNEY CONNECTOR GLOWS, YOU ARE OVERFIRING.

- REPLACE GALLS ONLY WITH CERAMIC 5 MM THICK ONLY.
- CAUTION: AIR IS NECESSARY FOR FIREPLACE OPERATION. PRIMARY AND SECONDARY COMBUSTION AIR OPENINGS MUST NOT BE OBSTRUCTED.
- WARNING: THIS FIREPLACE HAS NOT BEEN TESTED WITH AN UNVENTED GAS LOG SET. TO REDUCE THE RISK OF FIRE OR INJURY, DO NOT INSTALL AN UNVENTED GAS LOG SET INTO THE FIREPLACE.
- CONTACT LOCAL BUILDING CODE OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA.
- THE FIREPLACE AND CHIMNEY MUST BE INSPECTED AND CLEANED REGULARLY.

• POUR UTILISATION AVEC BOIS SEULEMENT, NE PAS UTILISER AVEC D'AUTRES COMBUSTIBLES.
• INSTALLER ET UTILISER CONFORMÉMENT AU MANUEL D'UTILISATION DU FABRIQUANT.

• UTILISER SEULEMENT AVEC UNE CHEMINÉE HOMOLOGUÉE SELON UL 103/ULC S629 DE 6 PO. (152 MM) PARMIS LA LISTE DANS LE MANUEL DU PROPRIÉTAIRE.
• PEUT ÊTRE CONNECTÉ À UNE CHEMINÉE DE MAÇONNERIE. VOIR LE MANUEL DU PROPRIÉTAIRE POUR INSTRUCTIONS.

- NE PAS RACCORDER CET APPAREIL À UNE CHEMINÉE DESSERVANT UN AUTRE APPAREIL.
- NE PAS UTILISER UN FOYER ENCASTRABLE OU D'AUTRES COMPOSANTES NON-HOMOLOGUÉES POUR UTILISATION AVEC CE FOYER.
- POUR OPÉRATION AVEC PORTE FERMÉE SEULEMENT.
- NE PAS SURCHAUFFER L'UNITÉ. SI L'APPAREIL OU LE TUYAU ROUGIT, IL Y A UN SURCHAUFFEMENT.
- REMPLACER LA VITRE AVEC UN VERRE CÉRAMIQUE DE 5 MM D'ÉPAISSEUR.

• ATTENTION : L'AIR EST NÉCESSAIRE AU FONCTIONNEMENT DU FOYER. LES ENTRÉES D'AIR DE COMBUSTION PRIMAIRE ET SECONDAIRE NE PEUVENT PAS ÊTRE OBSTRUÉES

• ATTENTION : CE FOYER N'A PAS ÉTÉ TESTÉ AVEC UN BRÛLEUR AU GAZ. POUR RÉDUIRE LES RISQUES D'INCENDIES OU DE BLESSURES, NE PAS INSTALLER UN BRÛLEUR DE GAZ DANS CE FOYER.

• CONSULTER LES AUTORITÉS DE VOTRE LOCALITÉ AYANT JURIDICTION CONCERNANT LES RESTRICTIONS ET INSPECTIONS D'INSTALLATION.
LE FOYER ET LA CHEMINÉE DOIVENT ÊTRE INSPECTÉS ET NETTOYÉS RÉGULIÈREMENT.

CAUTION



Hot while in operation. Do not touch. Keep children, clothing, and furniture away. Contact may cause skin burns. See nameplate and instructions.
Chaud pendant fonctionnement. Ne pas toucher. Garder les enfants, les vêtements et les meubles hors de portée. Risque de brûlures au contact. Voir la fiche signalétique et instructions.

JUNE 2020 / JUIN 2020

CERTIFIED TO / CERTIFIÉ SELON: ULC S627 : UL 1482 : UL 737

NOVO DUO 38



U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using cordwood. Tested with EPA ALT-125 Method at 2.16 gm/hr of emissions. This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual. Certification tests were performed by POLYTESTS SERVICES INC. with PFS-TECO as the third-party-certifier.

WH-NVD							supra						
DATE OF FABRICATION / DATE D													
JA	FE	MR	AR	MA	JN	JL	JA	FE	MR	AR	MA	JN	JL
2020		2021		2022		20	2020		2021		2022		20

MINIMUM CLEARANCES TO COMBUSTIBLES
DÉGAGEMENTS MINIMUMS AUX COMBUSTIBLES

- A) FROM STOVE TO SIDE WALL
- B) FROM PIPE TO SIDE WALL
- C) FROM STOVE TO BACK WALL
- D) FROM PIPE TO BACK WALL
- E) FROM STOVE TO WALL (CORNER)
- F) FROM PIPE TO STOVE (CORNER)

- J) STOVE TO BACK FLOOR PROTECTOR
- K) STOVE TO SIDE FLOOR PROTECTOR
- L) EDGE OF DOOR TO SIDE FLOOR PROTECTOR
- M) DOOR TO FRONT OF FLOOR PROTECTOR

SINGLE WALL
TUYAU SIMPLE
NOVO DUO

38

DOUBLE WALL
TUYAU DOUBLE
NOVO DUO

38

CANADA

8"

8"

N/A

18"

USA

N/A

8"

8"

16"

ELECTRICAL RATING

ALIMENTATION ÉLECTRIQUE

VOLTAGE / TENSION:

FREQUENCY / FRÉQUENCE:

POWER / PUISSANCE:

38

120

60

38

CAUTION



Hot while in operation. Do not touch. Keep children, clothing, and furniture away. Contact may cause skin burns. See nameplate and instructions.
Chaud pendant fonctionnement. Ne pas toucher. Garder les enfants, les vêtements et les meubles hors de portée. Risque de brûlures au contact. Voir la fiche signalétique et instructions.

