POLYTESTS
TESTING THROUGH YOUR REALITY

TEST REPORT

TEST OF A WOOD HEATER FOR EMISSIONS AND EFFICIENCY

PER EPA METHODS 28R AND ASTME2515 and ASTME2780 and CSAB415.1, MAY 2015

Client:

Hearthstone QHHP

317 Stafford ave.

Morrisville, Vt 05661

Model name: Castleton 8031

Attention: Rafaël Sanchez

TESTED BY:

Services Polytests Inc.

695-B Gaudette

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

TEST DATES: June 6th to 21st 2022

REPORT DATE: June 30th 2022

Revision 1: February 28th 2024

Project number: PI-20270

Tested:

Maxime Martin

written by:

Danick Power, P. Eng

Verified by third party certifier (PFS):

SUMMARY

Revision 1: February 28th 2024

- Appendix 15 additional spreadsheet for weighted average emission rate with negative filter weight rounded to zero.
- Section 3.4 updated to comment on category 1 unachievable with two attempts at the minimum setting

List of appendixes

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

- Test dates: June 6th to 21st 2022
- Test methods used:
  - Particulate emissions: ASTM E2780-10; ASTM E2515-11 methods 28R as referred into 40 CFR Part 60 Subpart AAA; CSA B 415.1-22
  - Efficiency: CSA B415.1-22

1.2 TEST UNIT INFORMATION

General

- Manufacturer: Hearthstone
- Product type: Hybrid wood stove
- Combustion system: catalytic, with pre combustion
- Unit tested: Castleton I 8031
- Option: optional convection fan can be installed on the wood stove; the alternative Catalyst cannot be installed in this stove as it fails the maximum burn rate requirement emission rate range from the WDS-146.

1.3 RESULTS

Emission results obtained

- Average emission rate: 0.98 grams/hour

Conformity: NSPS Phase 2020 with crib wood and CSAB415.1-22

1.4 PRETEST INFORMATION

Unit condition: The unit was received by carrier on May 30th 2022. The 50hrs of aging was done by the laboratory at medium heat draw, during week prior to testing (all data in Appendix 4).

Set up

- Venting system type: 6-inch diameter insulated chimney
- System height from floor: 15 feet
- Particularities: The unit was tested with the convection Fan ON for the first four tests, then a fifth test without the convection fan for a NO-Fan confirmation test. After the five tests the catalysts have been changes for the 50 hrs aging of the second (alternative) catalyst. Following the 50 hrs aging on the alternative catalyst a minimum and a maximum test have been done on the stove for catalyst equivalency (WDS-146- in appendix 15).

Break in period

- Duration: the unit was pre burned by Polytests and run for at least 50 hours for each catalyst, adequate documentation of fuel additions, flue and unit temperatures and fuel moisture recorded. All details in Appendix 4.
- Fuel: Red Oak cordwood between 19% and 25%

2 SUMMARY OF TEST RESULTS

2.1 EMISSIONS

Run Number	Test Date (YR-MM-DD)	Emission Rate (g/hr)	Burn Rate (kg/hr)	1st hour Emission Rate (g/hr)	CSA B415.1 CO emission Gr/hr	CSA B415.1 emission Gr/Mj
1	2022-06-06	0,50	1,110	1,597	25,765	0,068
2	2022-06-07	1,26	1,727	3,122	40,161	0,113
3	2022-06-08	1,06	0,849	4,211	33,586	0,187
4	2022-06-09	1,23	1,420	4,096	35,424	0,133
5	2022-06-13	0,89	0,962	3,435	22,785	0,138
6	2022-06-20	1,54	0,910	4,132	36,633	0,255
7	2022-06-21	3,90	2,068	9,457	125,883	0,300

2.2 AVERAGE CALCULATION

Test No.	Burn Rate (Kg/hr)	(E) Ave. Emission Rate g/hr	(OHE) %	Heat Output (BTU/HR)	CSA B415.1 CO emission g/min
3	0,85	1,06	78,4%	12 501	0,560
1	1,11	0,50	78,0%	16 153	0,429
4	1,42	1,23	76,3%	20 362	0,590
2	1,73	1,26	75,6%	24 540	0,669
Weighted particulate emission average of 4 test runs: 0.98 grams per hour.					
Weighted average HHV efficiency of 4 test runs: 77.3 %.					
Average Co 0.55 gr/min					

2.3 TEST FACILITY CONDITIONS

Run Number	Room Temperature		Barometric pressure		Relative humidity		Air Velocity	
	Before (F)	After (F)	Before (in.Hg)	After (in.Hg)	Before (%)	After (%)	Before (ft/min)	After (ft/min)
1	75	78	30,002	29,943	36,9	34,6	0	0
2	77	81	29,914	29,943	43	37,3	0	0
3	71	71	29,766	29,707	58,6	51,9	0	0
4	77	78	29,737	29,560	55,1	45,3	0	0
5	75	74	29,678	29,648	65,3	62,1	0	0
6	76	72	29,914	29,884	39	38,4	0	0
7	75	77	29,943	29,943	45,7	41,7	0	0

2.4 FUEL QUALITIES

Run Number	Pre-test Load			Test Load						
	Loading Weight Wet Basis (lbs)	Moisture Content Dry Basis (%)	Coal bed Weight (lbs)	Weight Wet Basis (lbs)	Density Wet Basis (lbs/cuft)	Moisture Content Dry Basis (%)	Piece Length (in.)	Number of 2X4's	Number of 4x4's	Number of Spacers
1	24,18	20,75	3,1	13,68	7,200	21,56	15	3	2	16
2	24,35	22,00	3,4	13,60	7,156	21,07	15	3	2	16
3	24,39	20,80	3,0	14,29	7,521	22,21	15	3	2	16
4	25,25	20,91	2,8	13,36	7,029	21,35	15	3	2	16
5	25,56	20,66	2,8	13,44	7,072	21,43	15	3	2	16
6	26,54	20,38	2,8	13,83	7,277	21,22	15	3	2	16
7	26,70	21,09	3,1	13,73	7,224	20,44	15	3	2	16

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

Run Number	Average dilution tunnel measurements			Sample Data			
	Burn Rate (Min)	Volumetric Flow Rate (dscf/min)	Total Temperatures (°R)	Volume sampled (DSCF)		Particulate catch (mg)	
				1	2	1	2
1	276	348,37	546,45	54,186	52,676	1,30	1,30
2	177	343,97	553,59	33,149	32,323	2,00	2,00
3	375	352,72	543,08	69,105	66,903	3,50	3,30
4	211	346,65	551,63	39,285	37,973	2,40	2,20
5	313	350,26	544,07	57,446	55,935	2,50	2,30
6	341	350,36	548,25	63,608	61,878	4,80	4,40
7	150	331,76	557,87	27,890	27,021	5,70	5,10

2.6 DILUTION TUNNEL DUAL TRAIN PRECISION

Run Number	Sample Ratio		Total Emission (g)			
	Train 1	Train 2	Train 1	Train 2	% Deviation	Deviation g/Kg
1	1774,44	1825,29	2,27	2,34	1,54%	0,014
2	1836,62	1883,56	3,67	3,77	1,26%	0,018
3	1914,07	1977,06	6,70	6,52	1,32%	0,033
4	1861,88	1926,18	4,43	4,20	2,60%	0,045
5	1908,43	1959,99	4,77	4,51	2,84%	0,052
6	1878,28	1930,77	9,02	8,50	2,97%	0,101
7	1784,32	1841,68	10,14	9,36	3,96%	0,149

2.7 GENERAL SUMMARY OF RESULTS

Run Number	Burn Rate (kg/hr)	Average Surface Temperature (F)	Change in surface Temperature (F)	Initial Draft (in. H^2O)	static pressure tunnel (in. H^2O)	Primary Air Setting	Run Time (min)
1	1,110	380,36	-47,3	0,062	0,000	lowest setting	276
2	1,727	441,14	-36,8	0,064	0,160	maximum	177
3	0,849	341,74	-91,7	0,053	0,180	lowest setting	375
4	1,420	449,16	-93,7	0,065	0,180	Mid-point	211
5	0,962	377,83	-69,4	0,053	0,180	lowest setting	313
6	0,910	363,33	-92,2	0,000	0,190	lowest setting	341
7	2,068	481,49	-62,8	0,071	0,180	maximum open	150

3 PROCESS DESCRIPTION

3.1 DISCUSSION

The unit was delivered by the client and received in a good condition. Four runs have been done for weighted average with the convection fan at "ON" position. One confirmation test was done without the standard convection fan and found compliant. Two more runs have been done with the alternative catalyst for equivalency, one at the maximum burn rate and a second at category 2 burn rate.

3.2 UNIT DIMENSIONS

Baffle

- Location: between top of combustion chamber and hearth
- Restriction: 2.0-inch X 15.125 inch at the front of the unit
- Dimensions: cover the hearth area minus the restriction at the front
- Material: Gemcolite ½ inch thick.

Bricks

- All stove made from soapstone; bottom made from cast Iron with lining of soapstone in the firebox

Flue gas exhaust

- Location: top flue or rear flue
- Dimensions: 6 in. diameter
- Material: Cast Iron

Gasket

- For all details refer to appendix 6

Overall unit dimension

- Overall dimensions: 24 ¾ inch wide x 23 ½ inch deep x 26 ¼ inch high
- Usable volume: 1.9 cuft
- Firebox volume details refer to appendix 12 Volume calculation

Convection fan

- Convection fan blower:
  - Free air: 150 CFM 110-120V (ref.: PT#90-57000)

Catalyst (appendix 6 for details):

- Applied Ceramics – P/N WF-4150001076
- Cell density: 50 CPSI
- Material: 16 Ga SS430 or 304

Alternative Catalyst: None

3.3 AIR SUPPLY SYSTEM

Description

- Primary air: Window wash design in cast iron channel fully gasketed on the top and bottom of the combustion chamber. Air intake on the middle-left side of the unit (if facing door of stove)
- Secondary air: secondary tube design with air intake coming from the bottom rear of unit, then up through a steel riser tube to the secondary air tube

Characterization

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

AIR INTRODUCTION SYSTEM		INLET (1) sq. in.			OUTLET (sq. in.)
Identification	Type	Imin	Imax	Controlled	
APPENDIX 14 SHARED and PA	Primary	(Air control slide) 0.375	(Air control slide) 2.400	yes	(Air wash) 3.323
APPENDIX 14 SHARED and SA	Secondary	(Riser Opening) 0.75	(Riser Opening) 0.75	yes	(Secondary tube Holes) 1.156
Appendix 14 TA	Pilot	Controlled by primary	Controlled by primary	None	(orifice) 0.110

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

Legend

Identification: Tag name referred to on drawings in Appendix 14, section airflow pattern
Type: Characterization of air intake
Imin: Minimum air intake of a particular air channel
Imax: Maximum air intake of a particular air channel
Controlled: Determines if a provision for air control is present
Outlet: Total air outlet of a particular air channel

3.4 OPERATION DURING TEST

All runs have been found appropriate, no anomalies happened and all runs below have been validate and found compliant. During some of the tests, negative weight has been found on back filter but none on probe and gasket, those were handled properly. A test in burn rate category 1 cannot be achieved, two unsuccessful attempts at the lowest air setting (run1 & run 3) did not achieve the .8 kg/hr burn rate

Run #1

This run was performed on June 6th 2022. It lasted 276 minutes and a 1.11 kg/hr burn rate was obtained & emission at 0.50 gr/hr. The convection fan Option was at on position during the entire test. Air inlet was set at the minimum (Lowest possible) setting. the burn rate for the low burn rate category was no greater than the rate that an operator can achieve in home use.

Run #2

This run was performed on June 7th 2022. It lasted 177 minutes and a 1.73 kg/hr burn rate was obtained & emission at 1.26 gr/hr. The convection fan Option was at on position during the entire test. Air inlet was set at the maximum opening.

Run #3

This run was performed on June 8th 2022. It lasted 375 minutes and a 0.85 kg/hr burn rate was obtained & emission at 1.06 gr/hr. The convection fan Option was at on position during the entire test. Air inlet was set at the minimum (Lowest possible) setting. the burn rate for the low burn rate category was no greater than the rate that an operator can achieve in home use.

Run #4

This run was performed on June 9th 2022. It lasted 211 minutes and a 1.42 kg/hr burn rate was obtained & emission at 1.23 gr/hr. The convection fan Option was at on position during the entire test. Air inlet was at the medium (mid-point from min to max) setting, category 3 burn rate was obtained.

Run #5

This run was performed on June 13th 2022. It lasted 313 minutes and a 0.89 kg/hr burn rate was obtained & emission at 0.96 gr/hr. The convection fan Option was at OFF position during the entire test. Air inlet was set at the lowest setting. This test complies for a no fan confirmation test.

Run #6

Following change of catalyst and an aging of 50hrs on this second catalyst. This run was performed on June 20th 2022. It lasted 341 minutes and a 0.91 kg/hr burn rate was obtained & emission at 1.5 gr/hr. The convection fan Option was at on position during the entire test. Air inlet was set at the minimum (Lowest possible) setting. This run at the lowest setting as for purpose to meet the catalyst equivalency (WDS-146 enclosed in appendix 15)

Run #7

This run was performed on June 21th 2022. It lasted 150 minutes and a 2.07 kg/hr burn rate was obtained & emission at 3.9 gr/hr. The convection fan Option was at on position during the entire test. Air inlet was set at the maximum opening. This run at the maximum setting failed to meet the catalyst equivalency (WDS-146 enclosed in appendix 15), with more than 0.5gr/hr above to the original catalyst run #2 emission result(1.26gr/hr)

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

Test fuel cribs

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

3.5 START-UP OPERATION

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

3.6 SAMPLING LOCATIONS

Particulate samples are collected from the dilution tunnel at a point 15 feet from the tunnel entrance. The tunnel has two elbows ahead of the sampling section. The sampling section is a continuous 8-inch diameter pipe straight over its entire length. Tunnel velocity pressure is determined by a standard pitot tube, thermocouple is installed on the pitot tube to measure the dry bulb temperature. MC is assumed, as allowed, to be 2%. Tunnel samplers are located downstream of the pitot tube and upstream from the end of this section. All detail of dilution tunnel can be found in appendix 8.

3.7 DRAWINGS

Various drawings of the stack gas sampling train and of dilution tunnel system are found in Appendix 1.

3.8 EMISSIONS EFFICIENCY TESTING EQUIPMENT LIST

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

4 SAMPLING METHODS

4.1 PARTICULATE SAMPLING

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

5 QUALITY ASSURANCE

5.1 INSTRUMENT CALIBRATION

5.1.1 GAS METERS

At the conclusion of each test program the gas meters are verified using the reference dry gas meter. This process involves sampling the train operation for 1 cubic foot of volume. With readings made to .01 ft', 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 NIST 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 10 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

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Date: 2022-06-06 Manufacturer: Hearthstone Model: 8031

Project #: PI 20270 Run: 1 Tech: M M Reviewer: SD

- Loading 300 LBS STAND FIRE
- by pass open
- Fan off
- At 125 LBS insert 1st preload
- At 107 LBS close Door
- At 300 LBS insert second preload
- At 45 LBS close air inlet, close by pass and open Fan (Low)
- At 3 LBS Rock coal Bed and insert load
- At 5 min close air inlet and by pass
- ~~At 47 LBS close air inlet and by pass run~~

TEST LOAD CONFIGURATION

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE / POST CHECKS

Date: 2022-06-06 Manufacturer: Hearthstone Model: 8031

Project #: PT 20270 Run: 1 Tech: MA Reviewer: MP

	Equipment #	Time	12%	22%
Moisture Meter Calibration Check:	EM-334	7130	ok	ok
		Pre-Test		Post-Test

Facility Conditions:

	Pre-Test	Post-Test
Air Velocity from less than 2 feet	0 (max50 Fpm)	0 (max50 Fpm)
Smoke Capture Check (tunnel velocity)	ok	NA
Picture	4 sides ok	ok

Wood Heater Conditions:

Date Wood Heater Stack Cleaned	2022-06-06
Date Dilution Tunnel Cleaned	2022-06-06
Induced Draft Check (max 0.005 H2O)	ok
Traverse before ignition	ok

Temperature System:

Ambient (65°-90°F)	ok °F

Proportional Checks:

Thermocouple check	ok
Pitot Clean	OK
Pitot verification	ok
Pictures for report	
Side	ok
Coal bed	ok
Load	ok
Load in stove	ok
Fuel adjustment	ok
Load Length approximately 5/6 of firebox Lenght	ok

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 2022-06-06 Manufacturer: Hearthstone Model: 8031

Project #: PT 2027 Run: 1 Tech: M M Reviewer: TC

Leakage Checks Tunnel Samplers

	System 1st hour		System 1		System 2	
Unplugged Flow Rate = .25cfm	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)
Vacuum (inches Hg.)	-10	-10	-10	-10	-10	-10
Final 1minute DGM (Liter)	644393 06	645989 92	644393,32	645990,40	392511 75	394075,18
Initial 1minute DGM (Liter)	644391 02	645989 90	644393,22	645990 38	392511 75	394075 18
Change (Liter)	0,04	0,02	0,10	0,02	Ø	Ø
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)	**0.20**	**0.20**	**0.20**	**0.20**	**0.20**	**0.20**
Check OK	ok	ok	ok	ok	ok	ok

POLYTESTS
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PRE-TEST SCALE AUDIT

Date: 2022-06-06 Manufacturer: Hearthstone Model: 8031
Project #: PI 20270 Run: 1 Tech: MM Reviewer: BP

Leakage Checks Flue Gas Sampler

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

Leakage Checks Pitot

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

Scales checks

Scale Type	Audit		Measured Weight
	Equipment #	~~44~~ Mm Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Platform	EM-205	10.00 Kg m. ~~lbs~~, Class F	10.00 ~~lbs~~ Kg. m
Wood	EM-090	440 lbs, Class F	440 lbs
Analytical	EM-335	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: 2022-06-06 Manufacturer: Hearthstone Model: 8031

Project #: PT 2270 Run: 1 Tech: M M Reviewer: DP

FOR TUNNELS < 12 in

Barometric pressure (P_{bar}) 101.6 (KPa.) Static pressure (P_q) 0.16 (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_2O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.070	71.43
B - Centroid	3.00	3.50	4	0.069	71.48
A-1	0.40	0.50	0.50	0.056	71.43
A-2	1.50	1.75	2	0.069	71.44
A-3	4.50	5.25	6	0.065	71.44
A-4	5.60	6.5	7.5	0.056	71.43
B-1	0.40	0.50	0.50	0.058	71.48
B-2	1.50	1.75	2	0.060	71.40
B-3	4.50	5.25	6	0.073	71.40
B-4	5.60	6.5	7.5	0.057	71.36
				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 H_2O)
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 $\frac{\text{in. } H_2O}{\{\ 13.6\ \}}$
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.

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CONTINUOUS ANALYZERS

Date: 2022-06-06 Manufacturer: Hearthstone Model: 8031

Project #: PT 20270 Run: 1 Tech: MM Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
CO	0	0	3042	3000	1019	1000
Tolerance CO	0	+/- 0.02	0042	+/- 0.15	0.019	+/- 0.05
CO_2	0	0	1803	1800	982	1000
Tolerance CO2	0	+/- 0.02	0.03	+/- 0.5	0.18	+/- 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	3041	1009	0	0.02	0.001	0.15	0.010	0.05	✓	
CO_2	0	1801	984	0	0.02	0.002	0.5	0.002	0.5	✓	

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TEST DATA LOG

Date: 2022-06-06 Manufacturer: Hearthstone Model: 8031

Project #: PT 2020 Run: 1 Tech: M M Reviewer: HC

RAW DRY GAS METER READINGS

	System 1	System 2	Blanck
Final (Liter)	645 989, 42	394 074, 00	382 211, 90
Initial (Liter)	644 394, 25	392 513, 00	380 899, 18

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	101,6	101,4
Dry Bulb (F):	75,1	78,3
Humidity (%):	36,9	34,6

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

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

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FUEL DATA

Date: 2022-06-06 Manufacturer: Hearthstone Model: 8031

Project #: PI 20270 Run: 1 Tech: MM Reviewer: DD

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight		Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 14 in.	1428	lbs.	19³	19³	19⁴	19³	19⁶
1 1/2 x 3 1/2 x 14 in.	1338	lbs.	19¹	19³	19⁴	19⁴	19⁶
1 1/2 x 3 1/2 x 14 in.	1464	lbs.	21⁰	21⁰	21¹	20⁹	20⁹
1 1/2 x 3 1/2 x 14 in.	1386	lbs.	22¹	22⁰	21⁹	21⁹	22⁰
1 1/2 x 3 1/2 x 14 in.	1764	lbs.	23¹	23¹	23⁶	23⁸	23⁴
1 1/2 x 3 1/2 x 14 in.	1702	lbs.	219	22¹	22⁰	21⁹	22⁶
1 1/2 x 3 1/2 x 14 in.	1498	lbs.	22⁹	22⁸	22⁷	22⁹	22³
1 1/2 x 3 1/2 x 14 in.	1502	lbs.	23¹	23²	22⁸	22⁹	23¹
x x in.		lbs.					
1 1/2 x 3 1/2 x 15 in.	1496	lbs.	20⁰	20¹	20³	20⁴	20³
1 1/2 x 3 1/2 x 15 in.	1548	lbs.	19¹	19⁶	19⁵	19⁴	19⁵
1 1/2 x 3 1/2 x 14 in.	1508	lbs.	20¹	20⁰	19⁹	19³	19⁴
1 1/2 x 3 1/2 x 14 in.	1540	lbs.	19⁶	19⁴	20³	20⁰	20⁰
1 1/2 x 3 1/2 x 14 in.	1476	lbs.	20¹	20³	20²	20¹	20⁴
1 1/2 x 3 1/2 x 14 in.	1604	lbs.	19⁶	19⁷	19⁸	19⁷	19⁶
1 1/2 x 3 1/2 x 14 in.	1462	lbs.	20⁰	20¹	20⁰	19⁸	19⁴
1 1/2 x 3 1/2 x 14 in.	1476	lbs.	19¹	19²	19¹	19³	19⁴
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					

TEST LOAD WEIGHT: 12,1047 13,078 lbs

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2022-06-06 Manufacturer: Hearthstone Model: 8031

Project #: PT 26270 Run: 1 Tech: MM Reviewer:

FUEL DESCRIPTION:

Type of wood :