- FOR USE WITH WOOD ONLY. DO NOT USE OTHER FUELS.
- USE ONLY IN ACCORDANCE WITH MAUFACTURER'S INSTALLATION AND OPERATING INSTRUCTIONS.
- NOT SUITABLE FOR MOBILE HOMES.
- USE 6 IN. (152 MM) DIAMETER LISTED CONNECTOR WITH LISTED FACTORY-BUILT CHIMNEY SUITABLE FOR USE WITH SOLID FUELS OR MASONRY CHIMNEY.
- DO NOT PASS THE CHIMNEY CONNECTOR THROUGH A COMBUSTIBLE CEILING.
- DO NOT CONNECT THIS UNIT TO A CHIMNEY SERVING ANOTHER APPLIANCE.
- FOR CLOSED DOOR OPERATION ONLY.
- DO NOT OVERFIRE THE UNIT. IF HEATER OR CHIMNEY CONNECTOR GLOWS, YOU ARE OVERFIRING.
- REPLACE GLASS ONLY WITH CERAMIC 5 MM THICK.
- CAUTION: AIR IS NECESSARY FOR WOODSTOVE OPERATION. PRIMARY AND SECONDARY COMBUSTION AIR OPENINGS MUST NOT BE OBSTRUCTED.
- COMBUSTIBLE FLOOR MUST BE PROTECTED BY A NON-COMBUSTIBLE MATERIAL EXTENDED TO THE FRONT, SIDES, AND BACK AS INDICATED.
- CONTACT LOCAL BUILDING CODE OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA.
- THE WOODSTOVE AND CHIMNEY NEED TO BE CLEANED AND INSPECTED REGULARLY.
- REFER TO INTERTEK'S DIRECTORY OF BUILDING PRODUCTS FOR DETAILED INFORMATION

- POUR UTILISATION AVEC BOIS SEULEMENT. NE PAS COMBUSTIBLES.
- INSTALLER ET UTILISER CONFORMÉMENT AU MANUE
- NE CONVIENT PAS AUX MAISONS MOBILES.
- UTILISER DU TUYAU DIAM. 6 PO. (152 MM) HOMOLOGUÉ PRÉFABRIQUÉE HOMOLOGUÉE CONVENANT POUR UN CARBURANTS SOLIDES OU UNE CHEMINÉE DE MAÇON
- NE PAS PASSER DE TUYAU À TRAVERS UN PLAFOND
- NE PAS RACCORDER CET APPAREIL À UNE CHEMINÉ
- POUR OPÉRATION AVEC PORTE FERMÉE SEULEMEN
- NE PAS SURCHAUFFER L'UNITÉ. SI LE POÊLE OU LE T
- REMPLACER UNE VITRE SEULEMENT AVEC DU VERRI D'ÉPAISSEUR.
- ATTENTION: L'AIR EST NÉCESSAIRE AU FONCTIONNE D'AIR DE COMBUSTION PRIMAIRE ET SECONDAIRE NE
- CONTACTER LES AUTORITÉS DE VOTRE LOCALITÉ A' LES RESTRICTIONS ET INSPECTIONS D'INSTALLATION.
- LE POÊLE ET LA CHEMINÉE DOIVENT ÊTRE INSPECTÉ
- SE RÉFÉRER AU RÉPERTOIRE DES PRODUITS DE CO INFORMATIONS DÉTAILLÉES

ne 3594 Jarry E., Montreal, QC
H1Z 2G4, Canada

IE FABRICATION				
AU	SE	OC	NO	DE
23		2024		2025

UTILISER AVEC D'AUTRES

IL D'UTILISATION DU FABRIQUANT.

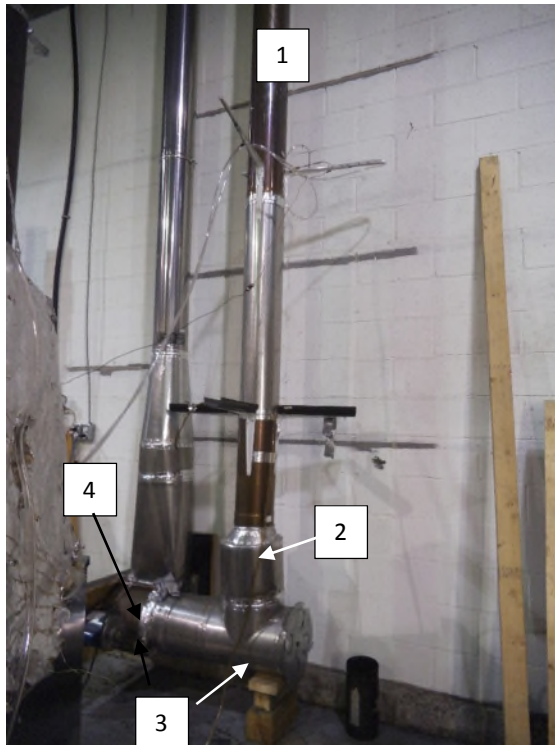
JÉ AVEC UNE CHEMINÉE
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COMBUSTIBLE.
E DESSERVANT UN AUTRE APPAREIL.
T.
UYAU ROUGIT, IL Y A SURCHAUFFÉ.
E PYROCÉRAMIQUE DE 5 MM

MENT DU POËLE. LES ENTRÉES
DOIVENT PAS ÊTRE OBSTRUÉES.
YANT JURIDICTION CONCERNANT
.
ÈS ET NETTOYÉS RÉGULIÈREMENT.
NSTRUCTION POUR DES