TEST LOAD

Piece Size	Weight		Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 15 in.	1 706	lbs.	196	193	194	193	198
1 1/2 x 3 1/2 x 15 in.	1 532	lbs.	210	211	199	198	208
1 1/2 x 3 1/2 x 15 in.	1 576	lbs.	222	221	219	220	223
3 1/2 x 3 1/2 x 15 in.	3 322	lbs.	231	230	229	223	222
3 1/2 x 3 1/2 x 15 in.	3 372	lbs.	228	221	222	223	224
x x in.		lbs.					
1 1/2 x 3/4 x 5 in.	0 132	lbs.			191		
1 1/2 x 3/4 x 5 in.	0 156	lbs.			196		
1 1/2 x 3/4 x 5 in.	0 132	lbs.			194		
1 1/2 x 3/4 x 5 in.	0 140	lbs.			193		
1 1/2 x 3/4 x 5 in.	0 136	lbs.			197		
1 1/2 x 3/4 x 5 in.	0 140	lbs.			198		
1 1/2 x 3/4 x 5 in.	0 132	lbs.			199		
1 1/2 x 3/4 x 5 in.	0 134	lbs.			200		
1 1/2 x 3/4 x 5 in.	0 132	lbs.			201		
1 1/2 x 3/4 x 5 in.	0 152	lbs.			203		
1 1/2 x 3/4 x 5 in.	0 154	lbs.			211		
1 1/2 x 3/4 x 5 in.	0 122	lbs.			213		
1 1/2 x 3/4 x 5 in.	0 122	lbs.			208		
1 1/2 x 3/4 x 5 in.	0 132	lbs.			193		
1 1/2 x 3/4 x 5 in.	0 136	lbs.			194		
1 1/2 x 3/4 x 5 in.	0 120	lbs.			196		
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					

TEST LOAD WEIGHT: 13 70 lbs Min 20%: 274 Max 25%: 342

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2022-06-02 Manufacturer: Heartland Model: 8031

Project #: PJ 20270 Run: 1 Tech: MM Reviewer: DP

		SYSTEM 1 ~~– 1st hour~~ System 2 MM				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	Blanck
Date	Time	001	333	334	06	42	335	336	25	339
2022-06-02	17:20	6,0991	0,1299	0,1275	33,9741	110,3110	0,1266	0,1302	34,9733	0,1279
2022-06-06	10:30	6,0942	0,1298	0,1276	33,9740	110,3109	0,1265	0,1303	34,9734	0,1278

		SYSTEM 1 – 1st 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	Blanck
Date	Time	001	333	334	06	42	335	336	25	339
2022-06-06	19:30	6,0947	0,1303	0,1274	33,9783	110,3118	0,1260	0,1296	34,9765	0,1279
2022-06-13	9:30	6,0944	0,1303	0,1274	33,9750	110,3110	0,1260	0,1296	34,9750	0,1279
2022-06-14	9:30	6,0943	0,1303	0,1274	33,9750	110,3110	0,1260	0,1296	34,9750	0,1279

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2022-06-02 Manufacturer: Hearthstone Model: 8031

Project #: PI 20270 Run: 1 Tech: MM Reviewer: DO

		SYSTEM 2 1st Hour MM			
Pre-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	43	337	338	34
2022-06-02	17:00	109 1644	01281	01280	34 2440
2022-06-06	10:00	109 1645	01280	01279	34 2441

		SYSTEM 2			
Post-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	43	337	338	34
2022-06-06	19:00	109 1654	01280	01274	34 2475
2022-06-13	9:00	109 1648	01280	01274	34 2452
2022-06-14	9:00	109 1648	01280	01274	34 2452

Paramètres

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

Code verrouillage:	HEA

Description du test

Test standard	EPA	
Run #	1	
Date	06-06-2022	
Technicien	M.M	
Project #	PI 20270	

Description de l'unité

Manufacturier	HEARTHSTONE	
Modèle	8031	
Combustion system	Cat	
Appliance type	WOOD STOVE	
Firebox volume	1,9	cu ft.
Appliance weight empty	N.A	lbs
Appliance weight full	N.A	lbs

Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	N.A	BTU/h Donnée fournie par le manfacturier
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):	1,007	Dimensionless
Equipment number (DGM #1):	EM 178	
Calibration Factor (DGM #2):	1,005	Dimensionless
Equipment number (DGM #2):	EM 318	
Calibration Factor (DGM #3):	0,988	
Equipment number (DGM #3):	EM 179	Dimensionless

Tunnel

Targeted tunnel flow rate	350	scfm
Tunnel diameter	8	in.
Molecular weight	29	29 as per ASTM E2515
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	PI 20270
Date	06-06-2022
Technicien	M.M

Fuel data

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

Default Fuel Values

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

	Start	End
Barometer (kPa):	101,6	101,4
Barometer (in.Hg):	30,002469	29,94340873
Dry Bulb (F):	75,1	78,3
Humidity (%):	36,9	34,6
Air velocity (ft/min)	0	0

DGM #1	Final:	22812,902	cuft	Final:	645989,420	Liter
	Initial:	22756,569	cuft	Initial:	644394,250	Liter
DGM #2	Final:	13916,592	cuft	Final:	394074,000	Liter
	Initial:	13861,466	cuft	Initial:	392513,000	Liter
DGM room	Final:	13497,686	cuft	Final:	382211,900	Liter
	Initial:	13451,328	cuft	Initial:	380899,180	Liter

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent: 265

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

Project nu.	PI 20270
Date	06-06-2022
Technicien	M.M

Preload data sheet

Test Load Weight:

Lower	Ideal	Upper
11,97	13,30	14,63

Load Volume: 0,6806 cu. ft

Loading Density: 12,727 lbs./ft3

Number of Spaces:

Spacer weight (lbs):

Load Density (wet): 35,533 lbs./ft3

Dry Wood Density: 29,426736

Piece Size (in): Thick	Wide	x Length	Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x Weight	Volume Cubic Inches
1,5	3,5	14	1,428	19,3	19,8	19,4	19,3	19,6	27,81744	73,50
1,5	3,5	14	1,338	19,1	19,3	19,2	19,4	19,6	25,85016	73,50
1,5	3,5	14	1,464	21	21,3	21,2	20,9	20,9	30,83184	73,50
1,5	3,5	14	1,386	22,1	22	21,9	21,9	22	30,46428	73,50
1,5	3,5	14	1,764	23,1	23,1	23,6	23,8	23,4	41,2776	73,50
1,5	3,5	14	1,702	21,9	22,1	22	21,9	22,6	37,6142	73,50
1,5	3,5	14	1,498	22,9	22,8	22,7	22,9	22,3	34,03456	73,50
1,5	3,5	14	1,502	23,1	23,2	22,8	22,9	23,1	34,57604	73,50
										0,00
1,5	3,5	14	1,496	20	20,1	20,3	20,4	20,3	30,24912	73,50
1,5	3,5	14	1,548	19,1	19,6	19,5	19,4	19,5	30,06216	73,50
1,5	3,5	14	1,508	20,1	20	19,9	19,3	19,4	29,76792	73,50
1,5	3,5	14	1,54	19,6	19,4	20,3	20	20	30,5844	73,50
1,5	3,5	14	1,466	20,1	20,3	20,2	20,1	20,4	29,64252	73,50
1,5	3,5	14	1,604	19,6	19,7	19,8	19,7	19,6	31,56672	73,50
1,5	3,5	14	1,462	20	20,1	20	19,8	19,4	29,03532	73,50
1,5	3,5	14	1,476	19,1	19,2	19,2	19,3	19,4	28,39824	73,50
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
								SUM MC:	501,77252	

PreTest Load Weight: 24,18 lbs.

Dry Weight: 9,08 kg.

Average Moisture Content: %

Dry: 20,75

20,75
Must be 18-28

Wet: 17,18
must be 15,2-22

Project nu.	PI 20270
Date	06-06-2022
Technicien	M.M

FUEL LOAD DATA SHEET, CSA B415

Test Load Weight:

Lower	Ideal	Upper
12,0	13,3	14,6

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

Load Volume: 0,35 cu. ft

Loading Density: 7,2 lbs./ft3

Number of Spaces: 16

Spacer weight: lbs

Load Density (wet): 32,9 lbs./ft3

Dry Wood Density: 27,1 lbs./ft3

Piece Size (in):			Weight	Meter Moisture Content Dry Uncorrected %					Ave. MC x	Volume	Ave. MC
Thick	Wide	Length	lbs						Weight	Cubic Inches	%
1,5	3,5	15	1,71	19,60	19,30	19,40	19,30	19,80	33,23288	78,75	19,5
1,5	3,5	15	1,53	21,00	21,10	19,90	19,80	20,80	31,43664	78,75	20,5
1,5	3,5	15	1,58	22,20	22,10	21,90	22,00	22,30	34,8296	78,75	22,1
3,5	3,5	15	3,32	23,10	23,00	22,90	23,30	23,20	76,7382	183,75	23,1
3,5	3,5	15	3,37	22,80	22,10	22,20	22,30	22,40	75,39792	183,75	22,4
										0,00	
										0,00	
										0,00	

1,5	0,75	5	0,13			19,10			2,5212	5,63	19,1
1,5	0,75	5	0,16			19,60			3,0576	5,63	19,6
1,5	0,75	5	0,13			19,40			2,5608	5,63	19,4
1,5	0,75	5	0,14			19,30			2,702	5,63	19,3
1,5	0,75	5	0,14			19,70			2,6792	5,63	19,7
1,5	0,75	5	0,14			19,80			2,772	5,63	19,8
1,5	0,75	5	0,13			19,90			2,6268	5,63	19,9
1,5	0,75	5	0,13			20,00			2,68	5,63	20,0
1,5	0,75	5	0,13			20,10			2,6532	5,63	20,1
1,5	0,75	5	0,15			20,30			3,0856	5,63	20,3
1,5	0,75	5	0,15			21,20			3,2648	5,63	21,2
1,5	0,75	5	0,12			21,30			2,5986	5,63	21,3
1,5	0,75	5	0,12			20,80			2,5376	5,63	20,8
1,5	0,75	5	0,13			19,30			2,5476	5,63	19,3
1,5	0,75	5	0,14			19,40			2,6384	5,63	19,4
1,5	0,75	5	0,12			19,60			2,352	5,63	19,6
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
								SUM MCx	294,91264		20,3 %

Test Load Weight: 13,68 lbs.

Dry Weight: 5,10 kg.

Average Moisture Content: %

Dry: 21,56 Dry(EPA) 21,56
Dry(B415 21,56

21,56
Must be 19-25

Wet: 17,73
must be 15,2-22

Coal Bed Range: 2,7 lbs. to 3,4 lbs.

TEST CHARGE:

Coal bed weight: 3,1 lbs.

Project nu.	PI 20270
Date	06-06-2022
Technicien	M.M

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	43	337	338	34	339	335	336	25	1	333	334	6	339		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	109,1644	0,1281	0,1280	34,2440	110,3110	0,1266	0,1302	34,9733	61,0941	0,1299	0,1275	33,9741	0,1279	2022-06-02	17:00
Before (6)	109,1645	0,1280	0,1279	34,2441	110,3109	0,1265	0,1303	34,9734	61,0942	0,1298	0,1276	33,9740	0,1278	2022-06-06	10:00
After (1)	109,1654	0,1280	0,1274	34,2475	110,3118	0,1260	0,1296	34,9765	61,0947	0,1303	0,1274	33,9783	0,1279	2022-06-06	19:00
After (2)	109,1648	0,1280	0,1274	34,2452	110,3110	0,1260	0,1296	34,9750	61,0944	0,1303	0,1274	33,9750	0,1279	2022-06-13	09:00
After (3)	109,1648	0,1280	0,1274	34,2452	110,3110	0,1260	0,1296	34,9750	61,0943	0,1303	0,1274	33,9750	0,1279	2022-06-14	09:00
After (4)															
After (5)															
After (6)	109,1648	0,1280	0,1274	34,2452	110,3110	0,1260	0,1296	34,9750	61,0943	0,1303	0,1274	33,9750	0,1279	2022-06-14	09:00
Difference	0,0003	0,0000	-0,0005	0,0011	0,0001	-0,0005	-0,0007	0,0016	0,0001	0,0005	-0,0002	0,0010	0,0001		
Total (mg)		0,9				1,4				1,4			0,1		
Total ajusté (mg)		**0,80**				**1,30**				**1,30**					

Project nu.	PI 20270
Date	06-06-2022
Technicien	M.M

Demonstration Purpose only Not real numbers negative mass adjusted to Zero

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	43	337	338	34	339	335	336	25	1	333	334	6	339		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	109,1644	0,1281	0,1280	34,2440	110,3110	0,1266	0,1302	34,9733	61,0941	0,1299	0,1275	33,9741	0,1279	2022-06-02	17:00
Before (6)	109,1645	0,1280	0,1279	34,2441	110,3109	0,1265	0,1303	34,9734	61,0942	0,1298	0,1276	33,9740	0,1278	2022-06-06	10:00
After (1)	109,1654	0,1280	0,1274	34,2475	110,3118	0,1260	0,1296	34,9765	61,0947	0,1303	0,1274	33,9783	0,1279	2022-06-06	19:00
After (2)	109,1648	0,1280	0,1274	34,2452	110,3110	0,1260	0,1296	34,9750	61,0944	0,1303	0,1274	33,9750	0,1279	2022-06-13	09:00
After (3)	109,1648	0,1280	0,1274	34,2452	110,3110	0,1260	0,1296	34,9750	61,0943	0,1303	0,1274	33,9750	0,1279	2022-06-14	09:00
After (4)															
After (5)															
After (6)	109,1648	0,1280	0,1279	34,2452	110,3110	0,1265	0,1303	34,9750	61,0943	0,1303	0,1276	33,9750	0,1279	2022-06-14	09:00
Difference	0,0003	0,0000	0,0000	0,0011	0,0001	0,0000	0,0000	0,0016	0,0001	0,0005	0,0000	0,0010	0,0001		
Total (mg)		1,4				3,1				1,6			0,1		
Total ajusté (mg)		**1,30**				**3,00**				**1,50**					

Project nu.	PI 20270
Date	06-06-2022
Technicien	M.M

Emission rate aglusted filter weight to zero 0,87gr/hr

SFBA EPA EMISSION RESULTS

Test Duration: **276** min

PRESSURE FACTOR:	DGM 1	0,97396	
	DGM 2	0,97713	
	DGM 3	1,00177	
TEMPERATURE FACTORS	DGM 1	0,98118	
	DGM 2	0,97263	
	DGM 3	0,98404	
VOLUMES SAMPLED	DGM 1	54,186	SCft
	DGM 2	52,676	Scft
	DGM 3	45,159	SCft

TOTAL TUNNEL VOLUME : 96173

SAMPLE RATIOS

Sample Train 1:	1774,878
Sample Train 2:	1825,742

Paticulate concentration

Sample Train 1	**0,000026**	g/dscf
Sample Train 2	**0,000027**	g/dscf
Room	**0,000002**	g/dscf

TOTAL EMISSIONS

Sample Train 1	**2,27**	g
Sample Train 2	**2,34**	g

EMISSION RATES

Sample Train 1	**0,49**	g/hr
Sample Train 2	**0,51**	g/hr

1st hour emission rate **1,60** g/hr

	Train 1	Train 2
Cs	2,584E-05	2,65775E-05

RESULTS

Average emission rate: 0,50 g/hr

Burn Rate : 1,110 Dry kg/hr

BAROMETRIC PRESSURE

Average:	29,972939	In Hg
Start:	30,002469	In Hg
End:	29,943409	In Hg

DGM CONTROLLER VALUES

DGM 1	Final:	22812,902	Cuft
	Initial:	22756,569	Cuft
DGM 2	Final:	13916,592	Cuft
	Initial:	13861,466	Cuft
DGM #3	Final:	13497,686	Cuft
	Initial:	13451,328	Cuft

TEMPERATURES

DGM 1	538,130	°R
DGM 2	542,860	°R

CALIBRATION FACTORS

DGM 1	1,0066
DGM 2	1,0054
DGM #3	0,9882

TUNNEL FLOW RATE: 348,453 Dscfm

PARTICULATE CATCH

Total Sample Train 1:	1,40	mg
Total Sample Train 2:	1,40	mg
Total Sample Train 1 1st hour:	0,90	mg