APPENDIX 8: Photographs of test set up

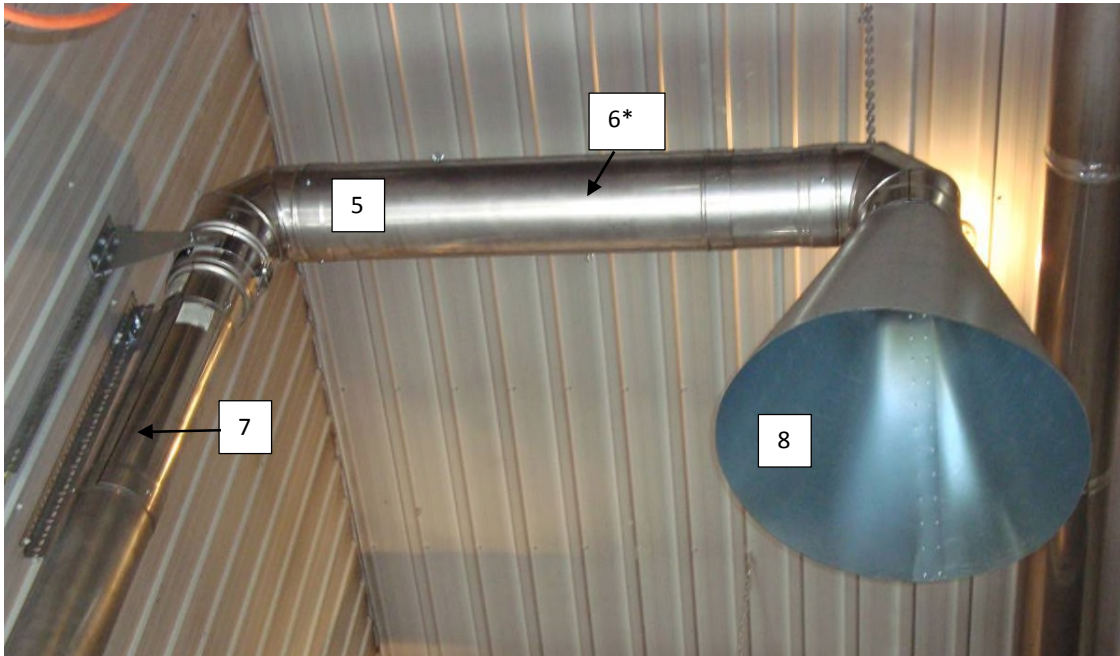
Dilution picture Dia 8

Picture 1: Sampling system



- 1 : 8 in dia Stainless steel pipe
- 2 : 16 in. Between sampling probe and lower elbow
- 3 : Air intake with damper to adjust flow rate
- 4 : Exhaust blower

Picture 2: Hood and mixing baffle



*The arrow point the deflectors inside of the pipe

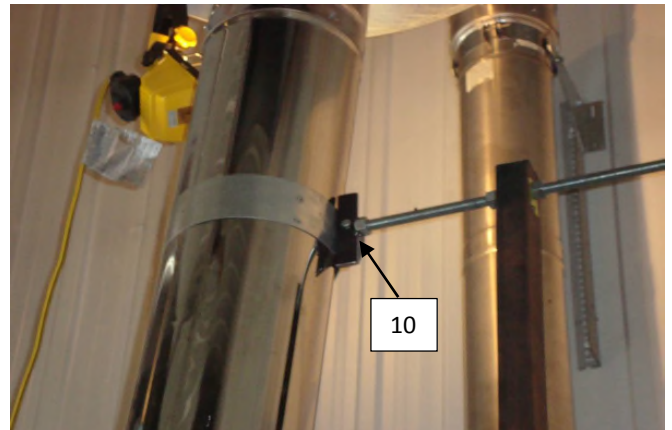
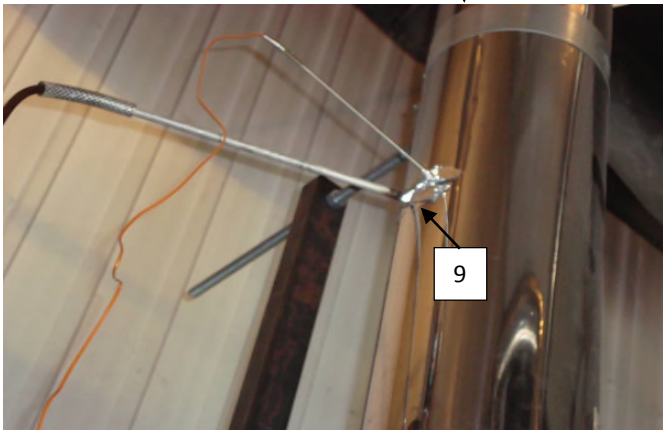
- 5 : 8 in. dia. Stainless steel pipe
- 6 : Mixing baffle (2) location 1 foot between baffles
- 7 : 10 feet long between velocity port and upper elbow
- 8 : 48 in. dia. Galvanized steel smoke captures hood