DEVIATION: 1,54%

#		#	#	#	#	#1	#2	#3	#4	#5	#6	#7	#8	#	Oven Zone 1	#OVEN 2	#OVEN 3	#Oven 4	Oven Zone 2	#OVEN 2	#OVEN 3	#OVEN 4	Oven 3	Cannot Get a	Flow (SCFM)	Pressure in Surface
Elapsed Time		Weight Remaining	CO	CO_2	O_2	Flue Gas	Room Temp	Tunnel Dry Bulb	Limit Time	Limit Rate 1	Limit 0.5Rate	Limit Lifter	Limit Rotation	Cetal yel	Reading	Outlet T	Outlet T	Temp	Reading	Outlet T	Outlet T	Temp	Pressure in wc	Pressure in wc	Temp.
min	New data row	lbs	%	%	%	°F	°F	°F	min	lbs	lbs	Lifter	rpm		Indicator	°F	°F	°F	Indicator	°F	°F	°F	in wc	in wc	°F
0,00	248,00	13,8	0,2	3,4	16,4,4	376,1	76,0	88,0	344,3	408,8	481,4	480,8	420,0	418,8	0,10	76,83	76,84	76,41	0,10	76,79	76,84	76,06	0,06	0,06	0
1,0	266,0	13,8	0,8	3,1	412,8	381,0	74,8	88,2	343,1	403,8	448,8	449,4	419,4	402,0	0,10	76,87	76,80	76,11	0,10	76,87	76,87	76,84	0,07	0,06	-1,8314890
2,0	267,0	13,8	0,8	3,4	411,4	387,2	74,0	87,3	340,7	401,8	448,1	447,8	418,8	401,2	0,10	76,83	76,88	76,01	0,10	76,13	76,80	76,79	0,07	0,06	-3,2010233
3,0	268,0	13,3	0,6	1,1	409,1	395,7	74,8	88,6	339,0	399,1	446,6	445,6	417,2	551,8	0,10	76,64	76,84	76,16	0,10	76,20	76,82	76,81	0,07	0,08	-5,3337870
4,0	269,0	13,1	0,4	1,9	408,7	413,4	75,0	91,0	337,0	398,8	441,8	442,8	416,8	848,0	0,10	76,70	76,83	76,40	0,10	76,70	76,81	76,24	0,06	0,06	-7,7302863
5,0	270,0	13,0	0,3	2,3	409,4	380,4	74,8	88,4	334,7	392,8	438,0	439,7	414,4	1144,8	0,10	76,80	76,83	76,58	0,10	76,70	77,14	76,18	0,07	0,07	-9,8035863
6,0	271,0	13,0	0,1	4,8	402,1	317,6	75,0	86,8	338,8	389,2	433,0	434,8	411,2	821,1	0,10	76,88	76,81	76,24	0,10	76,84	77,22	76,51	0,07	0,07	-12,334668
7,0	272,0	13,0	0,1	3,8	399,7	366,7	75,0	84,8	334,3	388,7	431,2	433,3	414,2	787,3	0,10	76,88	76,82	76,20	0,10	77,16	77,32	76,81	0,06	0,06	-14,678963
8,0	273,0	12,9	0,1	3,6	397,8	387,8	75,1	84,8	333,6	382,4	428,8	429,7	413,0	731,1	0,10	76,81	76,81	76,20	0,10	77,36	77,43	76,82	0,06	0,06	-16,851176
9,0	274,0	12,9	0,1	3,6	394,8	380,8	75,0	84,7	332,8	378,0	424,2	426,0	411,8	722,8	0,10	76,83	76,82	76,23	0,10	77,62	77,84	76,82	0,07	0,06	-19,623671
10,0	275,0	12,8	0,1	3,8	392,8	376,7	75,0	84,8	332,2	376,7	421,8	423,0	410,8	720,8	0,10	76,86	76,80	76,27	0,10	77,80	77,80	76,87	0,07	0,06	-21,08868
11,0	276,0	12,8	0,1	4,0	389,8	377,3	75,0	84,8	331,4	372,3	418,2	417,8	409,3	788,8	0,10	76,12	76,49	76,27	0,10	77,97	77,69	76,86	0,06	0,06	-24,868982
12,0	277,0	12,8	0,1	4,0	387,1	381,2	75,0	84,8	330,1	368,0	414,4	414,1	407,8	828,8	0,10	76,18	76,80	76,32	0,10	78,20	77,82	76,93	0,06	0,06	-27,318524
13,0	278,0	12,8	0,1	3,3	384,7	386,0	75,0	84,8	329,8	365,8	411,2	410,1	406,7	871,4	0,10	76,20	76,81	76,38	0,10	78,38	77,94	76,95	0,06	0,07	-30,712773
14,0	279,0	12,8	0,1	3,0	382,3	393,0	75,0	84,7	328,8	362,3	408,2	406,3	405,6	874,8	0,10	76,22	76,80	76,39	0,10	78,56	78,06	79,13	0,06	0,07	-32,21648
15,0	280,0	12,4	0,1	6,6	379,7	393,6	74,8	84,6	328,3	359,1	404,6	402,8	404,3	868,8	0,10	76,28	76,82	76,43	0,10	78,78	78,17	79,18	0,06	0,07	-34,604661
16,0	281,0	12,4	0,1	5,7	377,8	391,7	75,0	84,6	327,8	355,3	400,8	402,3	398,8	857,0	0,10	76,49	76,83	76,45	0,10	78,81	78,39	79,18	0,06	0,07	-36,844618
17,0	282,0	12,3	0,1	5,2	376,0	387,8	75,0	84,4	326,6	352,8	399,8	398,1	401,4	798,8	0,10	76,08	76,46	76,48	0,10	78,86	78,37	79,13	0,06	0,06	-38,37903
18,0	283,0	12,3	0,1	4,0	372,6	382,7	74,8	84,8	325,3	350,0	396,4	391,4	399,8	766,0	0,10	76,03	76,45	76,49	0,10	78,86	78,42	79,16	0,06	0,06	-41,810824
19,0	284,0	12,2	0,1	4,0	370,3	380,3	75,0	84,8	324,8	347,2	393,4	387,8	398,8	784,1	0,10	76,11	76,47	76,83	0,10	79,17	78,49	79,23	0,07	0,06	-44,131168
20,0	285,0	12,1	0,1	6,2	367,7	381,8	74,8	84,4	322,8	344,4	389,7	384,3	397,2	803,8	0,10	76,17	76,49	76,88	0,10	79,31	78,80	79,28	0,07	0,06	-46,728866
21,0	286,0	12,0	0,1	7,2	365,8	386,6	74,8	84,8	321,4	340,3	387,6	381,3	395,8	867,4	0,10	76,14	76,49	76,88	0,10	79,40	78,87	79,28	0,08	0,07	-48,842068
22,0	287,0	11,9	0,1	8,1	363,8	392,1	74,8	84,7	321,8	338,8	384,6	378,3	394,7	882,3	0,10	76,13	76,46	76,83	0,10	79,52	78,78	79,31	0,07	0,07	-50,788903
23,0	288,0	11,8	0,1	8,7	361,4	396,0	75,1	84,8	320,6	336,2	381,8	376,0	393,2	901,3	0,10	76,28	76,80	76,88	0,10	79,71	78,81	79,36	0,07	0,07	-53,030801
24,0	289,0	11,8	0,1	8,8	359,3	398,2	75,2	84,8	319,7	333,8	379,4	371,8	391,7	902,8	0,10	76,43	76,84	76,74	0,10	79,91	78,86	79,40	0,08	0,07	-55,113777
25,0	290,0	11,6	0,1	8,8	357,3	401,3	75,1	85,1	319,8	331,8	376,3	368,8	390,3	903,7	0,10	76,49	76,87	76,77	0,10	80,09	78,96	79,44	0,08	0,07	-57,143658
26,0	291,0	11,5	0,1	8,8	355,3	399,0	75,1	85,6	319,3	329,8	373,8	366,1	388,8	913,8	0,10	76,49	76,84	76,79	0,10	80,19	79,03	79,52	0,08	0,07	-59,304622
27,0	292,0	11,5	0,1	9,0	353,8	397,5	75,1	85,6	319,3	328,2	372,3	363,4	387,8	918,2	0,10	76,61	76,80	76,83	0,10	80,33	79,11	79,62	0,07	0,07	-60,824499
28,0	293,0	11,4	0,1	8,3	352,4	396,4	75,0	85,3	321,0	324,8	369,7	360,8	386,1	894,8	0,10	76,68	76,86	76,94	0,10	80,48	79,21	79,62	0,07	0,07	-61,886048
29,0	294,0	11,3	0,1	7,1	351,2	395,2	75,1	85,4	322,1	322,8	368,0	358,2	384,7	881,8	0,10	76,66	76,86	76,96	0,10	80,62	79,31	79,64	0,08	0,07	-63,26161
30,0	295,0	11,2	0,1	6,6	349,7	395,0	75,2	85,5	322,8	320,8	365,6	355,8	383,3	884,3	0,10	76,68	76,72	79,03	0,10	80,62	79,34	79,66	0,08	0,07	-64,7238
31,0	296,0	11,2	0,1	6,7	348,4	395,2	75,1	85,0	323,7	318,8	364,0	353,8	382,0	902,4	0,10	76,79	76,77	79,02	0,10	80,78	79,42	79,66	0,08	0,07	-66,686813
32,0	297,0	11,1	0,1	7,0	347,3	396,4	75,2	85,0	325,4	317,2	361,8	351,8	380,8	908,0	0,10	76,76	76,81	79,01	0,10	80,84	79,52	79,71	0,07	0,07	-67,158664
33,0	298,0	11,0	0,1	7,8	346,1	396,2	75,2	85,1	326,0	315,3	360,4	349,2	379,8	908,8	0,10	76,68	76,79	79,01	0,10	80,83	79,59	79,72	0,07	0,07	-68,311162
34,0	299,0	10,9	0,1	8,3	344,7	396,2	75,1	85,0	325,8	313,8	358,8	346,8	378,3	904,2	0,10	76,84	76,79	79,00	0,10	80,78	79,66	79,70	0,08	0,07	-69,7802
35,0	300,0	10,9	0,1	8,3	343,3	396,2	74,8	85,1	325,8	312,3	355,8	345,0	377,2	900,4	0,10	76,89	76,82	79,08	0,10	80,91	79,70	79,73	0,07	0,07	-71,161113
36,0	301,0	10,8	0,1	8,3	342,0	397,0	75,3	84,8	324,6	310,6	354,0	343,2	376,8	902,8	0,10	76,75	76,87	79,03	0,10	81,06	79,74	79,73	0,08	0,07	-72,366218
37,0	302,0	10,7	0,1	8,3	340,8	395,0	75,1	84,8	324,0	309,1	352,4	341,4	376,0	913,8	0,10	76,89	76,81	79,03	0,10	81,14	79,82	79,78	0,08	0,07	-73,858771
38,0	303,0	10,6	0,1	8,6	339,8	397,8	75,3	85,3	324,4	307,8	352,4	339,8	375,4	908,8	0,10	76,70	76,83	79,08	0,10	81,18	79,87	79,78	0,07	0,07	-74,8316
39,0	304,0	10,5	0,1	8,7	338,6	398,0	75,3	85,6	327,4	306,3	351,0	337,8	372,1	918,8	0,10	76,79	76,85	79,14	0,10	81,22	79,91	79,88	0,07	0,07	-76,47042
40,0	305,0	10,5	0,1	9,2	338,1	399,0	75,2	85,3	329,0	304,8	349,0	336,5	371,2	918,4	0,10	76,78	76,84	79,18	0,10	81,28	79,98	79,87	0,08	0,07	-78,29089
41,0	306,0	10,3	0,1	9,4	337,3	312,4	75,3	85,7	329,2	303,8	348,6	336,0	370,0	926,8	0,10	76,73	76,88	79,23	0,10	81,28	80,04	79,83	0,07	0,07	-77,08606
42,0	307,0	10,3	0,1	10,0	336,8	314,0	75,3	85,8	331,3	302,8	347,8	333,6	368,8	922,0	0,10	76,84	76,88	79,24	0,10	81,24	80,11	79,83	0,07	0,07	-77,88612
43,0	308,0	10,2	0,1	10,6	336,0	314,0	75,4	86,0	332,2	301,8	346,6	332,0	367,7	908,8	0,10	76,80	76,82	79,30	0,10	81,38	80,19	79,88	0,08	0,07	-78,41489
44,0	309,0	10,1	0,1	10,3	335,8	315,2	75,4	86,2	334,3	300,2	345,8	330,8	366,7	906,8	0,10	76,80	76,86	79,36	0,10	81,44	80,24	80,03	0,08	0,07	-78,882989
45,0	310,0	10,0	0,1	10,0	335,1	316,0	75,3	86,8	337,1	299,3	345,0	329,3	365,6	918,3	0,10	76,82	76,86	79,40	0,10	81,58	80,31	80,11	0,07	0,07	-79,3898
46,0	311,0	9,9	0,1	10,6	334,1	316,2	75,3	86,1	338,6	298,8	340,8	328,0	364,7	923,8	0,10	76,90	76,11	79,39	0,10	81,53	80,36	80,14	0,08	0,07	-80,302234
47,0	312,0	9,8	0,1	12,0	333,6	322,8	75,3	86,5	339,8	297,8	341,3	327,1	363,6	930,8	0,10	77,13	76,16	79,48	0,10	81,68	80,40	80,16	0,07	0,07	-80,80131
48,0	313,0	9,7	0,1	12,2	333,8	325,8	75,3	86,5	342,0	296,8	341,4	326,8	362,4	931,8	0,10	77,18	76,23	79,48	0,10	81,78	80,46	80,20	0,07	0,07	-80,358618
49,0	314,0	9,6	0,1	12,1	334,0	324,0	75,3	86,4	344,7	296,3	341,3	326,8	361,8	938,0	0,10	77,07	76,23	79,47	0,10	81,78	80,52	80,20	0,08	0,07	-80,44062
50,0	315,0	9,5	0,1	12,2	333,6	325,3	75,3	86,6	346,4	295,8	341,8	326,4	360,4	938,8	0,10	77,03	76,24	79,53	0,10	81,78	80,60	80,28	0,07	0,07	-80,80456
51,0	316,0	9,4	0,1	11,0	333,0	324,0	75,4	86,6	348,7	295,8	341,1	326,1	359,3	923,0	0,10	77,13	76,27	79,61	0,10	81,84	80,60	80,31	0,08	0,07	-80,4831
52,0	317,0	9,3	0,0	11,7	334,2	324,8	75,6	86,7	350,7	295,3	341,4	326,1	358,4	917,8	0,10	77,10	76,27	79,64	0,10	81,84	80,65	80,36	0,08	0,07	-80,21351
53,0	318,0	9,2	0,0	11,4	334,6	324,1	75,2	86,8	353,8	295,1	341,4	326,1	357,4	913,8	0,10	77,08	76,30	79,68	0,10	81,86	80,70	80,42	0,08	0,07	-79,86281
54,0	319,0	9,1	0,0	11,2	334,0	323,7	75,8	86,7	355,8	295,3	342,0	326,3	356,4	911,2	0,10	77,13	76,31	79,71	0,10	81,92	80,77	80,48	0,07	0,07	-79,80061
55,0	320,0	9,0	0,1	10,0	335,8	323,1	75,8	86,8	359,0	295,0	342,8	326,4	355,8	911,7	0,10	77,18	76,33	79,77	0,10	81,97	80,79	80,50	0,07	0,07	-78,5603
56,0	321,0	9,0	0,1	10,0	336,0	323,2	75,4	86,7	361,2	294,8	343,2	326,8	354,8	913,8	0,10	77,20	76,38	79,78	0,10	82,00	80,87	80,50	0,07	0,07	-78,43874
57,0	322,0	8,9	0,1	11,1	335,8	323,8	75,4	86,4	364,0	294,3	343,8	326,8	354,0	918,3	0,10	77,18	76,39	79,82	0,10	82,05	80,95	80,51	0,08	0,07	-77,86646
58,0	323,0	8,8	0,1	11,8	337,2	324,0	75,6	86,8	366,4	294,8	345,3	326,8	353,3	918,7	0,10	77,21	76,41	79,87	0,10	82,04	80,98	80,56	0,08	0,07	-77,41888
59,0	324,0	8,7	0,1	11,8	337,7	324,0	75,8	86,8	368,8	295,0	345,2	326,8	352,4	922,3	0,10	77,28	76,44	79,91	0,10	82,05	81,04	80,61	0,07	0,07	-76,72234
60,0	325,0	8,6	0,1	12,1	338,2	325,8	75,8	86,8	371,0	295,0	346,3	327,3	351,8	926,8	0,10	77,31	76,45	79,94	0,10	82,04	81,09	80,62	0,08	0,07	-76,19078
61,0	326,0	8,5	0,1	11,0	338,6	326,0	75,4	86,7	373,7	295,1	347,2	327,8	350,7	924,0	0,10	77,28	76,46	79,94	0,10	82,10	81,12	80,66	0,07	0,07	-75,68617
62,0	327,0	8,4	0,1	11,8	339,8	326,2	75,8	86,1	376,2	295,4	348,4	328,3	349,8	923,2	0,10	77,23	76,48	79,98	0,10	82,10	81,18	80,61	0,07	0,07	-74,77482
63,0	328,0	8,3	0,1	11,8	339,8	326,2	75,7	86,4	378,4	295,7	349,8	329,3	348,8	928,8	0,10	77,04	76,44	79,89	0,10	82,06	81,20	80,62	0,08	0,07	-74,49186
64,0	329,0	8,2	0,1	11,0	340,0	326,1	75,8	86,4	379,7	295,8	351,6	329,8	348,0	928,8	0,10	76,82	76,43	79,90	0,10	81,88	81,19	80,62	0,07	0,07	-73,46676
65,0	330,0	8,0	0,1	12,3	341,7	326,0	75,4	86,8	381,8	296,1	353,0	330,4	347,3	938,3	0,10	76,83	76,39	79,91	0,10	81,83	81,21	80,64	0,08	0,07	-72,75876
66,0	331,0	8,0	0,1	12,8	342,4	326,0	75,7	86,0	384,3	296,8	354,1	331,0	346,3	958,8	0,10	76,83	76,40	79,97	0,10	81,88	81,22	80,68	0,08	0,07	-71,07094
67,0	332,0	7,8	0,1	13,6	343,2	331,7	75,8	87,0	387,3	297,4	355,1	331,3	345,3	974,8	0,10	76,88	76,43	80,04	0,10	81,94	81,22	80,71	0,08	0,07	-71,20811
68,0	333,0	7,8	0,1	13,7	344,2	336,0	75,8	87,2	389,8	297,8	356,8	331,8	344,8	980,8	0,10	77,20	76,44	80,08	0,10	82,01	81,31	80,81	0,07	0,07	-70,35275
69,0	334,0	7,6	0,2	13,8	344,7	336,7	75,7	87,8	390,8	298,0	358,4	333,0	343,8	988,8	0,10	77,18	76,50	80,13	0,10	82,06	81,30	80,89	0,07	0,07	-69,66467
70,0	335,0	7,6	0,1	13,8	345,8	337,8	75,8	87,3	394,0	298,6	359,8	333,8	342,8	980,8	0,10	77,20	76,50	80,14	0,10	82,10	81,33	80,82	0,07	0,07	-68,86839
71,0	336,0	7,5	0,1	13,1	346,7	338,3	75,8	87,2	396,0	299,3	361,4	334,8	342,2	971,8	0,10	77,19	76,51	80,14	0,10	82,11	81,42	80,81	0,08	0,07	-67,67372
72,0	337,0	7,4	0,1	12,8	347,0	337,8	75,8	87,3	399,0	300,1	363,1	336,8	341,4	962,0	0,10	77,25	76,57	80,18	0,10	82,16	81,50	80,83	0,08	0,07	-66,49814
73,0	338,0	7,3	0,1	12,8	349,0	338,7	75,7	87,8	402,8	300,8	364,2	336,7	340,7	953,8	0,10	77,47	76,61	80,26	0,10	82,21	81,47	81,01	0,08	0,07	-65,36848
74,0	339,0	7,3	0,1	12,8	349,8	338,8	76,0	87,8	404,8	301,7	365,0	338,0	339,8	952,8	0,10	77,49	76,64	77,71	0,10	82,28	81,54	81,03	0,07	0,07	-64,02188
75,0	340,0	7,1	0,1	12,8	350,8	338,3	76,3	87,8	406,3	302,3	367,1	339,8	339,0	949,8	0,10	77,58	76,69	78,02	0,10	82,38	81,68	81,06	0,08	0,07	-63,57496
76,0	341,0	7,0	0,1	12,7	352,0	339,0	76,0	87,8	409,3	303,0	369,1	340,8	338,1	954,8	0,10	77,65	76,71	78,18	0,10	82,45	81,87	81,10	0,07	0,07	-62,38219
77,0	342,0	6,9	0,1	12,9	353,3	339,6	75,8	88,0	412,8	303,8	370,8	342,3	337,2	962,0	0,10	77,63	76,74	78,38	0,10	82,48	81,82	81,18	0,07	0,07	-61,13584
78,0	343,0	6,8	0,1	13,2	354,4	339,8	75,8	87,8	414,8	304,2	372,1	343,3	336,4	974,2	0,10	77,68	76,78	78,48	0,10	82,51	81,87	81,28	0,07	0,07	-60,28818
79,0	344,0	6,7	0,1	13,7	355,8	340,3	75,8	88,0	417,3	304,8	373,8	344,3	335,8	984,8	0,10	77,68	76,79	78,61	0,10	82,58	81,91	81,28	0,08	0,07	-58,86451
80,0	345,0	6,6	0,1	14,3	356,8	342,7	76,0	88,2	419,8	306,4	375,3	346,8	334,8	987,3	0,10	77,70	76,80	78,77	0,10	82,67	81,96	81,31	0,08	0,07	-57,86899
81,0	346,0	6,5	0,3	14,7	357,8	346,8	76,1	88,7	422,1	307,4	377,2	348,8	334,1	1010,1	0,10	77,77	76,82	78,91	0,10	82,88	81,98	81,40	0,08	0,07	-56,86201
82,0	347,0	6,4	0,8	14,0	358,8	348,6	75,8	88,6	423,7	308,3	378,8	350,1	333,3	1017,1	0,10	77,74	76,82	79,02	0,10	82,88	81,96	81,48	0,08	0,07	-55,81761
83,0	348,0	6,3	0,8	14,0	360,0	350,3	76,0	88,7	425,6	309,3	380,3	352,3	332,7	1022,1	0,10	77,78	76,84	79,12	0,10	82,83	81,80	81,50	0,07	0,07	-54,49461
84,0	349,0	6,2	0,8	14,0	361,3	352,7	76,2	88,8	428,6	310,4	381,8	353,7	332,0	1024,3	0,10	77,81	76,80	79,28	0,10	82,70	81,84	81,56	0,07	0,07	-53,12041
85,0	350,0	6,0	0,8	14,8	362,8	354,8	76,3	88,7	432,4	311,8	382,8	355,8	331,8	1017,7	0,10	77,88	76,83	79,37	0,10	82,74	81,92	81,60	0,08	0,07	-51,81212
86,0	351,0	6,0	0,1	13,0	364,0	355,7	76,1	88,8	433,8	312,8	385,1	357,8	331,1	990,4	0,10	77,91	76,87	79,81	0,10	82,80	82,00	81,66	0,08	0,07	-50,45408
87,0	352,0	5,9	0,1	13,2	365,4	351,2	76,1	88,8	434,0	313,8	386,8	359,8	330,8	967,8	0,10	77,94	77,00	79,60	0,10	82,87	82,06	81,72	0,07	0,07	-49,03766
88,0	353,0	5,8	0,1	12,8	366,8	348,0	76,3	88,1	436,3	315,3	388,8	361,7	330,0	954,2	0,10	77,99	77,01	79,68	0,10	82,89	82,09	81,76	0,08	0,07	-47,44869
89,0	354,0	5,7	0,1	12,3	368,4	346,2	76,3	88,3	441,8	316,3	390,7	364,1	329,8	946,8	0,10	78,04	77,02	79,77	0,10	82,93	82,12	81,84	0,07	0,07	-46,01031
90,0	355,0	5,6	0,0	11,7	369,7	342,6	76,1	88,6	443,8	317,8	392,4	366,0	329,8	936,1	0,10	78,01	77,04	79,83	0,10	82,96	82,17	81,82	0,07	0,07	-44,60858
91,0	356,0	5,5	0,0	11,2	371,1	338,8	76,3	88,6	446,3	318,7	394,2	368,0	329,3	914,8	0,10	78,04	77,08	79,94	0,10	83,00	82,20	81,80	0,08	0,07	-43,31519
92,0	357,0	5,4	0,0	10,8	372,2	334,0	76,4	88,6	447,7	319,8	396,0	370,1	327,6	902,8	0,10	78,16	77,13	80,04	0,10	83,08	82,27	81,83	0,07	0,07	-42,16851
93,0	358,0	5,3	0,0	10,6	373,6	330,6	76,3	88,2	450,0	321,1	397,8	372,3	327,0	888,8	0,10	78,20	77,14	80,07	0,10	83,07	82,28	81,83	0,08	0,07	-40,77889
94,0	359,0	5,3	0,1	11,3	374,7	328,8	76,3	88,3	450,8	322,3	399,8	374,4	326,3	907,1	0,10	78,31	77,20	80,16	0,10	83,16	82,32	81,83	0,08	0,07	-39,47796
95,0	360,0	5,2	0,1	11,8	375,4	328,3	76,6	88,6	450,8	323,3	401,2	376,5	325,8	913,8	0,10	78,37	77,28	80,23	0,10	83,18	82,32	81,86	0,08	0,07	-39,01453
96,0	361,0	5,1	0,1	12,2	376,3	328,2	76,6	88,7	451,3	324,4	403,0	378,2	324,8	923,8	0,10	78,30	77,24	80,38	0,10	83,18	82,37	81,83	0,08	0,07	-38,04804
97,0	362,0	5,0	0,1	12,7	376,0