Picture 3: Stack sampling



Picture 3.1: Gas analysis and temperature probe

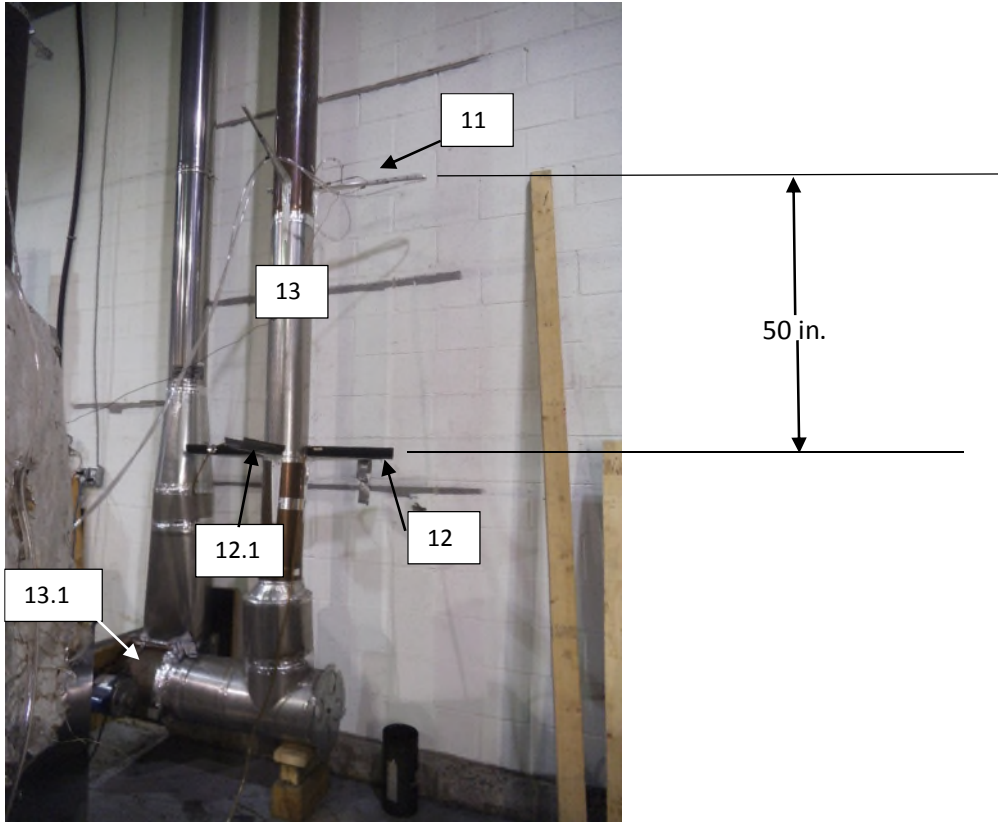
Picture 3.2: chimney support



9 : Temperature and gas analyser sampling ports located 9 feet above platform

10 : Exhaust system support bracket

Picture 4: Tunnel flow measurement and sampling probe



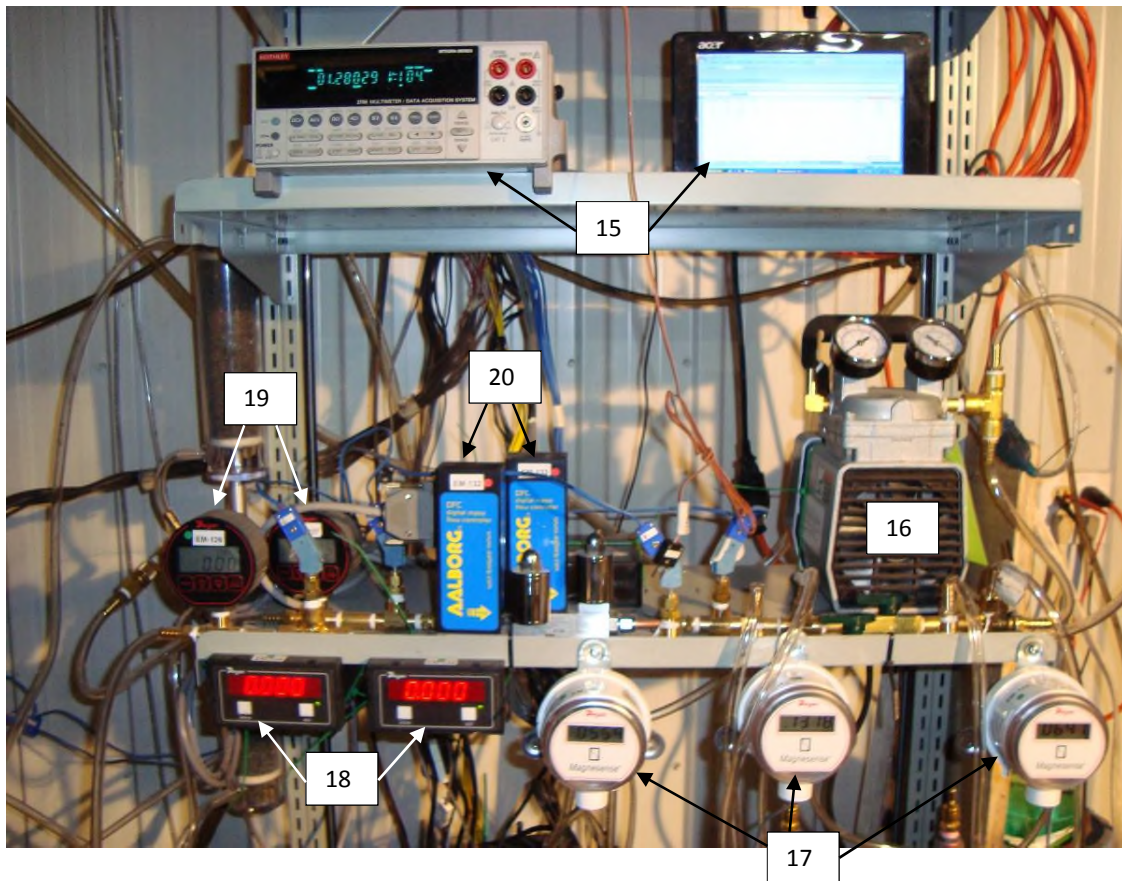
- 11 : Velocity port
- 12 : Sampling port, 2 sampling probes with 2x48 mm. dia.filter each. Filter used: Millipore AP4004700
- 12.1 : Sampling port, sampling probes with 2x48 mm. dia.filter each. Filter used: Millipore AP4004700, for first hour sampling
- 13 : 18 feet long dilution tunnel
- 13.1 : Extraction blower

Picture 5: Draft sampling



14 : Draft sampling port located 6 in. from the flue outlet

Picture 6: Equipments

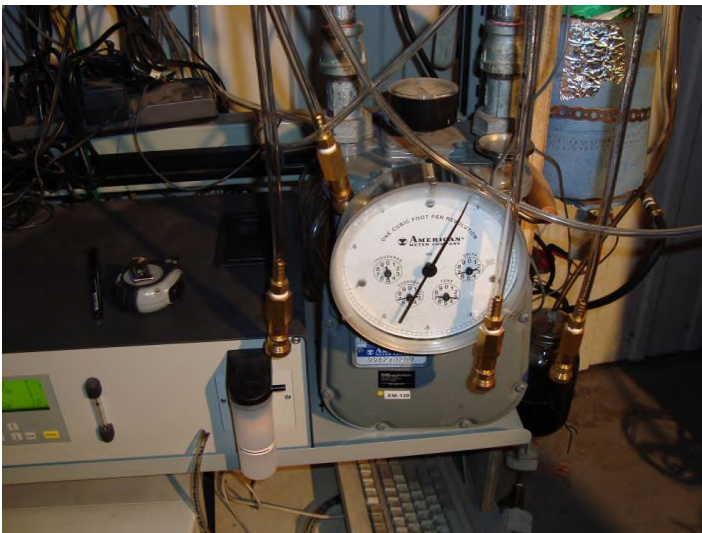


- 15 : Acquisition system
- 16 : Vacuum pump
- 17 : Digital manometer
- 18 : Digital read out for mass flow meter
- 19 : Digital vacuum gage
- 20 : Mass flow meter