102,0	367,0	4,6	0,2	13,7	381,3	333,0	76,8	88,6	494,6	331,4	409,7	388,6	321,6	984,0	0,10	78,42	77,46	80,74	0,20	83,32	82,87	82,10	0,08	0,27	-33,16299
103,0	368,0	4,8	0,2	13,6	382,3	334,0	76,8	89,0	494,6	332,8	411,1	390,3	321,8	984,6	0,10	78,37	77,50	80,80	0,20	83,30	82,82	82,11	0,07	0,27	-32,34571
104,0	369,0	4,8	0,1	13,7	383,3	334,6	76,7	88,7	495,3	334,4	413,6	392,3	321,1	986,3	0,10	78,41	77,54	80,87	0,20	83,38	82,86	82,14	0,07	0,27	-31,08808
105,0	370,0	4,4	0,1	13,4	384,1	334,6	76,8	88,8	494,8	336,7	415,0	394,1	320,8	983,8	0,10	78,41	77,55	80,86	0,20	83,41	82,88	82,14	0,08	0,27	-30,30222
106,0	371,0	4,3	0,1	13,2	385,4	333,6	76,3	88,3	497,6	337,3	415,6	395,8	320,7	982,3	0,10	78,43	77,56	80,83	0,20	83,44	82,71	82,14	0,07	0,27	-30,028858
107,0	372,0	4,2	0,1	13,1	386,8	332,7	76,3	88,4	498,3	338,6	417,6	397,2	320,3	980,4	0,10	78,42	77,59	80,86	0,20	83,43	82,75	82,16	0,08	0,27	-27,69927
108,0	373,0	4,1	0,2	12,9	387,8	331,7	76,7	88,3	499,1	340,1	419,1	398,5	320,3	987,8	0,20	78,40	77,58	80,88	0,20	83,41	82,80	82,16	0,07	0,27	-26,56775
109,0	374,0	4,0	0,2	12,7	388,7	331,0	76,7	88,4	499,8	340,8	420,8	401,3	320,3	984,8	0,10	78,38	77,61	81,04	0,20	83,44	82,83	82,17	0,07	0,27	-25,6824
110,0	375,0	3,9	0,2	12,8	389,8	330,3	76,8	88,7	499,8	343,4	421,8	402,1	320,1	984,2	0,10	78,42	77,62	81,08	0,20	83,48	82,86	82,24	0,07	0,27	-24,78917
111,0	376,0	3,9	0,2	12,9	390,7	330,2	77,0	88,7	500,3	345,2	422,6	404,8	320,0	986,1	0,10	78,50	77,74	81,18	0,20	83,68	82,84	82,24	0,07	0,27	-23,7964
112,0	377,0	3,8	0,2	13,0	391,4	330,7	77,1	88,2	498,6	346,6	424,8	406,5	320,0	984,7	0,10	78,62	77,78	81,18	0,20	83,88	82,81	82,21	0,08	0,27	-23,09574
113,0	378,0	3,8	0,2	13,1	392,6	330,4	76,9	89,1	501,3	348,1	426,6	408,1	319,8	981,8	0,20	78,74	77,81	81,28	0,20	83,88	82,83	82,28	0,07	0,27	-21,8499
114,0	379,0	3,7	0,2	13,2	393,7	330,8	76,9	89,0	501,3	349,7	428,2	409,5	319,6	985,8	0,10	78,78	77,85	81,27	0,20	83,70	82,85	82,30	0,08	0,27	-20,74581
115,0	380,0	3,6	0,2	13,2	394,8	330,3	77,0	89,0	502,3	351,3	430,0	411,1	319,5	947,8	0,10	78,74	77,84	81,33	0,20	83,70	82,84	82,26	0,07	0,27	-19,97913
116,0	381,0	3,6	0,2	13,1	395,8	329,1	77,0	89,3	502,1	353,1	431,6	412,7	319,2	941,8	0,10	78,83	77,89	81,40	0,20	83,70	82,88	82,42	0,08	0,27	-18,60103
117,0	382,0	3,6	0,2	12,9	396,8	328,2	76,8	89,1	503,3	354,8	433,3	414,2	319,2	934,8	0,10	78,73	77,81	81,47	0,20	83,63	83,01	82,48	0,07	0,27	-17,81227
118,0	383,0	3,4	0,1	12,8	397,8	326,8	76,9	88,8	502,8	356,4	434,6	415,8	319,3	936,8	0,10	78,68	77,80	81,49	0,20	83,62	83,08	82,44	0,07	0,27	-16,64898
119,0	384,0	3,3	0,1	12,8	398,6	325,8	77,1	89,0	503,1	358,4	436,8	417,0	319,1	919,3	0,10	78,72	77,80	81,53	0,20	83,68	83,13	82,48	0,07	0,27	-15,80861
120,0	385,0	3,3	0,1	12,3	399,7	322,7	77,1	89,0	503,6	360,2	438,2	418,7	319,1	913,2	0,10	78,78	77,83	81,58	0,20	83,69	83,14	82,48	0,07	0,27	-14,75864
121,0	386,0	3,3	0,1	11,9	400,8	320,8	77,0	88,7	502,8	362,1	440,2	420,2	318,8	903,3	0,10	78,78	77,84	81,60	0,20	83,70	83,18	82,47	0,07	0,27	-13,83966
122,0	387,0	3,2	0,1	11,6	401,8	318,8	77,0	88,9	502,6	364,2	441,8	422,0	318,8	896,3	0,10	78,77	77,84	81,64	0,20	83,74	83,18	82,49	0,08	0,27	-12,86784
123,0	388,0	3,1	0,1	11,3	402,8	316,4	77,0	88,8	503,3	366,2	443,8	423,8	319,0	887,8	0,10	78,79	77,88	81,66	0,20	83,74	83,21	82,50	0,08	0,27	-11,46338
124,0	389,0	3,0	0,1	10,9	404,0	314,0	77,2	88,8	503,8	368,1	444,8	424,8	319,1	878,3	0,10	78,80	78,00	81,67	0,20	83,81	83,24	82,49	0,08	0,27	-10,41368
125,0	390,0	3,0	0,1	10,7	405,0	311,0	77,2	88,8	502,8	370,1	446,0	426,8	319,3	865,8	0,10	78,99	78,02	81,70	0,20	83,83	83,34	82,84	0,07	0,27	-9,453299
126,0	391,0	3,0	0,1	10,6	405,7	308,7	77,1	88,8	501,8	371,8	447,8	428,2	319,3	860,3	0,10	78,93	78,04	81,74	0,20	83,79	83,32	82,86	0,08	0,26	-8,481042
127,0	392,0	2,9	0,1	10,7	406,4	306,3	76,8	88,2	500,8	373,8	448,8	429,4	319,5	856,1	0,10	78,87	78,08	81,71	0,20	83,78	83,38	82,83	0,07	0,26	-8,010841
128,0	393,0	2,9	0,1	10,8	407,2	303,7	76,8	87,8	499,7	376,8	450,0	431,1	319,7	850,2	0,10	78,81	78,07	81,69	0,20	83,78	83,42	82,48	0,07	0,26	-7,207123
129,0	394,0	2,8	0,1	10,3	407,7	301,2	77,1	88,1	498,7	377,2	450,6	432,2	319,8	841,2	0,10	78,82	78,05	81,71	0,20	83,86	83,45	82,48	0,08	0,26	-6,702899
130,0	395,0	2,8	0,1	10,1	408,4	298,7	76,7	87,6	497,8	378,8	452,0	433,6	319,8	834,2	0,10	78,83	78,00	81,74	0,20	83,88	83,48	82,48	0,07	0,26	-6,034424
131,0	396,0	2,8	0,1	9,9	409,1	296,2	77,2	87,5	497,8	380,3	452,8	434,5	320,3	833,1	0,10	78,87	78,11	81,70	0,20	83,88	83,48	82,50	0,08	0,26	-5,346418
132,0	397,0	2,7	0,1	9,7	409,8	293,9	77,3	87,8	498,6	381,6	454,1	435,8	320,3	838,2	0,10	78,89	78,11	81,71	0,20	83,82	83,48	82,41	0,07	0,26	-4,861168
133,0	398,0	2,7	0,1	9,6	409,8	292,0	77,0	87,6	498,3	382,7	454,6	437,0	320,8	838,3	0,10	78,82	78,14	81,72	0,20	83,88	83,83	82,44	0,08	0,26	-4,618213
134,0	399,0	2,7	0,1	9,8	410,3	290,2	77,2	87,8	498,4	384,1	455,8	438,3	320,8	827,3	0,10	78,81	78,18	81,73	0,20	83,79	83,86	82,39	0,08	0,26	-4,180056
135,0	400,0	2,6	0,1	9,4	410,8	288,8	77,0	87,4	497,1	385,0	456,7	439,2	320,8	822,0	0,10	78,84	78,18	81,71	0,20	83,88	83,88	82,39	0,07	0,26	-3,824453
136,0	401,0	2,6	0,1	9,2	410,8	287,1	77,2	87,2	496,0	386,8	457,4	439,8	321,0	820,0	0,10	78,86	78,21	81,70	0,20	83,82	83,88	82,36	0,08	0,26	-3,570801
137,0	402,0	2,6	0,1	9,0	410,8	284,9	76,8	86,8	447,0	386,7	458,3	441,2	321,8	814,7	0,10	78,82	78,20	81,67	0,20	83,83	83,84	82,39	0,08	0,26	-3,471844
138,0	403,0	2,6	0,1	8,9	411,1	283,4	77,1	86,8	448,7	387,4	458,8	442,0	321,7	809,8	0,10	78,88	78,20	81,68	0,20	83,88	83,88	82,28	0,07	0,26	-3,299841
139,0	404,0	2,5	0,1	8,8	411,3	281,4	77,1	87,5	444,0	388,3	459,8	442,5	321,8	805,0	0,10	78,84	78,23	81,72	0,20	83,87	83,84	82,31	0,07	0,26	-3,254734
140,0	405,0	2,5	0,1	8,8	411,2	279,6	77,1	87,3	442,0	388,8	459,8	443,1	322,1	800,4	0,10	79,04	78,28	81,70	0,20	83,89	83,84	82,34	0,07	0,26	-3,23439
141,0	406,0	2,5	0,1	8,7	411,2	278,1	77,2	87,1	439,3	389,3	460,1	444,3	322,5	797,1	0,10	79,03	78,34	81,70	0,20	83,87	83,87	82,34	0,07	0,26	-3,234539
142,0	407,0	2,5	0,1	8,7	411,0	276,3	77,2	87,1	436,3	389,8	460,3	444,8	322,7	791,3	0,10	79,03	78,34	81,70	0,20	83,88	83,88	82,26	0,08	0,26	-3,86791
143,0	408,0	2,4	0,1	8,7	410,8	274,9	77,1	86,9	435,3	390,4	460,8	445,3	322,9	787,8	0,10	79,03	78,35	81,69	0,20	83,93	83,89	82,23	0,08	0,26	-3,47916
144,0	409,0	2,4	0,1	8,7	410,8	273,7	77,2	86,8	432,6	390,8	461,4	445,8	323,1	783,8	0,10	79,08	78,38	81,69	0,20	83,98	83,91	82,24	0,08	0,26	-3,632248
145,0	410,0	2,4	0,1	8,7	410,8	272,4	77,0	87,0	431,2	391,3	460,8	446,3	323,4	780,8	0,10	79,09	78,30	81,69	0,20	84,01	83,94	82,24	0,08	0,26	-3,758613
146,0	411,0	2,3	0,1	8,7	410,4	270,4	76,9	87,0	428,7	391,8	461,1	446,8	323,8	778,0	0,10	79,06	78,31	81,69	0,20	84,03	83,94	82,26	0,07	0,26	-3,881311
147,0	412,0	2,4	0,1	8,7	410,4	268,8	77,2	87,0	424,7	392,3	461,7	447,3	324,0	776,2	0,10	79,09	78,33	81,71	0,20	84,07	83,98	82,28	0,08	0,26	-4,014809
148,0	413,0	2,3	0,1	8,7	409,8	267,0	77,2	87,0	423,1	392,8	461,8	447,8	324,3	774,7	0,20	79,13	78,34	81,69	0,20	84,11	83,94	82,28	0,08	0,26	-4,061823
149,0	414,0	2,3	0,1	8,7	409,8	265,0	77,0	87,0	421,8	393,1	461,8	448,2	324,6	773,1	0,10	79,10	78,37	81,73	0,20	84,09	83,77	82,26	0,08	0,26	-4,066883
150,0	415,0	2,3	0,1	8,7	409,4	263,8	77,3	86,8	419,6	393,6	462,3	448,6	324,8	771,0	0,10	79,11	78,36	81,72	0,20	84,11	83,78	82,23	0,07	0,25	-4,109941
151,0	416,0	2,3	0,1	8,8	409,0	262,2	77,0	86,8	417,1	394,0	462,8	449,1	325,0	769,8	0,10	79,10	78,40	81,70	0,20	84,08	83,78	82,22	0,08	0,25	-4,013027
152,0	417,0	2,2	0,1	8,8	409,0	264,2	77,0	86,6	414,6	394,8	462,8	449,1	325,0	768,8	0,10	79,12	78,40	81,71	0,20	84,10	83,74	82,20	0,08	0,25	-3,994843
153,0	418,0	2,2	0,1	8,9	409,0	263,3	77,0	86,8	412,0	395,4	462,4	449,5	325,0	768,2	0,10	79,11	78,42	81,72	0,20	84,08	83,78	82,20	0,08	0,25	-3,404283
154,0	419,0	2,2	0,1	8,8	408,8	262,7	77,2	86,9	408,9	396,1	462,3	449,8	324,1	769,8	0,10	79,20	78,48	81,78	0,20	84,20	83,82	82,28	0,07	0,25	-3,787671
155,0	420,0	2,2	0,1	8,8	408,4	262,0	77,0	86,8	404,8	396,8	462,4	449,8	324,8	770,8	0,10	79,16	78,46	81,78	0,20	84,16	83,79	82,18	0,08	0,25	-3,674483
156,0	421,0	2,1	0,1	8,8	408,4	261,7	77,1	86,7	400,0	397,8	462,8	450,3	324,8	771,4	0,10	79,22	78,47	81,79	0,20	84,17	83,78	82,21	0,08	0,25	-3,582862
157,0	422,0	2,1	0,1	8,8	408,1	260,7	77,1	86,7	402,8	398,7	461,8	450,1	327,2	770,3	0,10	79,20	78,50	81,79	0,20	84,18	83,78	82,21	0,08	0,25	-3,290881
158,0	423,0	2,1	0,1	8,8	408,0	260,1	77,2	86,8	400,0	399,8	461,0	450,0	327,6	766,8	0,10	79,26	78,51	81,80	0,20	84,20	83,80	82,20	0,08	0,25	-3,408758
159,0	424,0	2,1	0,1	8,8	407,7	259,3	77,1	86,8	398,8	400,4	461,7	450,0	328,0	761,8	0,10	79,18	78,54	81,79	0,20	84,17	83,83	82,24	0,08	0,25	-3,655100
160,0	425,0	2,1	0,1	8,8	407,4	258,6	77,2	86,6	396,1	401,2	461,7	449,8	328,3	758,8	0,10	79,25	78,58	81,77	0,20	84,28	83,84	82,23	0,07	0,25	-3,884289
161,0	426,0	2,0	0,1	8,8	407,1	257,8	77,2	86,7	394,1	402,2	461,1	449,7	328,7	758,8	0,10	79,23	78,58	81,80	0,20	84,24	83,82	82,24	0,08	0,25	-7,295263
162,0	427,0	2,0	0,1	8,8	406,8	256,8	77,2	86,8	392,2	402,8	460,8	449,3	329,4	755,3	0,10	79,28	78,60	81,79	0,20	84,24	83,86	82,24	0,08	0,25	-7,642467
163,0	428,0	2,0	0,1	8,8	406,8	256,0	77,4	86,8	390,8	403,8	460,1	449,2	330,0	753,8	0,10	79,34	78,61	81,80	0,20	84,30	83,81	82,24	0,08	0,25	-7,848792
164,0	429,0	2,0	0,1	8,8	406,4	255,8	77,4	86,8	388,4	404,2	460,0	449,0	330,4	752,8	0,10	79,37	78,68	81,82	0,20	84,31	83,85	82,23	0,07	0,25	-8,000366
165,0	430,0	2,0	0,1	8,8	406,1	255,6	77,2	86,8	386,8	404,8	459,7	448,7	330,8	753,3	0,10	79,36	78,69	81,83	0,20	84,31	83,90	82,26	0,08	0,25	-8,278569
166,0	431,0	2,0	0,1	8,8	405,8	254,9	77,3	86,8	385,0	405,8	459,4	448,3	331,8	752,7	0,10	79,37	78,69	81,81	0,20	84,31	84,01	82,28	0,07	0,25	-8,652399
167,0	432,0	1,9	0,1	8,8	405,8	254,4	77,6	86,8	383,3	406,8	458,8	448,1	332,0	752,8	0,10	79,38	78,73	81,80	0,20	84,28	84,05	82,18	0,08	0,25	-8,768402
168,0	433,0	1,9	0,1	8,8	405,8	253,7	77,3	86,2	380,2	406,3	458,7	447,8	332,8	752,3	0,10	79,43	78,78	81,79	0,20	84,38	84,07	82,17	0,07	0,25	-8,369883
169,0	434,0	1,9	0,1	8,8	404,8	252,9	77,1	86,4	378,8	406,7	458,0	447,1	332,8	752,3	0,20	79,43	78,78	81,79	0,20	84,41	84,06	82,18	0,07	0,25	-8,774268
170,0	435,0	1,9	0,1	8,8	404,3	252,0	77,2	86,2	376,6	407,3	457,9	446,5	333,4	752,1	0,10	79,48	78,80	81,77	0,20	84,42	84,08	82,18	0,07	0,25	-10,08613
171,0	436,0	1,8	0,1	8,8	404,2	252,0	77,2	86,0	375,0	407,8	457,4	446,0	333,7	753,3	0,10	79,51	78,80	81,77	0,20	84,45	84,08	82,14	0,08	0,25	-10,36498
172,0	437,0	1,8	0,1	8,8	403,8	251,8	77,4	86,1	373,8	407,8	457,4	446,6	334,3	753,1	0,10	79,54	78,83	81,74	0,20	84,48	84,12	82,14	0,08	0,25	-10,73478
173,0	438,0	1,8	0,1	8,8	403,2	252,2	77,2	86,1	371,1	407,8	457,1	446,3	334,7	753,3	0,10	79,54	78,83	81,78	0,20	84,52	84,11	82,13	0,07	0,25	-11,10797
174,0	439,0	1,8	0,1	8,4	402,8	252,3	77,2	86,1	369,6	408,2	456,8	444,8	335,0	753,7	0,10	79,54	78,84	81,78	0,20	84,51	84,10	82,18	0,07	0,25	-11,80366
175,0	440,0	1,8	0,1	8,4	402,3	252,2	77,3	86,4	367,1	408,8	456,5	444,3	335,4	753,8	0,10	79,58	78,86	81,79	0,20	84,52	84,07	82,18	0,08	0,25	-12,12383
176,0	441,0	1,7	0,1	8,4	402,1	251,8	77,2	86,4	364,0	409,0	456,0	443,8	335,8	754,1	0,10	79,49	78,83	81,79	0,20	84,40	84,11	82,18	0,07	0,25	-12,36299
177,0	442,0	1,8	0,1	8,4	401,8	251,7	77,8	86,2	364,4	408,7	455,2	443,2	336,3	754,7	0,10	79,58	78,89	81,80	0,20	84,44	84,14	82,17	0,07	0,25	-12,84837
178,0	443,0	1,7	0,1	8,4	401,1	251,3	77,3	86,2	362,8	408,8	455,2	442,8	336,6	754,8	0,10	79,65	78,92	81,80	0,20	84,54	84,14	82,18	0,08	0,25	-13,36633
179,0	444,0	1,7	0,1	8,4	400,7	251,2	77,2	86,2	360,8	408,8	454,8	442,2	337,1	754,8	0,10	79,61	78,93	81,79	0,20	84,54	84,17	82,18	0,07	0,25	-13,88798
180,0	445,0	1,7	0,1	8,4	400,3	250,9	77,2	86,0	359,8	409,0	454,8	441,8	337,8	755,2	0,10	79,64	78,93	81,80	0,20	84,58	84,22	82,16	0,07	0,25	-14,07632
181,0	446,0	1,7	0,1	8,4	400,1	251,3	77,2	85,8	358,0	409,2	453,8	441,2	338,3	755,3	0,10	79,67	78,94	81,77	0,20	84,62	84,21	82,11	0,07	0,25	-14,27233
182,0	447,0	1,7	0,1	8,4	399,8	251,2	77,2	85,8	356,2	409,2	453,8	440,8	338,8	755,1	0,10	79,68	78,96	81,77	0,20	84,60	84,21	82,14	0,08	0,25	-14,7614
183,0	448,0	1,6	0,2	8,3	399,2	250,7	77,8	86,0	354,8	409,2	452,8	440,3	339,0	755,2	0,10	79,59	79,01	81,78	0,20	84,57	84,31	82,14	0,07	0,25	-15,21618
184,0	449,0	1,6	0,2	8,3	398,7	250,8	77,3	85,8	353,4	409,2	452,0	439,8	339,8	755,4	0,10	79,60	79,01	81,78	0,20	84,64	84,38	82,14	0,08	0,25	-15,70579
185,0	450,0	1,6	0,2	8,3	398,2	250,7	77,8	85,8	351,2	409,2	451,3	439,2	340,1	756,4	0,10	79,63	78,99	81,68	0,20	84,61	84,36	82,07	0,08	0,25	-16,28231
186,0	451,0	1,6	0,2	8,3	397,7	250,9	77,3	85,7	349,7	408,8	451,0	438,7	340,4	757,1	0,10	79,63	78,97	81,70	0,20	84,48	84,37	82,03	0,08	0,25	-16,68892
187,0	452,0	1,6	0,2	8,3	397,4	250,5	77,4	86,0	348,0	408,8	450,7	437,8	340,8	756,8	0,10	79,62	78,98	81,67	0,20	84,62	84,37	82,04	0,08	0,25	-16,98603
188,0	453,0	1,6	0,2	8,3	397,0	250,5	77,3	85,8	346,2	408,8	449,8	437,3	341,2	757,8	0,10	79,60	79,00	81,67	0,20	84,58	84,37	82,06	0,07	0,25	-17,36671
189,0	454,0	1,6	0,2	8,3	396,6	250,5	77,4	85,8	345,0	408,8	449,8	437,1	341,7	758,0	0,10	79,61	78,99	81,68	0,20	84,48	84,38	82,00	0,08	0,25	-17,78487
190,0	455,0	1,5	0,2	8,3	396,2	250,5	77,3	85,8	344,2	408,8	448,8	436,4	341,9	758,7	0,10	79,57	78,98	81,81	0,20	84,42	84,39	82,03	0,08	0,25	-18,29271
191,0	456,0	1,5	0,1	8,3	395,8	248,0	77,3	85,7	343,0	408,8	448,0	435,8	342,3	721,1	0,10	79,28	78,95	81,69	0,20	84,32	84,39	81,84	0,08	0,25	-18,8988
192,0	457,0	1,5	0,1	8,3	395,5	248,3	77,3	85,8	341,1	408,7	447,8	435,1	342,6	721,3	0,10	79,31	78,92	81,64	0,20	84,27	84,35	81,82	0,08	0,25	-19,26555
193,0	458,0	1,5	0,1	8,3	395,1	248,3	77,3	85,8	339,8	408,3	447,0	434,5	343,0	721,0	0,10	79,31	78,94	81,63	0,20	84,23	84,37	81,81	0,07	0,25	-19,75093
194,0	459,0	1,4	0,1	8,3	394,7	244,2	77,3	85,2	338,0	408,3	446,8	434,1	343,4	718,0	0,10	79,31	78,94	81,63	0,20	84,28	84,38	81,86	0,08	0,25	-20,13782
195,0	460,0	1,4	0,1	8,3	394,1	242,8	77,4	85,2	336,1	408,7	446,7	433,8	343,8	718,4	0,10	79,30	78,94	81,68	0,20	84,27	84,37	81,86	0,08	0,25	-20,27391
196,0	461,0	1,4	0,1	8,3	393,8	242,1	77,2	85,1	337,2	408,3	446,8	433,8	344,4	709,8	0,10	79,24	78,94	81,68	0,20	84,24	84,37	81,82	0,07	0,25	-20,60899
197,0	462,0	1,4	0,1	8,3	393,3	241,1	77,0	85,3	338,8	408,0	446,1	433,8	344,8	709,8	0,10	79,18	78,90	81,68	0,20	84,18	84,37	81,77	0,07	0,25	-21,15218
198,0	463,0	1,4	0,1	8,3	393,0	240,4	77,1	85,8	334,8	408,0	444,4	432,7	345,4	711,6	0,10	79,18	78,91	81,68	0,20	84,18	84,37	81,83	0,08	0,25	-21,41653
199,0	464,0	1,4	0,1	8,3	392,6	240,3	77,1	85,4	333,1	408,1	443,7	432,3	345,8	713,3	0,10	79,18	78,91	81,67	0,20	84,23	84,37	81,82	0,07	0,25	-21,80821
200,0	465,0	1,3	0,1	8,3	392,3	240,8	77,1	85,8	332,3	408,0	443,3	431,8	346,3	714,0	0,10	79,27	78,91	81,67	0,20	84,31	84,31	81,83	0,07	0,25	-22,09628
201,0	466,0	1,3	0,1	8,3	392,0	240,1	77,3	85,8	331,1	407,8	442,8	431,8	346,7	714,8	0,10	79,30	78,94	81,62	0,20