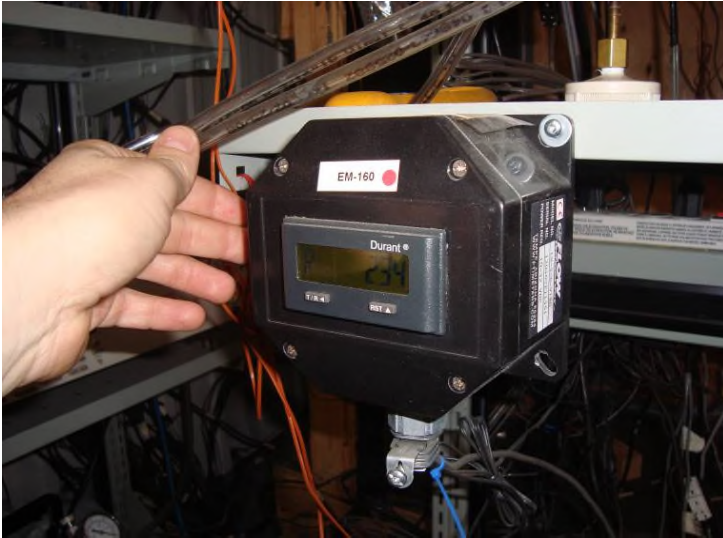
Picture 7: Gaz analyser



Picture 8: Reference dry gas meter



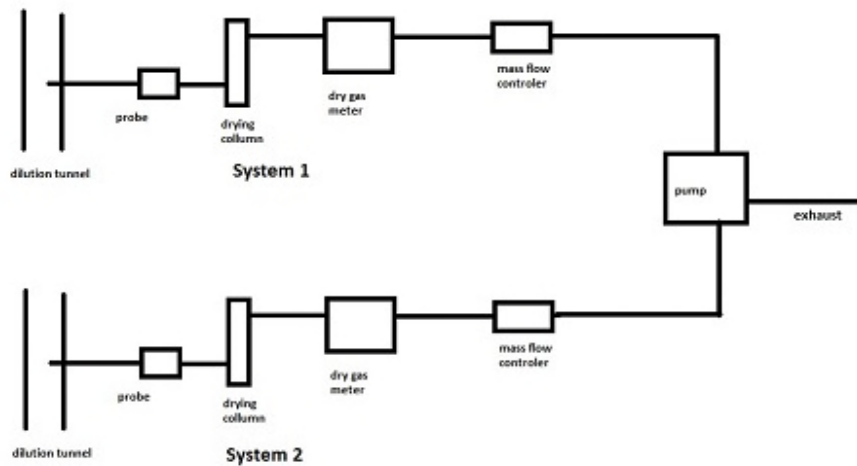
Picture 10: Water flow meter



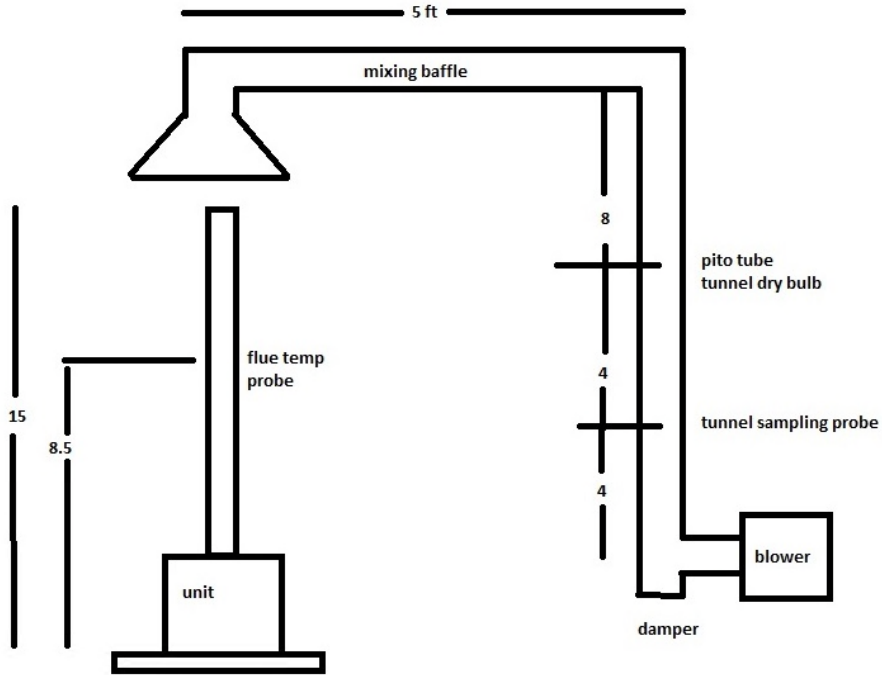
Picture 11: Dry gas meter



Picture 12 : Dilution tunnel sample system



Picture 13: Dilution tunnel



APPENDIX 9: Test load photographs

Run 1.1



Run 1.2



Run 2.1



APPENDIX 10: Laboratory Operating Procedures

APPENDIX 12: Volume calculations

4 Volume Calculations

The usable firebox of the 38SFC_D & 38ST_D consists of a rectangular prism with a front width of 23.000 in, depth of 14.000 in, and a height of 18.250 in, making a 3.401 ft³ combustion chamber (refer to Figure 4-1).

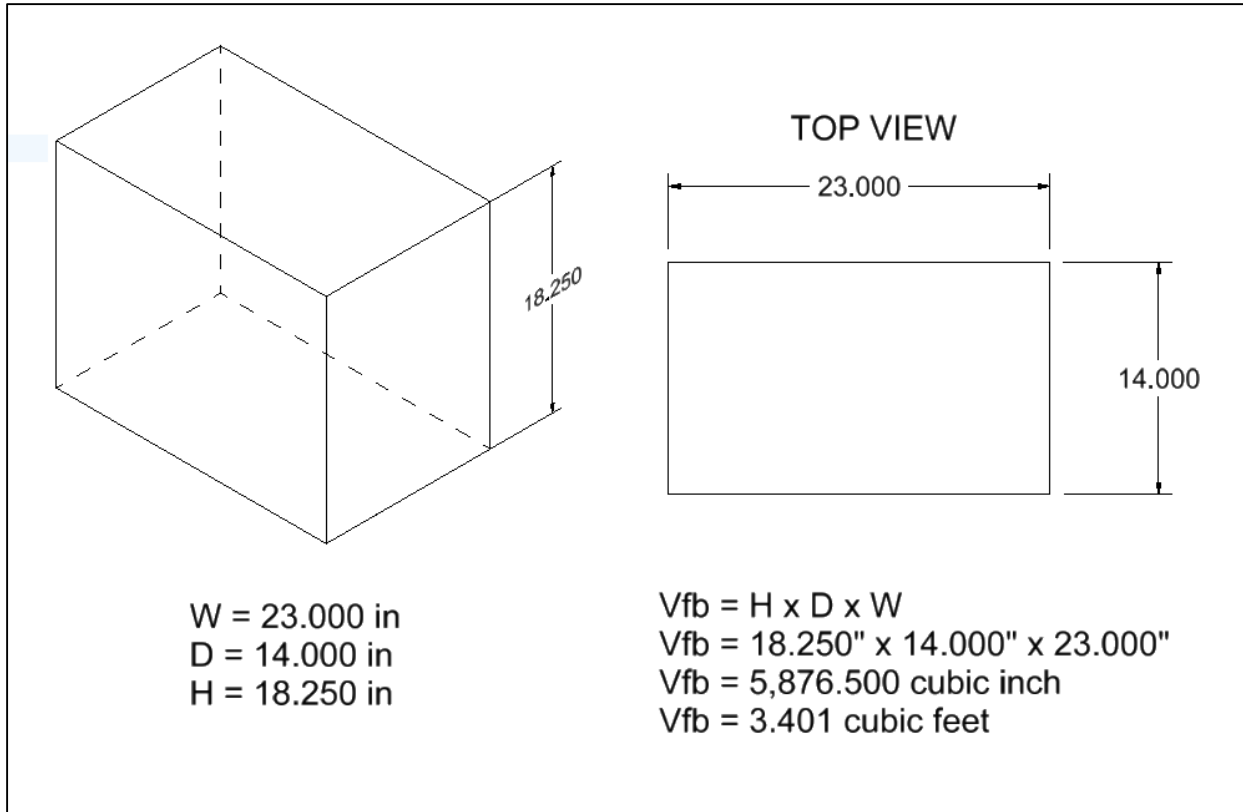


Figure 4-1: Firebox Volume Calculation

APPENDIX 13: Operating instruction

16 Control Settings

16.1 Start-up

1. Place the first row of start-up fuel wood (approx. 12" long) in the north-south direction.
2. Place the second row of start-up wood (approx. 20") in the east-west direction.
3. Continue stacking the start-up wood by alternating the placing direction until a weight between 8 to 9 lbs of kindling has been obtain.
4. Scatter 1 lbs of kindling on top the start-up fuel; allow a clearance of 5" between the top row of the kindling and the baffle.
5. Position the primary air control in the ignition setting (left lever pushed back) and the burn rate adjuster at the maximum primary position (refer to Figure 17-1).
6. Start the blowers at maximum speed.
7. With a torch, light the top row of the kindling wood for 1 minute and close the door of the unit.

16.2 High Fire Test Run

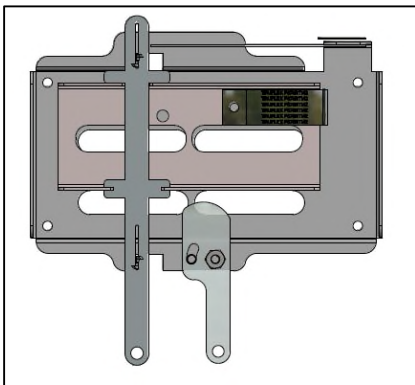


Figure 16-2: Primary Air Control - Ignition Setting

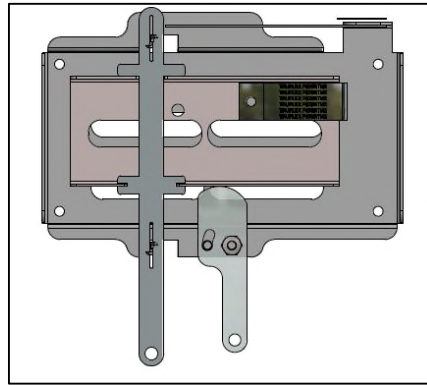


Figure 16-1: Primary Air Control - High Burn Rate

1. Stop the blowers approximately 5 minutes before loading.
2. Insert 30 lbs to 32 lbs of wood (5 pieces) once the kindling has reached the lower portion of the loading bracket:
 - a. Place the first row of wood (2 pieces) in the north-south direction on the center of the hearth, with 8" space between the logs.
 - b. Place the second row of wood (2 pieces), in the east-west direction with a 1" to 2" space between the logs.
 - c. Place the fifth log on top of the first and second row, in a diagonal direction.
3. Keep the door slightly open until proper ignition has been completed (approximately 3 minutes).
4. Once the door is closed, push back the left lever of the primary air control.
5. Assure that the right lever is set to the maximum position (refer to Figure 17-2).
6. Start the blowers approximately 20 minutes after loading.

16.3 Low Fire Test Run

1. Stop the blowers approximately 5 minutes before loading.
2. Insert 40 lbs to 42 lbs of wood (7 pieces) once the high fire test run has reached the lower portion of the loading bracket:
 - a. Place the first row of wood (2 pieces) in the north-south direction on the center of the hearth, with 6" space between the logs.
 - b. Place the second row of wood (2 pieces), in the east-west direction with a 4" to 5" space between the logs.
 - c. Place the third row of wood (3 pieces) in the north-south direction on top of the second row of wood, with 1" space between the logs.
3. Keep the door slightly open until proper ignition has been completed (approximately 3 minutes).
4. Once the door is closed, push back the left lever of the primary air control.
5. Position the Primary Air Control right lever to the medium position (Figure 17-4) for the first 15 minutes before setting it to the minimum position (Figure 17-3).
6. Start the blowers approximately 20 minutes after loading.

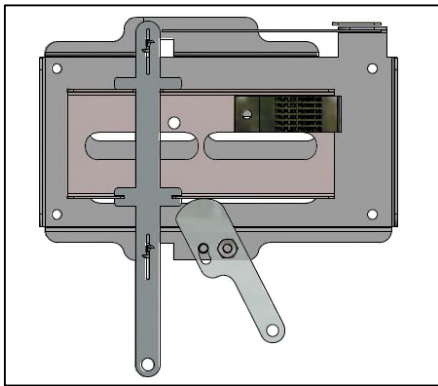


Figure 16-4: Primary Air Control - Low Burn Rate

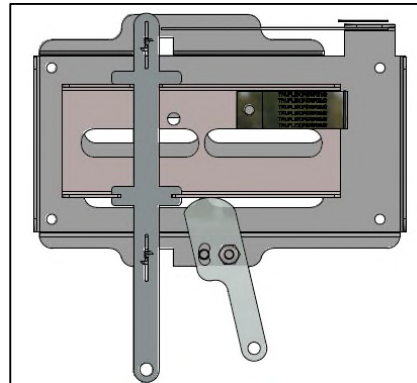


Figure 16-3: Primary Air Control – Medium Burn Rate

16.4 Medium Fire Test Run

1. Stop the blowers approximately 5 minutes before loading.
2. Insert 40 lbs to 42 lbs of wood (7 pieces) once the high fire test run has reached the lower portion of the loading bracket:
 - a. Place the first row of wood (2 pieces) in the north-south direction on the center of the hearth, with 6" space between the logs.
 - b. Place the second row of wood (2 pieces), in the east-west direction with a 4" to 5" space between the logs.
 - c. Place the third row of wood (3 pieces) in the north-south direction on top of the second row of wood, with 1" space between the logs.
3. Keep the door slightly open until proper ignition has been completed (approximately 3 minutes).
4. Once the door is closed, push back the left lever of the primary air control.
5. Position the Primary Air Control right lever to the medium position (Figure 17-4).
6. Start the blowers approximately 20 minutes after loading.