108,0	473,0	1,2	0,1	8,5	390,3	240,1	77,4	88,4	323,7	407,4	440,8	429,8	380,1	718,8	0,10	79,87	79,09	81,47	0,10	84,88	84,30	81,83	0,07	0,05	-34,08444
109,0	474,0	1,2	0,1	8,4	390,1	239,7	77,3	88,4	322,9	407,3	439,8	429,8	380,7	720,8	0,10	79,88	79,10	81,49	0,10	84,80	84,33	81,82	0,07	0,05	-34,38234
110,0	475,0	1,1	0,1	8,4	390,0	240,0	77,4	88,3	322,6	407,3	439,6	429,4	381,2	721,8	0,10	79,81	79,10	81,47	0,10	84,83	84,30	81,81	0,08	0,05	-34,39443
111,0	476,0	1,1	0,1	8,3	389,8	239,3	77,8	88,4	321,7	407,1	439,4	429,2	381,7	720,8	0,10	79,79	79,15	81,49	0,10	84,79	84,38	81,88	0,07	0,05	-34,80363
112,0	477,0	1,1	0,1	8,2	389,4	238,2	77,4	88,8	320,0	406,8	439,1	428,8	382,2	719,8	0,10	79,83	79,15	81,48	0,10	84,68	84,35	81,83	0,08	0,05	-34,69794
113,0	478,0	1,1	0,1	8,2	389,0	238,3	77,4	88,8	318,8	406,7	438,3	428,6	382,6	722,0	0,10	79,67	79,18	81,49	0,10	84,72	84,38	81,83	0,08	0,05	-35,41263
114,0	479,0	1,1	0,1	8,4	388,8	238,4	77,3	88,8	318,1	406,6	437,8	428,3	383,1	724,8	0,10	79,68	79,18	81,51	0,10	84,72	84,34	81,81	0,08	0,05	-35,43777
115,0	480,0	1,1	0,1	8,4	388,8	238,7	77,3	88,6	317,8	406,4	437,8	427,7	383,4	725,8	0,10	79,70	79,10	81,51	0,10	84,72	84,36	81,87	0,08	0,05	-35,61345
116,0	481,0	1,1	0,2	8,4	388,4	238,7	77,3	88,8	318,4	406,3	437,4	427,8	383,8	723,8	0,10	79,76	79,22	81,51	0,10	84,78	84,36	81,87	0,08	0,05	-34,93543
117,0	482,0	1,0	0,2	8,4	388,1	238,3	77,3	88,6	318,6	406,8	437,2	427,3	384,4	726,8	0,20	79,77	79,22	81,52	0,10	84,78	84,37	81,86	0,08	0,05	-34,54563
118,0	483,0	1,0	0,2	8,4	388,0	238,8	77,4	88,6	314,6	406,7	437,0	427,0	384,8	729,0	0,10	79,81	79,24	81,52	0,10	84,81	84,38	81,90	0,08	0,05	-36,467
119,0	484,0	1,0	0,2	8,4	387,8	239,6	77,3	88,5	313,6	406,3	436,8	426,8	385,0	730,7	0,10	79,76	79,24	81,53	0,10	84,68	84,39	81,88	0,07	0,05	-34,87873
120,0	485,0	1,0	0,3	8,3	387,4	240,0	77,4	88,4	313,8	404,8	436,6	426,4	385,4	732,3	0,10	79,77	79,23	81,51	0,10	84,80	84,40	81,89	0,08	0,05	-37,01366
121,0	486,0	1,0	0,3	8,3	387,1	240,2	77,1	88,4	313,3	404,8	436,2	426,8	385,7	733,8	0,10	79,72	79,24	81,51	0,10	84,79	84,40	81,90	0,08	0,05	-37,33504
122,0	487,0	1,0	0,3	8,3	386,8	240,4	77,2	88,4	312,3	404,2	436,1	426,4	386,0	735,2	0,10	79,74	79,28	81,53	0,10	84,78	84,42	81,87	0,07	0,05	-37,65264
123,0	488,0	0,9	0,3	8,3	386,4	240,6	77,2	88,3	310,9	404,0	435,7	424,9	386,3	736,2	0,10	79,69	79,23	81,53	0,10	84,78	84,43	81,87	0,08	0,05	-38,04187
124,0	489,0	0,9	0,3	8,2	386,0	240,4	77,3	88,5	310,0	403,4	435,4	424,7	386,6	737,8	0,10	79,68	79,28	81,53	0,10	84,77	84,45	81,90	0,08	0,05	-38,39391
125,0	490,0	0,9	0,3	8,2	385,8	240,8	77,0	88,5	309,3	403,0	435,0	424,4	386,8	738,4	0,10	79,68	79,28	81,53	0,10	84,77	84,44	81,88	0,08	0,05	-38,61102
126,0	491,0	0,9	0,3	8,2	385,5	240,8	77,2	88,4	308,8	402,8	434,8	424,0	387,2	739,0	0,10	79,61	79,24	81,54	0,10	84,79	84,41	81,86	0,08	0,05	-38,83604
127,0	492,0	0,8	0,3	8,2	385,1	241,1	77,0	88,4	308,0	402,1	434,6	423,4	387,4	740,4	0,10	79,60	79,24	81,52	0,10	84,78	84,44	81,87	0,08	0,05	-39,28833
128,0	493,0	0,8	0,3	8,2	384,8	241,1	77,1	88,3	307,0	401,8	434,4	423,2	387,8	743,1	0,10	79,62	79,28	81,51	0,10	84,76	84,48	81,86	0,07	0,05	-39,80748
129,0	494,0	0,8	0,3	8,2	384,6	241,6	77,1	88,3	306,4	401,3	434,3	422,8	388,1	760,8	0,10	79,63	79,36	81,51	0,10	84,74	84,51	81,86	0,08	0,05	-39,81717
130,0	495,0	0,8	0,3	8,2	384,3	242,6	77,1	88,3	306,2	400,8	434,0	422,1	388,2	788,8	0,20	79,62	79,34	81,50	0,10	84,76	84,52	81,84	0,08	0,05	-30,12421
131,0	496,0	0,8	0,3	8,2	383,9	243,0	77,0	88,2	305,3	400,8	433,8	421,8	388,7	788,7	0,10	79,61	79,34	81,47	0,10	84,68	84,54	81,82	0,08	0,05	-30,40481
132,0	497,0	0,8	0,3	8,2	383,6	243,2	77,1	88,1	304,3	400,0	433,0	421,2	388,9	780,7	0,10	79,62	79,34	81,49	0,10	84,74	84,58	81,83	0,07	0,05	-30,65837
133,0	498,0	0,7	0,3	8,1	383,2	243,1	77,1	88,2	304,2	399,8	432,6	420,8	389,3	781,6	0,10	79,60	79,22	81,50	0,10	84,73	84,63	81,81	0,08	0,05	-31,18886
134,0	499,0	0,7	0,3	8,1	383,0	243,7	77,3	88,2	303,2	398,8	433,1	420,4	389,4	782,3	0,10	79,62	79,30	81,48	0,10	84,68	84,63	81,80	0,07	0,05	-31,39332
135,0	500,0	0,7	0,3	8,1	382,7	243,4	77,1	88,1	303,1	398,6	432,4	419,8	389,7	782,4	0,10	79,53	79,10	81,48	0,10	84,50	84,66	81,81	0,07	0,05	-31,72407
136,0	501,0	0,7	0,3	8,1	382,3	244,0	77,3	88,2	301,8	398,1	432,3	419,5	389,8	783,2	0,10	79,54	79,10	81,43	0,10	84,52	84,68	81,79	0,08	0,05	-32,18421
137,0	502,0	0,7	0,3	8,1	382,1	244,8	77,3	88,4	302,0	397,7	432,0	418,7	390,1	781,7	0,10	79,54	79,18	81,48	0,10	84,58	84,65	81,82	0,07	0,05	-32,33565
138,0	503,0	0,7	0,2	8,0	381,8	244,3	77,3	88,1	301,6	397,4	429,8	418,2	390,5	799,2	0,10	79,48	79,31	81,46	0,10	84,60	84,60	81,81	0,07	0,05	-32,85458
139,0	504,0	0,7	0,2	8,0	381,6	244,8	77,3	88,3	299,8	396,8	430,4	417,8	390,7	798,8	0,10	79,52	79,10	81,45	0,10	84,58	84,60	81,79	0,07	0,05	-33,38057
140,0	505,0	0,6	0,2	8,0	381,2	244,6	77,3	88,3	300,1	396,3	430,4	417,4	390,7	788,6	0,10	79,52	79,22	81,42	0,10	84,62	84,57	81,78	0,08	0,05	-33,42048
141,0	506,0	0,6	0,2	7,9	380,7	244,5	77,3	88,2	299,8	395,8	430,2	416,8	391,0	784,8	0,10	79,53	79,28	81,42	0,10	84,62	84,55	81,78	0,08	0,05	-33,67382
142,0	507,0	0,6	0,2	7,9	380,4	244,3	77,8	84,0	299,1	395,2	430,0	416,5	391,4	784,4	0,10	79,54	79,23	81,39	0,10	84,60	84,60	81,74	0,08	0,05	-33,88456
143,0	508,0	0,6	0,2	7,9	380,0	244,3	77,4	88,2	298,8	394,8	429,8	416,7	391,3	784,3	0,10	79,58	79,28	81,40	0,10	84,60	84,62	81,72	0,07	0,05	-34,43827
144,0	509,0	0,6	0,2	7,9	379,6	244,0	77,4	88,1	298,4	394,1	429,3	416,2	391,3	784,1	0,10	79,55	79,28	81,39	0,10	84,60	84,58	81,78	0,08	0,05	-34,76809
145,0	510,0	0,6	0,2	7,9	379,3	243,8	77,4	88,2	298,0	393,8	428,8	416,0	391,3	784,3	0,10	79,53	79,24	81,41	0,10	84,58	84,55	81,74	0,07	0,05	-35,1398
146,0	511,0	0,6	0,2	7,8	378,9	243,9	77,1	88,1	297,3	393,4	427,7	414,8	391,3	748,8	0,10	79,50	79,24	81,40	0,10	84,63	84,50	81,74	0,07	0,05	-35,64114
147,0	512,0	0,6	0,2	7,8	378,6	243,7	77,3	88,0	296,7	392,8	428,0	413,8	391,2	743,4	0,10	79,50	79,23	81,41	0,10	84,62	84,51	81,72	0,07	0,05	-35,86096
148,0	513,0	0,6	0,2	7,7	378,2	243,4	77,2	84,0	296,1	392,5	427,8	413,1	391,6	738,5	0,10	79,50	79,23	81,39	0,10	84,60	84,57	81,72	0,07	0,05	-36,10489
149,0	514,0	0,6	0,2	7,7	377,8	242,8	77,3	84,0	295,7	391,8	427,1	412,8	391,8	737,1	0,10	79,48	79,21	81,36	0,10	84,57	84,57	81,70	0,07	0,05	-36,4033
150,0	515,0	0,6	0,2	7,7	377,6	242,6	77,2	88,1	295,7	391,5	426,8	412,4	391,7	736,3	0,10	79,48	79,23	81,37	0,10	84,60	84,55	81,70	0,08	0,05	-36,80832
151,0	516,0	0,6	0,2	7,7	377,2	242,8	76,9	84,0	294,9	391,2	426,3	411,7	391,9	735,7	0,20	79,48	79,23	81,36	0,10	84,61	84,58	81,69	0,08	0,05	-37,20656
152,0	517,0	0,4	0,2	7,6	376,8	243,0	77,1	88,0	294,4	390,8	426,1	411,1	391,8	734,8	0,10	79,47	79,22	81,38	0,10	84,62	84,59	81,69	0,07	0,05	-37,58487
153,0	518,0	0,4	0,2	7,6	376,4	242,8	77,3	88,0	294,1	390,1	425,3	410,8	391,8	734,3	0,10	79,51	79,23	81,34	0,10	84,67	84,60	81,68	0,07	0,05	-38,02676
154,0	519,0	0,4	0,2	7,6	376,1	242,4	77,1	84,0	294,3	389,8	424,7	410,3	391,8	734,2	0,10	79,48	79,24	81,34	0,10	84,64	84,59	81,68	0,08	0,05	-38,34802
155,0	520,0	0,4	0,2	7,6	375,8	242,8	77,3	88,0	293,3	389,2	424,6	409,8	392,0	733,8	0,10	79,40	79,23	81,33	0,10	84,53	84,61	81,64	0,07	0,05	-38,64803
156,0	521,0	0,4	0,2	7,6	375,5	242,4	77,3	88,1	293,0	388,6	424,3	408,8	391,8	733,3	0,10	79,31	79,23	81,30	0,10	84,62	84,60	81,64	0,07	0,05	-39,08433
157,0	522,0	0,4	0,2	7,6	375,2	242,1	77,4	88,2	292,2	388,4	424,0	408,5	391,8	733,8	0,10	79,38	79,23	81,30	0,10	84,48	84,58	81,68	0,08	0,05	-39,4995
158,0	523,0	0,4	0,2	7,6	374,8	242,0	77,3	88,0	292,1	387,8	423,3	407,8	391,8	733,7	0,10	79,47	79,28	81,30	0,10	84,53	84,60	81,68	0,07	0,05	-39,89891
159,0	524,0	0,4	0,2	7,6	374,5	242,0	77,3	88,0	291,4	387,6	423,3	407,4	392,0	733,4	0,10	79,42	79,28	81,30	0,10	84,52	84,60	81,67	0,08	0,05	-40,13078
160,0	525,0	0,4	0,2	7,5	374,2	241,8	77,3	84,0	290,8	386,8	422,4	407,0	391,9	732,8	0,10	79,43	79,23	81,30	0,10	84,54	84,59	81,62	0,08	0,05	-40,62286
161,0	526,0	0,3	0,3	7,5	373,9	242,1	77,2	88,0	290,3	386,4	421,8	406,2	391,8	733,2	0,20	79,47	79,28	81,28	0,10	84,58	84,59	81,61	0,07	0,05	-41,18481
162,0	527,0	0,3	0,3	7,5	373,5	241,9	77,3	88,0	289,8	386,0	421,1	405,7	391,9	733,8	0,10	79,48	79,23	81,27	0,10	84,58	84,58	81,64	0,08	0,05	-41,62287
163,0	528,0	0,3	0,3	7,5	373,2	242,4	77,2	88,0	289,4	385,4	420,4	405,2	391,8	734,8	0,10	79,44	79,24	81,28	0,10	84,58	84,61	81,62	0,07	0,05	-41,65277
164,0	529,0	0,3	0,3	7,5	372,9	242,4	77,2	84,0	288,7	385,0	419,8	404,8	392,0	734,7	0,10	79,39	79,31	81,28	0,10	84,50	84,59	81,62	0,07	0,05	-42,38108
165,0	530,0	0,3	0,2	7,5	372,5	242,0	77,0	84,0	288,3	384,5	419,0	404,3	392,1	734,5	0,10	79,30	79,30	81,28	0,10	84,40	84,59	81,57	0,07	0,05	-42,84488
166,0	531,0	0,2	0,2	7,4	372,2	241,8	77,3	84,0	287,3	383,9	418,2	403,4	392,0	734,4	0,10	79,31	79,38	81,28	0,10	84,41	84,58	81,60	0,07	0,05	-43,24043
167,0	532,0	0,2	0,2	7,4	370,8	241,8	77,2	88,2	287,1	383,4	418,0	402,8	392,0	734,1	0,20	79,38	79,21	81,28	0,10	84,48	84,58	81,62	0,08	0,05	-43,6078
168,0	533,0	0,2	0,2	7,4	370,5	241,8	77,2	88,4	286,8	383,1	417,4	402,4	392,0	733,8	0,10	79,41	79,23	81,30	0,10	84,42	84,62	81,60	0,08	0,05	-43,61199
169,0	534,0	0,2	0,2	8,1	370,1	240,0	77,1	88,4	287,0	382,8	417,1	401,8	391,8	684,8	0,20	79,44	79,24	81,30	0,10	84,84	84,60	81,69	0,07	0,05	-44,38266
170,0	535,0	0,2	0,1	7,9	369,8	237,4	77,2	88,8	286,7	382,0	417,0	401,4	391,8	674,8	0,10	79,48	79,23	81,33	0,10	84,84	84,66	81,68	0,08	0,05	-44,62518
171,0	536,0	0,1	0,1	7,7	369,2	236,6	77,4	88,4	286,6	381,1	416,4	400,8	391,7	668,2	0,10	79,51	79,23	81,32	0,10	84,88	84,62	81,68	0,08	0,05	-45,2366
172,0	537,0	0,1	0,1	7,7	368,7	234,3	77,3	88,4	286,3	380,3	415,8	400,8	391,8	662,1	0,10	79,51	79,23	81,33	0,10	84,81	84,63	81,71	0,08	0,05	-45,66518
173,0	538,0	0,1	0,1	7,7	368,2	233,0	77,3	88,4	286,7	379,8	414,8	400,0	391,8	660,8	0,10	79,53	79,23	81,33	0,10	84,88	84,60	81,71	0,08	0,05	-46,20168
174,0	539,0	0,1	0,1	7,7	367,8	232,0	77,3	88,5	286,3	379,7	414,3	399,7	391,8	658,8	0,10	79,52	79,22	81,38	0,10	84,88	84,58	81,70	0,08	0,05	-46,62612
175,0	540,0	0,1	0,1	7,7	367,5	231,1	77,1	88,5	286,1	377,8	414,0	399,4	392,0	660,8	0,10	79,52	79,22	81,37	0,10	84,83	84,58	81,73	0,07	0,05	-46,9958
176,0	541,0	0,0	0,1	7,7	367,1	230,3	77,0	88,5	285,7	376,8	413,4	399,2	392,2	661,0	0,10	79,53	79,23	81,39	0,10	84,87	84,33	81,76	0,08	0,05	-47,32379

Manufacturer: HEARTHSTONE
Model: 8031

Run: 1
Project #: PI 20270
Test Duration: 276 min

Note: In the "Input data", "Calc. % O_2", "Fuel Properties", and "Mass Balance" columns, [a], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses

Overall Heating Efficiency: 78,02%
Combustion Efficiency: 98,67%
Heat Transfer Efficiency: 79,07%

	HHV	LHV
Eff	78,02%	84,32%
Comb Eff	98,67%	98,67%
HT Eff	79,07%	85,46%
Output	17 028	kJ/h
Burn Rate	1,10	kg/h
Grams CO	119	g
Input	21 826	kJ/h
MC wet	17,73	

Ultimate CO_2
$CO_{2 ult}$ 19,64
F_o
1,062

Heat Output: 16 153 Btu/h
Heat Input: 20 704 Btu/h
Burn Duration: 4,60 h
Burn Rate: 2,43 lb/h
Stack Temp: 283,5 Deg. F

	Averages	0,13	9,21	1,30	20,32	10,94	139,71	24,76	0,99	0,80	0,79
INPUT DATA				Oxygen Calculation			Input Data		Combust Eff %	Heat Transfer %	Net Eff %
Elapsed Time	Weight Remaining (kg)	% CO [a]	% CO_2 [d]	Excess Air EA	Total O_2	Calc. % O_2 [g]	Flue Gas (ºC)	Room Temp (ºC)			
0,00	6,16	0,23	2,38	653,0%	20,77	18,28	137,3	23,9	94,0%	60,4%	57,1%
1,00	6,11	0,51	2,10	651,2%	20,77	18,41	128,8	23,8	85,7%	56,8%	48,6%
2,00	6,11	0,54	3,43	394,2%	20,68	16,97	147,3	23,8	89,8%	66,9%	60,1%
3,00	6,02	0,57	1,07	1102,8%	20,83	19,48	173,7	23,8	74,8%	13,5%	10,1%
4,00	5,93	0,38	1,95	742,5%	20,79	18,65	211,9	23,9	88,5%	32,0%	28,3%
5,00	5,89	0,31	2,26	663,4%	20,77	18,35	177,0	23,8	91,8%	48,5%	44,5%
6,00	5,89	0,10	4,81	300,0%	20,62	15,76	158,7	23,9	99,1%	71,5%	70,9%
7,00	5,89	0,08	3,81	405,9%	20,68	16,84	148,3	23,9	99,6%	69,0%	68,7%
8,00	5,84	0,07	3,62	432,9%	20,70	17,04	142,0	24,0	99,8%	69,1%	68,9%
9,00	5,84	0,06	3,65	429,2%	20,69	17,01	138,1	23,9	99,9%	69,9%	69,8%
10,00	5,80	0,06	3,78	411,3%	20,69	16,87	135,9	23,9	100,0%	70,9%	70,9%
11,00	5,80	0,07	6,03	222,5%	20,54	14,48	136,3	23,9	99,8%	77,4%	77,2%
12,00	5,71	0,08	6,92	180,7%	20,48	13,52	138,4	23,9	99,6%	78,6%	78,3%
13,00	5,71	0,10	7,28	166,2%	20,45	13,12	141,6	23,9	99,4%	78,8%	78,3%
14,00	5,66	0,10	7,00	176,5%	20,47	13,42	144,4	23,9	99,3%	78,1%	77,6%
15,00	5,62	0,10	6,62	192,2%	20,50	13,82	145,3	23,8	99,3%	77,4%	76,9%
16,00	5,62	0,10	5,69	239,7%	20,56	14,82	144,3	23,9	99,3%	75,8%	75,2%
17,00	5,57	0,09	5,16	273,7%	20,59	15,38	142,1	23,9	99,3%	74,8%	74,3%
18,00	5,57	0,10	4,92	291,8%	20,61	15,64	139,3	23,8	99,2%	74,5%	73,9%
19,00	5,52	0,10	4,87	295,7%	20,61	15,70	138,0	23,9	99,3%	74,5%	73,9%
20,00	5,48	0,11	6,16	213,2%	20,53	14,31	138,6	23,8	99,1%	77,3%	76,7%
21,00	5,43	0,13	7,22	167,5%	20,46	13,17	141,5	23,9	99,1%	78,7%	78,0%
22,00	5,39	0,12	8,13	138,3%	20,40	12,21	144,5	23,9	99,2%	79,5%	78,9%
23,00	5,34	0,11	8,74	122,0%	20,36	11,56	146,7	23,9	99,4%	80,0%	79,5%
24,00	5,34	0,10	8,45	129,7%	20,38	11,87	147,9	24,0	99,4%	79,6%	79,1%
25,00	5,25	0,10	8,50	128,5%	20,37	11,82	149,6	23,9	99,4%	79,5%	79,1%
26,00	5,21	0,09	9,52	104,5%	20,31	10,74	151,7	23,9	99,5%	80,3%	79,9%
27,00	5,21	0,08	9,89	96,9%	20,28	10,35	153,1	24,0	99,6%	80,5%	80,2%
28,00	5,16	0,08	8,29	134,8%	20,39	12,06	152,4	23,9	99,6%	79,0%	78,7%
29,00	5,12	0,09	7,13	172,0%	20,46	13,29	151,8	24,0	99,5%	77,6%	77,2%
30,00	5,07	0,09	6,62	192,7%	20,50	13,83	151,7	24,0	99,4%	76,8%	76,4%
31,00	5,07	0,10	6,70	189,0%	20,49	13,74	151,8	23,9	99,4%	76,9%	76,5%
32,00	5,03	0,10	7,05	174,8%	20,47	13,37	152,5	24,0	99,4%	77,4%	76,9%
33,00	4,98	0,10	7,76	149,9%	20,42	12,61	153,4	24,0	99,4%	78,3%	77,8%
34,00	4,93	0,10	8,27	134,6%	20,39	12,06	153,4	23,9	99,4%	78,9%	78,5%
35,00	4,94	0,09	8,26	135,3%	20,39	12,09	153,5	23,9	99,5%	78,9%	78,5%
36,00	4,89	0,09	8,34	133,0%	20,38	12,00	153,1	24,1	99,5%	79,0%	78,6%
37,00	4,84	0,10	8,27	134,7%	20,39	12,07	153,2	24,1	99,5%	79,0%	78,5%
38,00	4,80	0,09	8,60	126,1%	20,37	11,72	153,3	24,1	99,6%	79,3%	79,0%
39,00	4,75	0,09	8,71	123,3%	20,36	11,61	153,8	24,0	99,5%	79,4%	79,0%
40,00	4,75	0,08	9,21	111,4%	20,33	11,07	154,4	24,0	99,6%	79,8%	79,5%
41,00	4,66	0,08	9,42	106,8%	20,31	10,86	155,8	24,1	99,6%	79,9%	79,6%
42,00	4,66	0,08	9,98	95,4%	20,28	10,26	156,7	24,0	99,6%	80,3%	80,0%
43,00	4,62	0,06	10,61	84,1%	20,24	9,59	157,2	24,1	99,8%	80,8%	80,6%
44,00	4,57	0,06	10,32	89,1%	20,25	9,90	157,3	24,1	99,8%	80,6%	80,4%
45,00	4,53	0,07	10,04	94,2%	20,27	10,19	157,8	24,0	99,7%	80,3%	80,0%
46,00	4,48	0,10	10,60	83,7%	20,23	9,59	159,6	24,2	99,5%	80,6%	80,2%
47,00	4,43	0,09	11,98	62,7%	20,14	8,11	161,6	24,1	99,6%	81,4%	81,0%
48,00	4,39	0,07	12,24	59,6%	20,13	7,85	161,9	24,1	99,7%	81,5%	81,3%
49,00	4,35	0,07	12,10	61,4%	20,14	8,00	162,7	24,1	99,7%	81,4%	81,1%
50,00	4,30	0,06	12,18	60,5%	20,13	7,92	162,9	24,1	99,8%	81,4%	81,2%
51,00	4,25	0,05	11,95	63,8%	20,15	8,18	162,7	24,1	99,9%	81,3%	81,2%
52,00	4,21	0,05	11,70	67,2%	20,16	8,44	162,7	24,2	99,9%	81,1%	81,0%
53,00	4,16	0,05	11,42	71,2%	20,18	8,74	162,3	24,0	99,9%	81,0%	80,9%
54,00	4,12	0,05	11,17	75,0%	20,20	9,00	162,0	24,1	99,9%	80,8%	80,7%
55,00	4,09	0,05	10,93	78,9%	20,22	9,26	161,7	24,1	99,9%	80,7%	80,6%
56,00	4,07	0,06	10,94	78,6%	20,21	9,24	161,8	24,1	99,8%	80,7%	80,5%
57,00	4,03	0,06	11,09	76,1%	20,20	9,08	161,8	24,1	99,8%	80,8%	80,6%
58,00	3,98	0,06	11,47	70,3%	20,18	8,68	161,9	24,2	99,8%	81,0%	80,8%
59,00	3,94	0,06	11,83	65,2%	20,15	8,29	162,7	24,2	99,8%	81,2%	81,0%
60,00	3,89	0,06	12,08	61,8%	20,14	8,03	163,2	24,2	99,8%	81,3%	81,1%
61,00	3,84	0,06	11,90	64,2%	20,15	8,22	163,3	24,1	99,7%	81,2%	81,0%
62,00	3,80	0,06	11,75	66,3%	20,16	8,38	162,9	24,2	99,8%	81,2%	81,0%
63,00	3,76	0,06	11,77	66,1%	20,16	8,36	162,9	24,3	99,8%	81,2%	81,0%
64,00	3,71	0,06	11,95	63,6%	20,15	8,17	163,4	24,1	99,8%	81,2%	81,1%
65,00	3,64	0,06	12,33	58,6%	20,12	7,77	163,8	24,1	99,8%	81,4%	81,3%
66,00	3,62	0,08	12,84	52,1%	20,09	7,21	165,0	24,3	99,6%	81,6%	81,3%
67,00	3,53	0,14	13,45	44,5%	20,04	6,52	166,5	24,3	99,2%	81,8%	81,2%
68,00	3,53	0,20	13,73	41,1%	20,02	6,20	168,0	24,3	98,9%	81,8%	81,0%
69,00	3,44	0,19	13,79	40,5%	20,02	6,13	169,3	24,3	99,0%	81,8%	81,0%
70,00	3,44	0,09	13,48	44,7%	20,04	6,52	169,8	24,2	99,5%	81,7%	81,3%
71,00	3,39	0,07	13,13	48,8%	20,07	6,90	170,1	24,3	99,7%	81,5%	81,3%
72,00	3,35	0,06	12,80	52,7%	20,09	7,26	169,9	24,2	99,8%	81,3%	81,1%
73,00	3,30	0,06	12,52	56,1%	20,11	7,56	169,3	24,3	99,8%	81,2%	81,0%
74,00	3,26	0,06	12,46	56,9%	20,11	7,63	169,3	24,4	99,8%	81,2%	81,0%
75,00	3,21	0,06	12,46	57,0%	20,11	7,63	169,1	24,5	99,8%	81,2%	81,0%
76,00	3,16	0,06	12,66	54,5%	20,10	7,42	169,4	24,4	99,8%	81,3%	81,1%
77,00	3,12	0,06	12,89	51,7%	20,08	7,16	169,8	24,3	99,8%	81,4%	81,2%
78,00	3,07	0,07	13,25	47,4%	20,06	6,77	170,9	24,3	99,7%	81,5%	81,2%
79,00	3,03	0,10	13,66	42,7%	20,03	6,32	171,6	24,4	99,5%	81,7%	81,3%
80,00	2,98	0,15	14,29	36,1%	19,99	5,62	172,6	24,5	99,3%	81,9%	81,3%
81,00	2,94	0,31	14,72	30,7%	19,95	5,08	174,9	24,5	98,3%	81,9%	80,5%
82,00	2,89	0,45	14,90	28,0%	19,93	4,80	176,4	24,4	97,6%	81,8%	79,9%
83,00	2,85	0,52	14,93	27,1%	19,92	4,73	176,9	24,4	97,2%	81,8%	79,5%
84,00	2,80	0,56	14,87	27,4%	19,92	4,78	178,1	24,6	97,0%	81,7%	79,3%
85,00	2,71	0,46	14,82	28,6%	19,93	4,88	179,3	24,5	97,5%	81,6%	79,6%
86,00	2,71	0,14	13,93	39,7%	20,01	6,02	178,7	24,5	99,3%	81,4%	80,8%
87,00	2,67	0,10	13,25	47,1%	20,06	6,76	177,3	24,6	99,5%	81,1%	80,7%
88,00	2,62	0,08	12,75	53,1%	20,09	7,30	176,0	24,6	99,7%	81,0%	80,7%
89,00	2,57	0,06	12,32	58,6%	20,12	7,77	174,5	24,6	99,8%	80,8%	80,6%
90,00	2,53	0,05	11,75	66,5%	20,16	8,39	172,5	24,5	99,9%	80,6%	80,5%
91,00	2,48	0,04	11,22	74,4%	20,20	8,95	170,3	24,6	99,9%	80,4%	80,3%
92,00	2,44	0,04	10,78	81,5%	20,23	9,42	168,3	24,7	99,9%	80,2%	80,2%

93,00	2,42	0,04	10,56	85,3%	20,24	9,66	165,9	24,6	99,9%	80,2%	80,1%
94,00	2,39	0,06	11,31	72,7%	20,19	8,85	165,3	24,7	99,8%	80,8%	80,6%
95,00	2,35	0,06	11,80	65,6%	20,16	8,33	164,6	24,8	99,8%	81,1%	80,9%
96,00	2,30	0,07	12,18	60,4%	20,13	7,92	164,5	24,8	99,7%	81,3%	81,1%
97,00	2,27	0,07	12,71	53,7%	20,10	7,35	164,9	24,9	99,7%	81,6%	81,3%
98,00	2,26	0,09	13,12	48,8%	20,07	6,91	165,5	24,9	99,6%	81,8%	81,4%
99,00	2,21	0,11	13,58	43,5%	20,04	6,40	166,2	24,8	99,5%	81,9%	81,5%
100,00	2,17	0,16	13,88	40,0%	20,01	6,06	166,9	24,8	99,2%	82,0%	81,3%
101,00	2,12	0,16	13,69	41,8%	20,03	6,26	167,4	24,8	99,1%	81,9%	81,2%
102,00	2,08	0,18	13,66	41,9%	20,03	6,28	167,7	24,7	99,0%	81,9%	81,1%
103,00	2,03	0,16	13,63	42,4%	20,03	6,31	167,8	24,8	99,1%	81,9%	81,1%
104,00	2,03	0,14	13,66	42,3%	20,03	6,30	168,0	24,8	99,3%	81,9%	81,2%
105,00	1,98	0,12	13,41	45,1%	20,05	6,57	168,1	24,9	99,4%	81,8%	81,2%
106,00	1,94	0,11	13,20	47,6%	20,06	6,81	167,5	24,6	99,4%	81,7%	81,2%
107,00	1,89	0,13	13,11	48,3%	20,07	6,88	167,0	24,6	99,3%	81,6%	81,1%
108,00	1,85	0,15	12,90	50,5%	20,08	7,10	166,5	24,7	99,2%	81,6%	80,9%
109,00	1,80	0,15	12,72	52,6%	20,09	7,29	166,1	24,9	99,2%	81,5%	80,8%
110,00	1,80	0,16	12,80	51,5%	20,08	7,20	165,7	24,9	99,1%	81,6%	80,8%
111,00	1,76	0,19	12,90	50,1%	20,08	7,08	165,6	25,0	98,9%	81,6%	80,8%
112,00	1,71	0,21	12,97	49,1%	20,07	7,00	166,0	25,1	98,8%	81,6%	80,7%
113,00	1,71	0,21	13,12	47,4%	20,06	6,84	165,8	24,9	98,8%	81,7%	80,7%
114,00	1,67	0,20	13,23	46,2%	20,05	6,72	165,8	25,0	98,9%	81,8%	80,9%
115,00	1,62	0,18	13,20	46,6%	20,06	6,77	165,7	25,0	99,0%	81,8%	81,0%
116,00	1,58	0,16	13,07	48,5%	20,07	6,92	165,0	25,0	99,1%	81,8%	81,0%
117,00	1,58	0,14	12,94	50,2%	20,08	7,07	164,6	24,9	99,2%	81,7%	81,1%
118,00	1,53	0,12	12,75	52,5%	20,09	7,27	163,8	24,9	99,3%	81,7%	81,1%
119,00	1,49	0,11	12,52	55,5%	20,11	7,53	163,2	25,1	99,4%	81,6%	81,1%
120,00	1,49	0,10	12,24	59,2%	20,13	7,84	161,5	25,0	99,5%	81,6%	81,2%
121,00	1,44	0,09	11,91	63,7%	20,15	8,19	160,4	25,0	99,6%	81,4%	81,1%
122,00	1,43	0,08	11,57	68,7%	20,17	8,57	159,2	25,0	99,6%	81,3%	81,0%
123,00	1,39	0,07	11,27	73,2%	20,19	8,89	158,0	25,0	99,7%	81,2%	81,0%
124,00	1,37	0,06	10,87	79,7%	20,22	9,31	156,6	25,1	99,8%	81,1%	80,9%
125,00	1,35	0,05	10,68	83,0%	20,23	9,52	155,0	25,0	99,8%	81,0%	80,9%
126,00	1,35	0,05	10,62	84,1%	20,24	9,59	153,7	25,0	99,9%	81,1%	81,0%
127,00	1,30	0,05	10,68	83,0%	20,23	9,52	152,4	24,9	99,9%	81,2%	81,1%
128,00	1,30	0,05	10,50	86,1%	20,24	9,71	150,9	24,9	99,9%	81,2%	81,1%
129,00	1,26	0,06	10,31	89,5%	20,26	9,92	149,5	25,1	99,8%	81,2%	81,0%
130,00	1,26	0,07	10,06	93,9%	20,27	10,18	148,1	24,9	99,7%	81,1%	80,8%
131,00	1,26	0,08	9,89	97,0%	20,28	10,35	146,8	25,1	99,6%	81,0%	80,8%
132,00	1,21	0,08	9,73	100,1%	20,29	10,52	145,5	25,2	99,6%	81,0%	80,7%
133,00	1,21	0,09	9,65	101,8%	20,30	10,60	144,4	25,0	99,6%	81,0%	80,7%
134,00	1,21	0,08	9,45	106,0%	20,31	10,82	143,5	25,1	99,6%	80,9%	80,6%
135,00	1,17	0,08	9,42	106,7%	20,31	10,85	142,7	25,0	99,6%	81,0%	80,6%
136,00	1,17	0,08	9,18	112,2%	20,33	11,11	141,7	25,1	99,6%	80,9%	80,6%
137,00	1,17	0,08	9,03	115,6%	20,34	11,27	140,5	24,9	99,6%	80,8%	80,5%
138,00	1,17	0,08	8,92	118,4%	20,35	11,39	139,7	25,1	99,6%	80,8%	80,5%
139,00	1,12	0,08	8,80	121,2%	20,35	11,51	138,5	25,1	99,6%	80,8%	80,5%
140,00	1,12	0,07	8,75	122,6%	20,36	11,57	137,5	25,1	99,7%	80,8%	80,6%
141,00	1,12	0,07	8,73	123,1%	20,36	11,59	136,6	25,1	99,7%	80,9%	80,6%
142,00	1,12	0,07	8,73	123,1%	20,36	11,59	135,6	25,1	99,7%	81,0%	80,7%
143,00	1,08	0,07	8,73	123,1%	20,36	11,59	135,0	25,0	99,7%	81,0%	80,8%
144,00	1,08	0,07	8,73	123,1%	20,36	11,59	134,3	25,1	99,7%	81,1%	80,8%
145,00	1,08	0,07	8,72	123,6%	20,36	11,61	133,5	25,0	99,7%	81,1%	80,9%
146,00	1,03	0,07	8,73	123,3%	20,36	11,60	132,4	24,9	99,7%	81,2%	81,0%
147,00	1,08	0,07	8,73	123,2%	20,36	11,59	132,0	25,1	99,7%	81,3%	81,0%
148,00	1,03	0,07	8,75	122,8%	20,36	11,58	131,1	25,1	99,7%	81,3%	81,1%
149,00	1,03	0,07	8,73	123,2%	20,36	11,59	130,5	25,0	99,7%	81,4%	81,1%
150,00	1,03	0,07	8,73	123,1%	20,36	11,59	129,9	25,1	99,7%	81,4%	81,2%
151,00	1,03	0,08	8,78	121,8%	20,36	11,54	129,2	25,1	99,7%	81,5%	81,2%
152,00	0,99	0,08	8,83	120,4%	20,35	11,48	129,0	25,0	99,6%	81,6%	81,2%
153,00	0,99	0,08	8,90	118,7%	20,35	11,41	128,5	25,0	99,6%	81,6%	81,3%
154,00	0,99	0,09	8,83	120,1%	20,35	11,47	128,2	25,1	99,5%	81,6%	81,2%
155,00	0,99	0,09	8,75	122,1%	20,36	11,56	127,8	25,0	99,5%	81,6%	81,2%
156,00	0,94	0,10	8,64	124,9%	20,36	11,68	127,6	25,0	99,4%	81,5%	81,0%
157,00	0,94	0,10	8,62	125,2%	20,36	11,69	127,1	25,1	99,4%	81,5%	81,0%
158,00	0,94	0,10	8,59	126,1%	20,37	11,73	126,7	25,1	99,4%	81,5%	81,1%
159,00	0,94	0,10	8,58	126,3%	20,37	11,73	126,3	25,1	99,4%	81,6%	81,1%
160,00	0,94	0,10	8,56	127,0%	20,37	11,77	125,9	25,1	99,4%	81,6%	81,1%
161,00	0,90	0,10	8,56	126,9%	20,37	11,76	125,3	25,1	99,4%	81,6%	81,2%
162,00	0,90	0,10	8,54	127,4%	20,37	11,78	125,0	25,2	99,4%	81,6%	81,2%
163,00	0,90	0,11	8,52	127,7%	20,37	11,80	124,4	25,2	99,4%	81,7%	81,2%
164,00	0,90	0,11	8,53	127,6%	20,37	11,79	124,3	25,2	99,3%	81,7%	81,1%
165,00	0,90	0,11	8,51	127,9%	20,37	11,81	124,1	25,1	99,3%	81,7%	81,1%
166,00	0,90	0,11	8,52	127,4%	20,37	11,79	123,8	25,2	99,3%	81,7%	81,1%
167,00	0,85	0,12	8,49	128,2%	20,37	11,82	123,5	25,3	99,2%	81,7%	81,1%
168,00	0,85	0,12	8,50	127,8%	20,37	11,81	123,2	25,2	99,2%	81,7%	81,1%
169,00	0,85	0,12	8,51	127,5%	20,37	11,80	122,7	25,0	99,2%	81,8%	81,1%
170,00	0,85	0,13	8,50	127,9%	20,37	11,81	122,8	25,1	99,2%	81,8%	81,1%
171,00	0,85	0,13	8,46	128,7%	20,37	11,85	122,6	25,3	99,1%	81,8%	81,1%
172,00	0,85	0,13	8,46	128,6%	20,37	11,84	122,7	25,2	99,1%	81,7%	81,0%
173,00	0,80	0,13	8,44	129,0%	20,37	11,86	122,3	25,1	99,1%	81,8%	81,0%
174,00	0,80	0,14	8,43	129,3%	20,37	11,88	122,4	25,1	99,0%	81,7%	81,0%
175,00	0,80	0,14	8,43	129,3%	20,37	11,88	122,3	25,2	99,0%	81,7%	80,9%
176,00	0,79	0,14	8,41	129,6%	20,38	11,89	122,1	25,1	99,0%	81,7%	80,9%
177,00	0,80	0,14	8,41	129,7%	20,38	11,89	122,1	25,3	99,0%	81,8%	80,9%
178,00	0,76	0,14	8,38	130,5%	20,38	11,93	121,8	25,2	99,0%	81,7%	80,9%
179,00	0,76	0,15	8,39	130,1%	20,38	11,91	121,8	25,1	99,0%	81,7%	80,9%
180,00	0,76	0,15	8,36	131,0%	20,38	11,95	121,6	25,1	99,0%	81,7%	80,9%
181,00	0,76	0,15	8,38	130,5%	20,38	11,93	121,8	25,1	98,9%	81,7%	80,9%
182,00	0,76	0,15	8,33	131,8%	20,38	11,98	121,7	25,3	98,9%	81,7%	80,8%
183,00	0,72	0,15	8,34	131,3%	20,38	11,96	121,5	25,3	98,9%	81,7%	80,9%
184,00	0,71	0,15	8,33	131,7%	20,38	11,98	121,6	25,2	98,9%	81,7%	80,8%
185,00	0,71	0,15	8,32	131,7%	20,38	11,98	121,5	25,3	98,9%	81,7%	80,8%
186,00	0,71	0,16	8,31	132,2%	20,38	12,00	121,6	25,2	98,9%	81,7%	80,8%
187,00	0,71	0,16	8,31	132,1%	20,38	12,00	121,4	25,2	98,9%	81,7%	80,8%
188,00	0,71	0,16	8,32	131,6%	20,38	11,98	121,4	25,1	98,8%	81,7%	80,8%
189,00	0,71	0,16	8,32	131,7%	20,38	11,98	121,6	25,2	98,8%	81,7%	80,7%
190,00	0,67	0,15	8,28	133,0%	20,38	12,03	121,4	25,1	98,9%	81,7%	80,8%
191,00	0,67	0,11	8,49	128,4%	20,37	11,83	120,0	25,2	99,3%	82,0%	81,5%
192,00	0,67	0,11	8,51	128,1%	20,37	11,81	119,0	25,0	99,4%	82,1%	81,6%
193,00	0,67	0,11	8,49	128,4%	20,37	11,83	118,5	25,2	99,3%	82,1%	81,6%
194,00	0,62	0,11	8,51	127,8%	20,37	11,80	117,9	25,2	99,3%	82,2%	81,6%
195,00	0,62	0,12	8,51	127,6%	20,37	11,80	117,1	25,2	99,2%	82,2%	81,6%
196,00	0,62	0,12	8,51	127,6%	20,37	11,80	116,7	25,1	99,2%	82,3%	81,6%
197,00	0,62	0,12	8,49	128,0%	20,37	11,82	116,1	25,0	99,2%	82,3%	81,6%
198,00	0,62	0,13	8,49	127,9%	20,37	11,81	115,8	25,1	99,2%	82,3%	81,6%
199,00	0,62	0,13	8,51	127,4%	20,37	11,79	115,7	25,1	99,1%	82,3%	81,6%
200,00	0,61	0,13	8,51	127,3%	20,37	11,79	115,9	25,1	99,1%	82,3%	81,6%
201,00	0,58	0,13	8,51	127,3%	20,37	11,79	115,6	25,2	99,1%	82,4%	81,6%
202,00	0,58	0,13	8,51	127,2%	20,37	11,79	115,5	25,1	99,1%	82,4%	81,6%
203,00	0,58	0,14	8,48	128,0%	20,37	11,83	115,5	25,1	99,1%	82,3%	81,6%
204,00	0,58	0,13	8,48	128,1%	20,37	11,83	115,4	25,2	99,1%	82,4%	81,6%
205,00	0,58	0,14	8,44	129,0%	20,37	11,86	115,4	25,3	99,1%	82,3%	81,6%
206,00	0,53	0,14	8,48	128,0%	20,37	11,83	115,3	25,2	99,1%	82,4%	81,6%