APPENDIX 14: Drawing Air flow pattern

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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I. Test Method 28R for Certification and Auditing of Wood Heaters	6
A. <i>Summary Results – Adjustable Wood Burning Heaters</i>	Error! Bookmark not defined.
B. <i>Summary Results – Single Burn Rate Wood Burning Heaters</i>	Error! Bookmark not defined.
C. <i>Summary Results – Pellet Heaters</i>	Error! Bookmark not defined.
Hydronic Heaters	Error! Bookmark not defined.
II. Test Method 28WHH for Measurement of Particulate Emissions and Heating Efficiency of Wood-Fired Hydronic Heating Appliances Error! Bookmark not defined.	
Table 1A. Data Summary Part A	Error! Bookmark not defined.
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Table 1B. Data Summary Part B.....	Error! Bookmark not defined.
Table 1C: Additional (Hangtag) Information.....	Error! Bookmark not defined.
Table 2. Annual Weighting.....	Error! Bookmark not defined.
III. Test Method 28WHH for Certification of Cord Wood-Fired Hydronic Heating Appliances With Partial Thermal Storage	Error! Bookmark not defined.
Bookmark not defined.	
Table 2A. Data Summary Part A	Error! Bookmark not defined.
Table 2B. Data Summary Part B.....	Error! Bookmark not defined.
Table 3C. Data Summary Part D.....	Error! Bookmark not defined.
Forced-Air Furnaces.....	Error! Bookmark not defined.
IV. Forced-Air Furnaces	Error! Bookmark not defined.

**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

Heater Type (Circle One):	Adjustable Burn Rate Wood Heater	Pellet Stove	Single Burn Rate Heater	Hydronic Heater	Forced Air Furnace	Other:
Hydronic Heater Type (Circle One):	Traditional	Full Storage	Partial Storage	Indoor/Outdoor	Other:	
Forced-Air Furnace Type (Circle One):	Small (less than 65,000 BTU/hr heat output)		Large (greater than 65,000 BTU/hr heat output)		Other:	
Fuel Tested:	Crib	Pellet	Cordwood	Wood Chips	Other:	

Test Method(s) ALT-125

Catalyst: No

Model Names: Astra Duo 38, Elegance 42 ST, Monarch See-Through 38, Novo Duo 38 – Cast Iron, Novo Duo 38 - Soapstone

Physical Address (Street number and Address, not P.O. Box):
3594 Jarry, East

Mailing Address:
3594 Jarry, East, Montreal, QC, H1Z 2G4, Canada

City: Montreal

State: QC, Canada

ZIP Code: H1Z 2G4

Phone: (514) 593-4722

Email:
alexander@supremem.com

Website:
www.supremem.com

EPA Submission Date of 30 day Notice: 3rd of March, 2020 – Revised April 8th, 2020

MANUFACTURER'S AUTHORIZED REPRESENTATIVE INFORMATION

Name: Alexander Marcakis

Position/Title: Engineering Department

Address: 3594 Jarry, East

City: Montreal

State: QC, Canada

ZIP Code: H1Z 2G4

Phone: (514) 593-4722

E-mail:
alexander@supremem.com

Website:
www.supremem.com

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 Duo 38, Elegance 42 ST, Monarch See-Through 38, Novo Duo 38 – Cast Iron, Novo Duo 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 Duo 38, Elegance 42 ST, Monarch See-Through 38, Novo Duo 38 – Cast Iron, Novo Duo 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 satisfies 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 agrees 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 acknowledges 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 acknowledges that it is unlawful to sell, distribute or offer to sell or distribute an affected wood heater without a valid certificate of compliance.

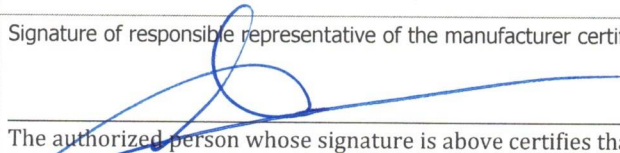
Print Name and Title:

Alexander Marcakis, Engineering Department

Date:

2nd of June, 2020

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 Duo 38, Elegance 42 ST, Monarch See-Through 38, Novo Duo 38 – Cast Iron, Novo Duo 38 - Soapstone) as tested is in compliance with all certification requirements of the 2015 NSPS. Foyers Supreme Incorporated (manufacturer) also acknowledges that we remain responsible for compliance regardless of any error by the test laboratory (Services Polytests Inc.) or third-party certifier (PFS-TECO).

Attachments

Instructions: Please complete the section applicable to your certification request. You may substitute your own data tables in lieu of the ones shown below provided that all the information is captured.

WOOD BURNING HEATERS

I. Test ALT-125 for Certification and Auditing of Wood Heaters

WEIGHTED AVERAGE SUMMARY

Model name / number	38 STD		
Usable Firebox volume	3.34		
Convection air Fan (no, Standard, option)	Optional		
average for each test run category	L	M	H
burn rate kg/h DB	1,35	1,50	5,34
PM Emission rate - g/h	1,61	1,38	4,84
Co emission rate - g/h	141,45	158,66	328,35
Overall Efficiency - CSA B 415,1			
% HHV Basis	66,1%	65,3%	62,2%
% LHV Basis	71,1%	70,2%	67,0%
Heat output - Btu/hr	17524	19628	61231
Category weighting	0,4	0,4	0,2

WEIGHTED AVERAGE FINAL RESULTS

ASTM E 3053 Weighted averages			
PM Emission Rate - g/h	2,16		
CO Emission Rate g/h	185,7		
Overall Efficiency - CSA B415,1			
% HHV Basis	64,98%		
% LHV Basis	69,92%		
Heat output range - Btu/h	17 524	to	61231
Co Arithmetic average g/min	3,49		