207,00	0,53	0,14	8,44	128,9%	20,37	11,86	115,1	25,3	99,0%	82,4%	81,6%
208,00	0,53	0,14	8,46	128,5%	20,37	11,85	115,6	25,2	99,0%	82,3%	81,5%
209,00	0,53	0,15	8,44	128,8%	20,37	11,86	115,4	25,1	99,0%	82,3%	81,5%
210,00	0,49	0,15	8,42	129,2%	20,37	11,88	115,5	25,2	99,0%	82,3%	81,4%
211,00	0,49	0,14	8,26	133,7%	20,39	12,05	115,1	25,3	99,0%	82,2%	81,4%
212,00	0,49	0,14	8,21	135,2%	20,39	12,11	114,5	25,2	99,0%	82,2%	81,4%
213,00	0,49	0,14	8,23	134,6%	20,39	12,09	114,6	25,2	99,0%	82,2%	81,4%
214,00	0,49	0,15	8,36	131,0%	20,38	11,95	114,7	25,2	98,9%	82,3%	81,4%
215,00	0,49	0,15	8,39	130,1%	20,38	11,91	114,8	25,2	98,9%	82,3%	81,5%
216,00	0,49	0,15	8,44	128,7%	20,37	11,86	114,9	25,2	98,9%	82,4%	81,5%
217,00	0,44	0,16	8,44	128,6%	20,37	11,86	115,2	25,2	98,9%	82,3%	81,4%
218,00	0,44	0,16	8,37	130,3%	20,38	11,93	115,3	25,2	98,8%	82,3%	81,3%
219,00	0,44	0,16	8,35	130,7%	20,38	11,94	115,3	25,2	98,8%	82,2%	81,3%
220,00	0,44	0,16	8,32	131,5%	20,38	11,98	115,5	25,2	98,8%	82,2%	81,2%
221,00	0,44	0,17	8,33	131,0%	20,38	11,96	115,7	25,1	98,7%	82,2%	81,2%
222,00	0,43	0,17	8,29	132,3%	20,38	12,01	115,8	25,1	98,7%	82,1%	81,1%
223,00	0,40	0,17	8,29	132,2%	20,38	12,01	115,9	25,1	98,7%	82,1%	81,1%
224,00	0,40	0,17	8,24	133,5%	20,38	12,06	115,8	25,2	98,7%	82,1%	81,0%
225,00	0,40	0,18	8,24	133,5%	20,38	12,06	116,0	25,0	98,6%	82,1%	81,0%
226,00	0,40	0,18	8,20	134,4%	20,39	12,09	116,0	25,1	98,6%	82,1%	80,9%
227,00	0,40	0,18	8,17	135,1%	20,39	12,12	116,1	25,0	98,6%	82,0%	80,9%
228,00	0,35	0,18	8,19	134,7%	20,39	12,11	116,2	25,0	98,6%	82,0%	80,9%
229,00	0,35	0,19	8,19	134,5%	20,39	12,10	116,5	25,1	98,5%	82,0%	80,7%
230,00	0,35	0,19	8,16	135,2%	20,39	12,14	117,0	25,1	98,4%	81,9%	80,6%
231,00	0,35	0,19	8,15	135,3%	20,39	12,14	117,2	25,0	98,4%	81,9%	80,6%
232,00	0,35	0,20	8,17	134,7%	20,39	12,12	117,3	25,0	98,4%	81,9%	80,6%
233,00	0,32	0,20	8,12	136,1%	20,39	12,17	117,3	25,1	98,4%	81,9%	80,6%
234,00	0,33	0,20	8,09	137,1%	20,39	12,21	117,6	25,2	98,4%	81,8%	80,5%
235,00	0,34	0,20	8,09	137,1%	20,39	12,21	117,4	25,1	98,4%	81,8%	80,5%
236,00	0,30	0,20	8,07	137,5%	20,39	12,22	117,8	25,2	98,4%	81,8%	80,5%
237,00	0,30	0,20	8,07	137,5%	20,39	12,22	118,0	25,1	98,4%	81,8%	80,5%
238,00	0,30	0,19	8,04	138,7%	20,40	12,26	117,9	25,2	98,5%	81,8%	80,5%
239,00	0,30	0,19	7,99	140,3%	20,40	12,32	118,2	25,1	98,5%	81,7%	80,5%
240,00	0,26	0,19	7,96	141,2%	20,40	12,35	118,0	25,2	98,5%	81,7%	80,5%
241,00	0,26	0,19	7,94	141,6%	20,40	12,37	118,0	25,2	98,5%	81,7%	80,4%
242,00	0,26	0,19	7,92	142,2%	20,40	12,39	117,9	25,3	98,5%	81,7%	80,4%
243,00	0,26	0,19	7,89	143,2%	20,41	12,42	117,9	25,2	98,5%	81,6%	80,4%
244,00	0,26	0,19	7,89	143,2%	20,41	12,42	117,8	25,2	98,5%	81,6%	80,4%
245,00	0,26	0,19	7,86	144,1%	20,41	12,46	117,7	25,2	98,4%	81,6%	80,3%
246,00	0,22	0,19	7,81	145,7%	20,41	12,51	117,7	25,1	98,5%	81,6%	80,3%
247,00	0,22	0,18	7,76	147,4%	20,42	12,57	117,6	25,2	98,5%	81,5%	80,3%
248,00	0,22	0,18	7,73	148,4%	20,42	12,60	117,5	25,1	98,5%	81,5%	80,3%
249,00	0,21	0,18	7,69	149,5%	20,42	12,64	117,1	25,2	98,5%	81,5%	80,3%
250,00	0,21	0,18	7,66	150,4%	20,42	12,67	117,2	25,1	98,5%	81,5%	80,3%
251,00	0,21	0,18	7,66	150,5%	20,42	12,67	117,1	25,0	98,5%	81,5%	80,3%
252,00	0,18	0,18	7,60	152,5%	20,43	12,74	117,2	25,1	98,5%	81,4%	80,2%
253,00	0,17	0,18	7,60	152,5%	20,43	12,74	116,9	25,2	98,5%	81,5%	80,2%
254,00	0,17	0,18	7,58	153,0%	20,43	12,75	116,9	25,1	98,5%	81,4%	80,2%
255,00	0,17	0,18	7,58	153,0%	20,43	12,75	116,9	25,2	98,5%	81,4%	80,2%
256,00	0,17	0,18	7,52	155,1%	20,43	12,82	116,9	25,2	98,5%	81,4%	80,1%
257,00	0,17	0,18	7,53	154,6%	20,43	12,81	116,7	25,2	98,5%	81,4%	80,2%
258,00	0,17	0,18	7,52	155,1%	20,43	12,82	116,6	25,1	98,5%	81,4%	80,1%
259,00	0,17	0,18	7,52	155,1%	20,43	12,82	116,6	25,1	98,5%	81,4%	80,1%
260,00	0,17	0,18	7,48	156,2%	20,43	12,86	116,6	25,1	98,5%	81,4%	80,1%
261,00	0,12	0,19	7,50	155,6%	20,43	12,84	116,7	25,1	98,4%	81,4%	80,1%
262,00	0,12	0,19	7,48	156,2%	20,43	12,86	116,6	25,2	98,4%	81,4%	80,1%
263,00	0,12	0,19	7,48	156,1%	20,43	12,86	116,9	25,1	98,4%	81,3%	80,0%
264,00	0,12	0,19	7,53	154,5%	20,43	12,81	116,9	25,1	98,4%	81,4%	80,1%
265,00	0,08	0,19	7,51	155,0%	20,43	12,82	116,6	25,0	98,4%	81,4%	80,1%
266,00	0,08	0,19	7,45	157,2%	20,44	12,89	116,6	25,2	98,4%	81,3%	80,0%
267,00	0,08	0,19	7,42	158,2%	20,44	12,93	116,4	25,1	98,4%	81,3%	80,0%
268,00	0,08	0,19	7,38	159,3%	20,44	12,96	116,6	25,1	98,3%	81,3%	79,9%
269,00	0,08	0,15	8,09	138,2%	20,40	12,22	115,6	25,1	98,9%	82,0%	81,1%
270,00	0,08	0,14	7,90	144,5%	20,41	12,44	114,1	25,1	99,0%	82,0%	81,2%
271,00	0,03	0,13	7,74	149,6%	20,42	12,62	113,1	25,2	99,1%	82,0%	81,2%
272,00	0,03	0,13	7,75	149,5%	20,42	12,61	112,4	25,2	99,1%	82,0%	81,3%
273,00	0,03	0,13	7,73	150,1%	20,42	12,63	111,6	25,2	99,1%	82,1%	81,3%
274,00	0,03	0,13	7,71	150,6%	20,42	12,65	111,1	25,1	99,1%	82,1%	81,4%
275,00	0,03	0,13	7,75	149,5%	20,42	12,61	110,6	25,1	99,1%	82,2%	81,4%
276,00	0,00	0,13	7,75	149,4%	20,42	12,61	110,2	25,0	99,1%	82,2%	81,4%

Tempe acquisition minutes	Flue temp °F	Room temp °F	Tunnel dry bulb °F	Catalyst °F	scale lbs	Right °F	Back °F	bottom °F	Top °F	Left °F
	70,73	70,34	71,35	70,59	2,87	71,14	71,06	71,12	71,41	71,13
	70,68	70,35	71,46	70,70	2,97	71,13	71,04	71,12	71,38	71,13
1	104,39	70,32	73,62	95,64	2,97	71,11	71,06	71,10	71,40	71,11
2	160,41	70,31	81,10	184,64	2,77	71,14	71,31	71,13	71,44	71,16
3	220,15	70,19	85,87	262,16	2,68	71,33	72,19	71,49	71,53	71,36
4	301,36	70,36	96,93	316,53	2,27	71,76	73,76	72,41	71,89	72,20
5	369,36	70,40	94,39	426,37	2,07	72,60	76,49	73,74	72,51	73,92
6	423,97	70,48	96,42	560,06	2,17	74,22	80,02	75,37	73,67	76,81
7	465,12	70,72	99,60	649,32	1,97	77,25	84,10	77,11	75,53	80,85
8	493,76	70,76	101,65	676,96	1,87	82,04	88,79	78,90	78,32	86,20
9	462,86	70,82	102,65	669,17	1,67	88,44	94,01	80,59	81,86	92,91
10	459,39	70,75	103,20	652,25	1,57	96,11	99,63	82,31	86,20	100,84
11	463,96	70,77	103,87	655,63	1,47	104,54	105,51	84,04	91,06	109,75
12	474,18	70,66	105,23	667,10	1,37	113,42	111,70	85,95	96,32	119,28
13	479,66	70,63	105,93	690,84	1,18	122,74	118,10	87,96	101,91	129,05
14	461,37	70,80	123,60	608,57	8,28	132,31	124,91	90,37	107,64	139,09
15	465,99	70,71	120,62	576,39	13,03	142,01	132,27	93,06	113,46	149,39
16	415,10	70,70	127,63	618,47	12,78	151,26	139,15	96,09	119,25	159,48
17	430,54	70,61	130,63	594,76	12,48	159,78	145,76	99,17	124,50	169,46
18	512,46	70,65	131,53	769,25	12,18	167,22	152,45	102,21	129,43	179,86
19	510,51	70,75	117,90	785,95	11,98	173,73	158,92	105,31	134,16	190,99
20	469,81	70,70	111,91	713,95	11,68	179,56	164,46	108,63	138,98	202,73
21	415,85	70,76	125,50	487,82	11,68	185,54	169,38	112,35	144,07	214,70
22	416,34	70,70	128,34	429,90	11,58	190,69	174,33	116,04	149,05	226,44
23	460,46	70,71	133,96	557,13	11,28	195,22	179,56	119,81	153,76	237,77
24	466,10	70,77	138,70	576,15	10,98	199,25	185,53	123,64	158,23	248,92
25	476,94	70,77	139,55	545,89	10,78	203,24	192,24	127,75	162,57	260,16
26	472,05	70,81	112,23	550,93	10,47	207,60	199,40	131,61	166,62	271,37
27	417,82	70,90	99,42	615,59	10,38	212,25	205,91	135,75	170,83	282,29
28	421,23	70,88	96,18	635,62	10,28	216,84	211,36	139,80	175,36	292,39
29	433,19	70,92	95,49	647,62	10,18	221,02	216,16	144,15	179,74	301,07
30	444,06	70,91	94,79	679,79	9,98	225,09	220,39	148,50	184,40	308,21
31	451,49	71,06	95,24	704,53	9,87	229,36	224,21	152,68	189,15	313,88
32	452,73	71,08	95,40	714,23	9,68	233,90	227,84	156,82	194,33	318,39
33	464,11	71,12	95,89	723,93	9,58	238,66	231,31	160,83	199,60	321,77
34	492,04	71,22	97,14	752,91	9,38	243,43	234,76	164,90	205,33	324,45
35	528,93	71,25	99,33	805,74	9,17	248,12	238,11	168,97	211,23	326,36
36	551,77	71,43	100,42	847,82	8,98	252,74	241,52	173,21	218,16	328,03
37	567,87	71,59	101,96	872,27	8,68	257,30	244,97	177,63	225,76	329,40
38	594,53	71,75	104,54	902,83	8,47	262,42	248,60	181,96	234,65	330,77
39	600,77	71,81	105,92	929,52	8,25	267,30	252,23	186,62	244,26	332,45
40	603,31	71,86	106,54	930,21	7,98	272,61	256,24	191,29	254,64	334,52
41	607,06	71,90	107,35	931,40	7,77	278,24	260,50	196,02	265,95	336,83
42	613,56	72,00	108,01	935,36	7,58	283,99	265,03	200,79	277,30	339,64
43	618,92	71,90	108,67	944,77	7,27	290,01	269,68	205,80	289,20	342,97
44	624,63	72,05	109,23	955,57	7,07	296,22	274,53	210,82	300,71	346,36
45	631,04	72,18	110,17	961,06	6,88	302,39	279,63	216,08	312,00	350,45
46	636,11	72,28	110,66	973,63	6,68	308,63	284,81	221,56	323,63	354,65
47	644,27	72,27	111,62	988,36	6,37	314,97	290,23	227,21	334,84	359,28
48	652,36	72,29	112,79	996,01	6,13	321,63	295,77	232,65	346,20	364,04
49	657,33	72,48	113,48	998,91	5,87	328,43	301,36	238,24	357,63	369,05
50	661,14	72,47	113,61	1001,66	5,67	335,62	307,05	244,08	369,06	374,87
51	666,56	72,54	114,07	1007,73	5,38	343,46	312,88	250,02	380,13	380,82
52	664,45	72,56	114,44	1011,37	5,17	351,92	318,95	256,34	391,81	387,18
53	666,93	72,64	114,25	1001,28	4,97	360,80	325,15	262,44	402,40	393,47
54	665,76	72,66	114,48	994,95	4,78	370,35	331,75	268,71	413,14	400,14
55	663,06	72,75	113,17	991,06	4,54	380,06	338,68	274,80	423,35	406,89
56	658,08	72,77	113,34	986,29	4,37	390,19	346,18	280,59	433,06	413,96
57	652,03	72,72	113,06	986,03	4,17	400,02	354,06	286,10	442,50	420,91
58	647,04	72,99	113,05	983,55	3,98	410,34	362,06	291,43	451,54	427,65
59	642,17	72,89	112,47	974,45	3,77	420,64	370,25	296,82	460,67	434,72
60	636,83	72,94	111,66	960,47	3,67	430,34	378,70	302,36	468,81	441,46
61	633,02	72,88	109,94	947,27	3,47	439,87	387,14	308,21	476,76	447,93
62	631,33	72,86	110,28	937,50	3,38	448,65	396,24	313,58	483,06	454,56
63	639,36	72,96	111,14	943,81	3,17	457,22	405,32	318,93	488,99	460,31
64	637,23	73,01	111,26	944,85	3,07	465,03	413,68	324,32	495,43	466,45
65	679,09	73,36	151,70	916,37	5,98	472,52	421,41	331,30	501,12	472,63
66	605,85	73,44	140,84	688,48	14,68	479,82	429,42	338,47	506,67	478,52
67	642,36	73,35	121,80	867,46	14,48	485,55	435,85	345,08	511,18	484,24
68	669,07	73,21	118,49	983,42	14,18	490,31	440,32	350,96	514,59	489,67
69	679,66	73,41	118,58	1009,39	13,88	494,37	443,17	356,39	518,09	494,13
70	683,68	73,38	118,24	1024,86	13,68	497,01	444,64	361,04	520,83	497,41
71	684,16	73,54	118,56	1030,17	13,38	499,80	445,15	364,04	525,01	499,86
72	687,10	73,66	117,93	1035,84	13,18	501,70	444,87	367,48	528,14	501,75
73	690,47	73,83	118,75	1045,15	12,88	503,28	444,42	369,69	532,42	502,95
74	692,04	73,65	119,52	1052,60	12,68	504,94	443,66	371,40	537,34	504,16
75	696,81	74,05	120,16	1057,66	12,38	505,79	442,72	372,70	541,62	504,76
76	700,30	73,93	120,49	1063,17	12,15	506,89	441,74	374,00	546,96	504,91
77	703,78	73,96	120,42	1067,72	11,88	507,91	441,09	375,10	552,55	505,40
78	711,15	74,11	120,71	1076,02	11,58	508,96	440,32	375,87	558,48	506,15
79	715,70	74,20	121,87	1081,63	11,28	509,80	439,84	376,64	563,82	506,45
80	721,37	74,30	122,16	1083,89	11,08	511,30	439,54	376,70	569,20	507,01
81	723,37	74,11	122,68	1086,47	10,78	512,09	439,19	377,48	575,05	507,77
82	724,45	74,14	122,80	1087,88	10,58	513,36	439,36	377,55	580,30	508,47
83	725,22	74,12	123,18	1089,52	10,28	514,87	439,48	377,77	585,76	509,52
84	725,90	74,19	123,16	1090,57	10,01	516,49	439,66	378,00	591,48	510,99
85	727,77	74,61	123,40	1093,35	9,78	518,09	440,43	377,89	596,57	512,64
86	729,25	74,54	123,56	1093,79	9,58	520,68	441,29	377,87	602,29	514,49
87	729,54	74,62	124,21	1092,42	9,28	522,63	442,16	377,72	607,36	516,52
88	729,35	74,55	123,95	1093,72	8,98	525,00	443,26	377,30	612,14	518,11

89	726,15	74,52	123,37	1093,30	8,78	527,91	444,53	377,34	617,78	521,82
90	725,07	74,51	123,34	1094,09	8,48	530,44	446,01	377,99	621,52	524,57
91	720,35	74,90	123,03	1090,41	8,28	534,10	447,58	377,46	626,18	527,89
92	715,99	74,87	123,55	1087,46	8,00	537,13	449,13	377,36	630,67	530,57
93	712,19	74,91	123,22	1086,61	7,78	540,77	450,68	377,73	634,96	533,91
94	709,04	75,04	122,17	1084,65	7,58	544,36	452,99	377,88	638,21	537,26
95	704,09	75,15	121,89	1082,18	7,28	548,63	455,08	378,27	642,25	540,95
96	702,60	75,10	122,08	1081,81	7,07	552,91	457,42	378,70	645,90	544,66
97	702,62	75,05	121,32	1086,43	6,88	557,91	459,77	379,42	649,71	548,66
98	701,71	74,95	120,16	1090,17	6,59	562,34	462,53	380,15	653,06	552,95
99	701,54	75,15	120,65	1092,82	6,37	567,22	465,15	380,75	656,42	557,04
100	700,88	75,12	119,61	1091,46	6,27	571,97	468,15	380,49	660,23	560,46
101	700,39	75,32	119,54	1088,90	5,98	576,77	470,79	381,77	661,70	565,70
102	726,24	75,20	119,77	1093,35	5,80	581,25	473,87	381,61	664,27	570,01
103	721,34	75,05	120,50	1097,44	5,67	586,00	476,87	382,49	667,24	574,62
104	711,82	75,04	117,73	1103,09	5,57	589,55	480,12	383,58	669,59	580,40
105	703,11	75,20	117,89	1103,56	5,38	591,71	483,64	384,30	672,33	585,10
106	691,49	75,46	117,25	1088,99	5,28	597,22	486,68	384,56	675,78	589,32
107	677,67	75,80	116,70	1067,77	5,07	601,60	490,61	385,70	678,06	593,67
108	663,97	75,32	116,17	1050,02	4,97	604,53	494,28	386,69	679,00	597,66
109	652,57	75,85	114,99	1037,79	4,87	607,46	497,84	387,91	681,97	603,01
110	643,46	75,10	114,21	1028,19	4,78	611,28	501,71	388,36	683,52	606,54
111	637,44	75,34	113,83	1019,14	4,68	614,77	505,68	388,42	684,93	610,91
112	627,66	75,32	113,37	1008,58	4,58	617,53	509,46	390,03	684,90	614,33
113	611,67	75,50	111,48	994,03	4,48	620,82	512,96	391,46	684,61	617,85
114	598,31	75,17	100,41	1044,33	4,37	623,54	516,12	393,79	676,84	620,63
115	468,73	75,15	96,35	1037,95	4,37	625,96	522,54	396,63	673,13	623,63
116	443,56	75,05	97,12	1011,17	4,37	628,67	525,39	397,19	673,97	626,17
117	425,28	75,29	95,94	991,15	4,27	629,92	528,05	398,70	668,66	627,56
118	410,94	75,50	94,73	970,23	4,27	631,15	530,52	400,10	664,45	628,70
119	398,06	75,24	93,62	949,21	4,22	631,32	532,22	401,49	660,35	628,93
120	387,13	75,12	93,17	935,18	4,17	631,10	532,52	402,71	656,30	628,79
121	377,25	75,15	92,42	929,06	4,17	630,64	534,08	404,06	651,34	628,09
122	368,63	75,30	92,17	915,46	4,17	629,18	533,89	405,18	648,17	626,54
123	361,36	75,08	91,51	900,72	4,17	626,64	534,34	406,33	640,74	624,61
124	354,22	75,31	91,44	887,47	4,08	625,02	533,77	407,38	635,79	622,50
125	348,06	75,36	90,66	876,56	4,08	622,24	533,85	408,50	628,83	620,02
126	342,49	75,23	90,38	867,18	4,08	619,18	532,99	409,40	622,47	617,30
127	337,16	75,27	89,81	859,21	4,08	616,30	532,12	410,28	615,75	614,49
128	332,39	75,35	89,64	852,67	4,08	613,69	530,95	410,88	609,29	611,43
129	327,61	75,15	88,92	845,92	4,08	609,92	529,45	411,37	603,11	608,14
130	323,31	75,18	88,71	838,99	3,98	606,37	528,31	411,85	596,21	605,29
131	319,66	75,10	88,26	832,54	3,98	603,63	526,79	412,28	590,30	601,96
132	315,27	75,00	88,20	826,73	3,98	600,21	525,30	412,63	583,66	598,60
133	311,54	75,08	88,18	821,82	3,98	596,94	522,85	412,93	579,97	595,36
134	307,60	75,22	87,87	817,21	3,98	593,63	521,23	413,06	573,67	592,26
135	304,70	75,15	87,62	812,67	3,98	590,03	519,88	413,18	568,88	588,88
136	301,22	74,95	87,17	807,54	3,98	587,26	518,08	413,62	560,61	585,81
137	298,42	74,85	86,91	802,90	3,98	584,49	516,05	414,00	554,86	582,36
138	295,27	74,94	86,73	798,23	3,97	581,01	514,44	414,25	549,46	579,07
139	293,26	74,96	86,57	794,27	3,91	578,06	512,26	414,75	544,49	575,79
140	290,41	75,02	85,89	790,55	3,88	574,66	509,85	414,73	539,63	571,73
141	288,10	75,15	86,10	786,70	3,88	571,69	507,95	414,56	532,13	569,50
142	286,01	74,90	85,93	783,53	3,88	568,85	506,40	414,60	525,94	566,37
143	284,36	74,80	86,09	780,72	3,88	565,96	504,20	414,63	520,85	563,46
144	281,56	74,84	85,76	777,80	3,77	562,74	502,43	414,56	516,23	559,95
145	279,51	74,88	85,56	774,92	3,81	559,64	500,23	414,49	512,99	557,01
146	278,20	74,87	85,81	772,22	3,77	557,56	498,82	414,95	506,58	554,41
147	276,58	74,89	85,58	769,55	3,77	554,43	496,54	415,19	501,01	551,89
148	274,35	75,03	85,14	767,55	3,77	551,69	494,77	415,41	497,31	549,48
149	273,62	75,04	84,92	766,12	3,77	548,70	493,03	415,74	490,65	546,56
150	272,52	74,82	85,13	764,76	3,77	545,80	491,01	415,80	485,27	543,66
151	270,97	75,05	85,09	763,27	3,77	543,47	489,28	415,93	481,39	541,06
152	269,24	74,91	85,06	761,69	3,77	540,54	487,09	415,85	478,94	538,67
153	268,49	75,11	84,54	760,46	3,67	537,57	485,53	415,84	475,21	536,29
154	266,45	75,04	84,44	758,45	3,67	535,56	483,75	415,68	469,12	533,70
155	266,51	75,03	84,19	756,76	3,67	533,18	482,20	415,76	465,42	531,18
156	265,23	74,90	84,35	755,22	3,67	530,75	480,50	415,87	460,13	528,73
157	264,24	75,00	83,96	754,66	3,67	528,05	478,77	415,69	455,51	526,05
158	262,81	74,96	84,10	754,33	3,67	525,99	476,99	415,60	452,24	523,83
159	261,82	75,07	83,70	753,57	3,66	523,58	475,28	415,36	447,54	521,58
160	260,97	74,95	83,75	753,12	3,67	521,46	473,83	415,49	443,97	519,28
161	259,44	75,02	83,80	752,32	3,57	519,71	471,91	415,44	441,13	517,26
162	258,50	74,65	84,04	751,11	3,57	517,51	470,06	415,27	437,36	514,90
163	257,30	74,71	83,91	750,74	3,57	515,20	468,27	415,41	434,22	513,04
164	256,73	74,85	83,61	751,71	3,57	513,16	466,50	415,52	431,95	510,32
165	256,80	74,68	83,59	751,31	3,57	511,13	464,63	415,31	426,87	508,23
166	255,97	74,98	83,85	749,95	3,57	509,73	462,63	415,32	423,25	506,11
167	254,62	74,99	83,95	748,13	3,50	507,44	460,47	415,14	420,49	504,46
168	254,13	74,84	83,96	745,84	3,47	505,44	458,83	415,14	417,56	502,61
169	252,99	74,81	83,55	740,63	3,47	503,19	456,68	415,37	415,54	500,91
170	251,97	74,97	83,06	737,79	3,47	501,33	454,79	415,61	412,71	498,82
171	251,32	74,86	83,08	736,76	3,47	499,54	452,80	415,66	408,34	497,33
172	249,97	74,74	83,20	736,45	3,47	497,49	450,46	415,68	405,42	495,32
173	249,76	74,66	83,00	736,54	3,38	495,52	448,51	415,86	403,29	493,52
174	249,64	74,85	82,96	736,91	3,38	493,66	446,71	415,91	399,73	491,72
175	247,70	74,85	82,73	737,76	3,38	491,95	444,47	416,06	397,45	490,02
176	246,66	74,94	82,76	740,04	3,38	490,10	442,42	415,79	394,69	488,39
177	246,36	74,87	82,35	742,18	3,38	488,41	440,35	415,43	391,72	486,69
178	245,83	74,87	82,42	742,07	3,38	486,71	438,54	414,93	388,17	484,94
179	245,36	74,86	82,34	736,56	3,38	485,18	436,76	414,74	386,20	483,99
180	244,43	74,74	82,26	731,52	3,28	483,35	434,97	414,60	384,90	481,43
181	244,22	74,50	82,09	728,37	3,28	481,27	433,45	414,60	380,69	479,28

182	242,70	74,82	82,25	717,12	3,28	479,66	431,78	414,66	379,12	477,72
183	240,90	74,74	82,54	707,93	3,28	478,48	429,92	415,11	376,94	476,16
184	239,56	74,79	82,42	702,50	3,28	476,83	428,12	415,40	375,28	474,55
185	238,14	74,73	82,52	697,95	3,27	475,32	426,60	415,74	372,92	472,91
186	237,02	74,81	82,50	694,80	3,18	473,71	424,84	416,11	371,01	471,26
187	235,66	74,66	82,51	692,13	3,17	472,18	423,20	416,58	368,85	469,75
188	235,13	74,95	82,58	690,39	3,17	470,66	421,57	416,96	366,62	467,92
189	234,42	74,79	82,64	690,28	3,17	469,01	420,10	417,56	365,18	466,34
190	233,83	74,78	82,46	692,80	3,17	467,51	418,62	417,93	362,43	464,74
191	233,44	74,69	82,40	693,97	3,17	465,46	417,01	418,20	360,41	463,52
192	233,45	74,85	82,14	693,60	3,17	464,04	415,55	418,64	359,06	462,04
193	233,01	74,99	82,26	692,80	3,07	462,71	414,10	418,59	356,05	460,56
194	232,44	75,07	81,93	692,02	3,07	460,89	412,62	419,00	355,05	459,09
195	232,12	74,81	82,02	691,56	3,07	459,67	411,41	419,24	352,52	457,86
196	231,64	74,95	82,42	691,30	3,07	458,14	409,93	419,33	351,25	456,46
197	230,68	74,92	82,27	690,78	3,07	456,43	408,86	419,26	348,62	455,25
198	260,57	75,08	86,75	688,06	3,07	456,71	407,61	419,68	346,85	453,64
199	254,51	74,86	85,27	534,65	3,06	455,28	406,95	419,99	345,13	452,53

POLYTESTS
TESTING THROUGH YOUR REALITY

Date: 2022-06-07 Manufacturer: Hearthstone Model: 8031

Project #: PI 20270 Run: 2 Tech: MM Reviewer: BP

- kindling 300 LBS STAND FIRE
- by pass open
- Fan off
- At 12 LBS insert preload
- At 11.8 LBS close Door
- At 11.1 LBS open Door
- At 9.5 LBS close Door
- At 360 LBS insert second preburn and close Door
- close By pass and open Fan High immediatly
- At 31 LBS Rack coal Bed
- After 2 min insert load
- close Door and by pass immediatly

TEST LOAD CONFIGURATION

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE / POST CHECKS

Date: 2022-06-07 Manufacturer: Hearthstone Model: 8031

Project #: pT 20270 Run: 2 Tech: MM Reviewer: DP

Equipment #	Time	12%	22%
EM 334	7:00	Ok	Ok

Moisture Meter Calibration Check:

Pre-Test **Post-Test**

Facility Conditions:

	Pre-Test	Post-Test
Air Velocity from less than 2 feet	0 (max50 Fpm)	0 (max50 Fpm)
Smoke Capture Check (tunnel velocity)	Ok	NA
Picture (4 sides)	Ok	Ok

Wood Heater Conditions:

Date Wood Heater Stack Cleaned	2022-06-06
Date Dilution Tunnel Cleaned	2022-06-06
Induced Draft Check (max 0.005 H2O)	Ok
Traverse before ignition	Ok

Temperature System:

Ambient (65°-90°F)	Ok °F

Proportional Checks:

Thermocouple check	Ok
Pitot Clean	Ok
Pitot verification	Ok

Pictures for report	
Side	Ok
Coal bed	Ok
Load	Ok
Load in stove	Ok
Fuel adjustment	Ok

Load Length approximately 5/6 of firebox Lenght: Ok

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 2022-06-07 Manufacturer: Hearthstone Model: 8031
Project #: PI 2023 Run: 2 Tech: MM Reviewer: DP

Leakage Checks Tunnel Samplers

	System 1st hour		System 1		System 2	
Unplugged Flow Rate = .25cfm	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)	Pre-Test ASTM (-15) CSA B4:5 (-5)	Post-Test ASTM (-15) CSA B415 (-5)
Vacuum (inches Hg.)	-10	-10	-10	-10	-10	-10
Final 1minute DGM (Liter)	645990,48	646931.15	645990.60	646931.30	394075.28	395034.63
Initial 1minute DGM (Liter)	645990.45	646931.10	645990.58 [illegible]	646931.25 [illegible]	394075.26	395034.63
Change (Liter)	0.03	0.05	0.02	0.05	0.02	∅
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 2022-06-07 Manufacturer: Mettler Toledo Model: 8031
Project #: PT 2070 Run: 2 Tech: MM Reviewer: DP

Leakage Checks Flue Gas Sampler

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

Leakage Checks Pitot

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

Scales checks

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM- 090	44 lbs, Class F	44 lbs
Platform	EM- 205	10,0 ~~lbs~~ kg, Class F	10,0 ~~lbs~~ kg
Wood	EM- 090	44 0 lbs, Class F	44 0 lbs
Analytical	EM 335	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: 2022-06-07 Manufacturer: Hearthstone Model: 8031

Project #: PT 20 270 Run: 2 Tech: MM Reviewer: DP

FOR TUNNELS < 12 in

Barometric pressure (P_{bar}) 101.3 (KPa.) Static pressure (P_g) 0 No (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_2O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.070	73.74
B - Centroid	3.00	3.50	4	0.071	73.89
A-1	0.40	0.50	0.50	0.057	73.74
A-2	1.50	1.75	2	0.072	73.68
A-3	4.50	5.25	6	0.066	73.68
A-4	5.60	6.5	7.5	0.056	73.82
B-1	0.40	0.50	0.50	0.056	73.89
B-2	1.50	1.75	2	0.066	73.79
B-3	4.50	5.25	6	0.076	73.79
B-4	5.60	6.5	7.5	0.057	73.89
				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 H_2O)
T_s = average absolute dilution tunnel temperature (°F + 460)
P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_g$
P_g = static pressure $\frac{\text{in. } H_2O}{\{\ 13.6\ \}}$
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.

POLYTESTS
TESTING THROUGH YOUR REALITY

CONTINUOUS ANALYZERS

Date: 2022-06-07 Manufacturer: Heathstone Model: 8031

Project #: pI 20270 Run: 2 Tech: MM Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
CO	0	0	3028	3000	1029	1000
Tolerance CO	0	+/- 0.02	008	+/- 0.15	0029	+/- 0.05
CO_2	0	0	1795	1800	981	1000
Tolerance CO2	0	+/- 0.02	005	+/- 0.5	019	+/- 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	3018	~~1026~~ 1026	0	0.02	0014	0.15	0.003	0.05	✓	
CO_2	0	1801	986	0	0.02	001	0.5	005	0.5	✓	

POLYTESTS
TESTING THROUGH YOUR REALITY

TEST DATA LOG

Date: 2022-06-07 Manufacturer: Hearthstone Model: 8031

Project #: PI 20270 Run: 2 Tech: MM Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blanck
Final (Liter)	646 970, 12	395033 12	383 012, 78
Initial (Liter)	645 990, 88	394 074, 78	382 212, 48

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	101,3	101,4
Dry Bulb (F):	76	80,6
Humidity (%):	43	37,3

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

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

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2022-06-07 Manufacturer: Hearthstone Model: 8031

Project #: PJ 20270 Run: 2 Tech: MM Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 14 in.	1192 lbs.	20.6	20.4	20.8	20.6	20.5
1 1/2 x 3 1/2 x 14 in.	1138 lbs.	20.1	21.1	21.3	21.3	21.4
1 1/2 x 3 1/2 x 14 in.	1142 lbs.	21.6	21.3	21.3	21.4	21.8
1 1/2 x 3 1/2 x 14 in.	1654 lbs.	23.1	23.0	23.2	23.3	23.4
1 1/2 x 3 1/2 x 14 in.	1664 lbs.	22.3	22.1	22.4	22.3	22.4
1 1/2 x 3 1/2 x 14 in.	1378 lbs.	21.1	21.6	21.7	21.6	21.9
1 1/2 x 3 1/2 x 14 in.	1644 lbs.	22.4	22.9	23.0	23.0	23.1
1 1/2 x 3 1/2 x 14 in.	1868 lbs.	21.1	21.2	21.3	21.3	21.6
x x in.	lbs.					
1 1/2 x x 14 in.	1858 lbs.	21.8	21.4	21.3	21.6	21.3
1 1/2 x x 14 in.	1314 lbs.	22.0	22.0	22.1	21.9	21.8
1 1/2 x x 14 in.	1372 lbs.	23.1	23.4	23.6	23.1	23.0
1 1/2 x x 14 in.	1394 lbs.	22.6	22.1	22.3	22.4	22.3
1 1/2 x x 14 in.	1334 lbs.	23.6	23.7	22.9	23.0	23.0
1 1/2 x x 14 in.	1362 lbs.	22.0	21.4	21.6	21.4	21.3
1 1/2 x x 14 in.	1310 lbs.	21.8	21.3	21.3	21.4	21.6
1 1/2 x x 14 in.	1372 lbs.	22.0	22.1	22.0	21.9	21.3
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 1238 + 12.06 lbs

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2022-06-07 Manufacturer: Hearthstone Model: 8031

Project #: P7 2027 Run: 2 Tech: MM Reviewer: DP

FUEL DESCRIPTION:

Type of wood :

TEST LOAD

Piece Size	Weight		Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 15 in.	1662	lbs.	21.7	21.3	21.5	21.3	21
1 1/2 x 3 1/2 x 15 in.	1490	lbs.	20.7	19.7	19.9	20.0	20.4
1 1/2 x 3 1/2 x 15 in.	1688	lbs.	19.1	19.3	19.2	19.3	19.3
3 1/2 x 3 1/2 x 15 in.	3252	lbs.	21.9	22.0	21.8	21.8	21.9
3 1/2 x 3 1/2 x 15 in.	3296	lbs.	22.1	22.0	22.3	22.6	22.8
x x in.		lbs.					
1 1/2 x 3/4 x 5 in.	0132	lbs.			19.3		
1 1/2 x 3/4 x 5 in.	0138	lbs.			19.1		
1 1/2 x 3/4 x 5 in.	0138	lbs.			19.6		
1 1/2 x 3/4 x 5 in.	0114	lbs.			19.8		
1 1/2 x 3/4 x 5 in.	0130	lbs.			19.5		
1 1/2 x 3/4 x 5 in.	0128	lbs.			20.0		
1 1/2 x 3/4 x 5 in.	0122	lbs.			20.0		
1 1/2 x 3/4 x 5 in.	0158	lbs.			19.7		
1 1/2 x 3/4 x 5 in.	0138	lbs.			19.7		
1 1/2 x 3/4 x 5 in.	0158	lbs.			19.9		
1 1/2 x 3/4 x 5 in.	0152	lbs.			20.1		
1 1/2 x 3/4 x 5 in.	0148	lbs.			20.4		
1 1/2 x 3/4 x 5 in.	0132	lbs.			20.2		
1 1/2 x 3/4 x 5 in.	0156	lbs.			19.7		
1 1/2 x 3/4 x 5 in.	0130	lbs.			19.6		
1 1/2 x 3/4 x 5 in.	0130	lbs.			19.4		
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					

TEST LOAD WEIGHT: 13602 lbs Min 20%: 272 Max 25%: 34

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2022-06-06 Manufacturer: Hearthstone Model: 8031

Project #: PT 20270 Run: 2 Tech: M.N Reviewer: DP

Pre-test Weight Record		SYSTEM ~~1 – 1st hour~~ System 2 M.N				SYSTEM 1				
		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	003	340	341	19	10	342	343	32	346
2022-06-06	17:00	614540	01276	01272	349631	946363	01275	01277	352288	01260
2022-06-07	9:00	614539	01275	~~01273~~ 01275	349630	946364	01276	01278	352287	01260

Post-test Weight Record		SYSTEM 1 – 1st hour				SYSTEM 1				
		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	003	340	341	19	10	342	343	32	346
2022-06-07	16:00	614545	01282	01270	349657	946375	01274	01274	352304	01260
2022-06-13	9:00	614541	01282	01270	349645	946366	01274	01274	352295	01260
2022-06-14	9:00	614540	01282	01270	349645	946365	01274	01274	352295	01260

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2022-06-06 Manufacturer: Hearthstone Model: 8031

Project #: pT 20270 Run: 2 Tech: MM Reviewer: DP

Pre-test Weight Record		SYSTEM 3 1st Hour Min.			
		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	60	344	345	35
2022-06-06	12:00	103 9567	01280	01267	34 0044
2022-06-07	9:00	103 9568	01281	01266	34 0045

Post-test Weight Record		SYSTEM 2			
		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	60	344	345	35
2022-06-07	12:00	103 9578	01286	01266	34 0068
2022-06-13	9:30	103 9570	01286	01266	34 0055
2022-06-14	9:30	103 9570	01286	01266	34 0055

Paramètres

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

Code verrouillage:	HEA	

Description du test

Test standard	EPA	
Run #	2	
Date	07-06-2022	
Technicien	m.m	
Project #	pi 20270	

Description de l'unité

Manufacturier	hearthstone	
Modèle	8031	
Combustion system	Cat	
Appliance type	woodstove	
Firebox volume	1,9	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

Paramètres du test

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

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	1,007	Dimensionless
Equipment number (DGM #1):	em 178	
Calibration Factor (DGM #2):	1,005	Dimensionless
Equipment number (DGM #2):	em 318	
Calibration Factor (DGM #3):	0,988	
Equipment number (DGM #3):	em 179	Dimensionless

Tunnel

Targeted tunnel flow rate	350	scfm
Tunnel diameter	8	in.
Molecular weight	29	29 as per ASTM E2515
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 20270
Date	07-06-2022
Technicien	m.m

Fuel data

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

Default Fuel Values

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

	Start	End
Barometer (kPa):	101,3	101,4
Barometer (in.Hg):	29,913879	29,94340873
Dry Bulb (F):	76,6	80,6
Humidity (%):	43	37,3
Air velocity (ft/min)	0	0

DGM #1	Final:	22847,535	cuft	Final:	646970,120	Liter
	Initial:	22812,953	cuft	Initial:	645990,880	Liter
DGM #2	Final:	13950,463	cuft	Final:	395033,120	Liter
	Initial:	13916,620	cuft	Initial:	394074,780	Liter
DGM room	Final:	13525,969	cuft	Final:	383012,780	Liter
	Initial:	13497,707	cuft	Initial:	382212,480	Liter

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent: 282

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

Project nu.	pi 20270
Date	07-06-2022
Technicien	m.m

Preload data sheet

Test Load Weight:

Lower	Ideal	Upper
11,97	13,30	14,63

Load Volume: 0,6806 cu. ft

Loading Density: 12,814 lbs./ft3

Number of Spaces:

Spacer weight (lbs):

Load Density (wet): 35,774 lbs./ft3

Dry Wood Density: 29,323108

Piece Size (in):			Weight	Meter Moisture Content					Ave. MC x	Volume
Thick	Wide	x Length	lbs	Dry Uncorrected %					Weight	Cubic Inches
1,5	3,5	14	1,192	20,6	20,4	20,8	20,6	20,9	24,62672	73,50
1,5	3,5	14	1,738	20,1	21,1	21,3	21,3	21,4	36,56752	73,50
1,5	3,5	14	1,142	21,6	21,3	21,3	21,4	21,8	24,53016	73,50
1,5	3,5	14	1,654	23,1	23	23,2	23,3	23,4	38,3728	73,50
1,5	3,5	14	1,664	22,3	22,1	22,4	22,3	22,4	37,1072	73,50
1,5	3,5	14	1,378	21,1	21,6	21,7	21,6	21,9	29,73724	73,50
1,5	3,5	14	1,644	22,4	22,9	23	23	23,2	37,6476	73,50
1,5	3,5	14	1,868	21,1	21,2	21,3	21,3	21,6	39,7884	73,50
										0,00
1,5	3,5	14	1,858	21,8	21,4	21,3	21,6	21,3	39,90984	73,50
1,5	3,5	14	1,314	22	22	22,1	21,9	21,8	28,85544	73,50
1,5	3,5	14	1,372	23,1	23,4	23,6	23,1	23	31,88528	73,50
1,5	3,5	14	1,394	22,6	22,1	22,3	22,4	22,3	31,14196	73,50
1,5	3,5	14	1,734	23,6	23,7	22,9	23	23	40,29816	73,50
1,5	3,5	14	1,362	22	21,4	21,6	21,4	21,3	29,33748	73,50
1,5	3,5	14	1,71	21,8	21,7	21,3	21,4	21,6	36,8676	73,50
1,5	3,5	14	1,322	22	22,1	22	21,9	21,3	28,89892	73,50
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
								SUM MC:	535,57232	

PreTest Load Weight: 24,35 lbs.

Dry Weight: 9,05 kg.

Average Moisture Content: %

Dry: 22,00

22,00
Must be 18-28

Wet: 18,03
must be 15,2-22

Project nu.	pi 20270
Date	07-06-2022
Technicien	mm

FUEL LOAD DATA SHEET, CSA B415

Test Load Weight:

Lower	Ideal	Upper
12,0	13,3	14,6

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

Load Volume: 0,35 cu. ft — Loading Density: 7,2 lbs./ft3

Number of Spaces: 16 — Load Density (wet): 32,6 lbs./ft3

Spacer weight: lbs — Dry Wood Density: 26,9 lbs./ft3

Piece Size (in): Thick	Wide	Length	Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x Weight	Volume Cubic Inches	Ave. MC %
1,5	3,5	15	1,66	21,70	21,30	21,50	21,30	21,00	35,50032	78,75	21,4
1,5	3,5	15	1,49	20,70	19,70	19,90	20,00	20,40	30,0086	78,75	20,1
1,5	3,5	15	1,69	19,10	19,30	19,20	19,30	19,30	32,47712	78,75	19,2
3,5	3,5	15	3,25	21,90	22,00	21,80	21,80	21,90	71,15376	183,75	21,9
3,5	3,5	15	3,30	22,10	22,00	22,30	22,60	22,80	73,69856	183,75	22,4
										0,00	
										0,00	
										0,00	

1,5	0,75	5	0,14			19,30			2,6248	5,63	19,3
1,5	0,75	5	0,14			19,30			2,6634	5,63	19,3
1,5	0,75	5	0,14			19,60			2,7048	5,63	19,6
1,5	0,75	5	0,11			19,80			2,2572	5,63	19,8
1,5	0,75	5	0,13			19,90			2,587	5,63	19,9
1,5	0,75	5	0,13			20,00			2,56	5,63	20,0
1,5	0,75	5	0,12			20,00			2,44	5,63	20,0
1,5	0,75	5	0,16			19,70			3,1126	5,63	19,7
1,5	0,75	5	0,14			19,70			2,7186	5,63	19,7
1,5	0,75	5	0,16			19,90			3,1442	5,63	19,9
1,5	0,75	5	0,15			20,10			3,0552	5,63	20,1
1,5	0,75	5	0,15			20,20			2,9896	5,63	20,2
1,5	0,75	5	0,13			20,20			2,6664	5,63	20,2
1,5	0,75	5	0,16			19,70			3,0732	5,63	19,7
1,5	0,75	5	0,13			19,60			2,548	5,63	19,6
1,5	0,75	5	0,13			19,40			2,522	5,63	19,4
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
								SUM MCx	286,50536		20,1 %

Test Load Weight: 13,60 lbs. — Dry Weight: 5,09 kg.

Average Moisture Content: %

Dry: 21,07 Dry(EPA) 21,07 Dry(B415 21,07 — 21,07 Must be 19-25 — Wet: 17,41 must be 15,2-22

Coal Bed Range: 2,7 lbs. to 3,4 lbs.

TEST CHARGE:

Coal bed weight: 3,4 lbs.

Project nu.	pi 20270
Date	07-06-2022
Technicien	m.m

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	60	344	345	35	346	342	343	32	3	340	341	19	346		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	103,9567	0,1280	0,1267	34,0044	94,6363	0,1275	0,1277	35,2288	61,4540	0,1276	0,1272	34,9631	0,1260	2022-06-06	17:00
Before (6)	103,9568	0,1281	0,1266	34,0045	94,6364	0,1276	0,1278	35,2287	61,4539	0,1275	0,1273	34,9630	0,1260	2022-06-07	09:00
After (1)	103,9578	0,1286	0,1266	34,0068	94,6375	0,1274	0,1274	35,2304	61,4545	0,1282	0,1270	34,9657	0,1260	2022-06-07	16:00
After (2)	103,9570	0,1286	0,1266	34,0055	94,6366	0,1274	0,1274	35,2295	61,4541	0,1282	0,1270	34,9645	0,1260	2022-06-13	09:00
After (3)	103,9570	0,1286	0,1266	34,0055	94,6365	0,1274	0,1274	35,2295	61,4540	0,1282	0,1270	34,9645	0,1260	2022-06-14	09:00
After (4)															
After (5)															
After (6)	103,9570	0,1286	0,1266	34,0055	94,6365	0,1274	0,1274	35,2295	61,4540	0,1282	0,1270	34,9645	0,1260	2022-06-14	09:00
Difference	0,0002	0,0005	0,0000	0,0010	0,0001	-0,0002	-0,0004	0,0008	0,0001	0,0007	-0,0003	0,0015	0,0000		
Total (mg)		1,7				2				2			0		
Total ajusté (mg)		**1,70**				**2,00**				**2,00**					

Project nu.	pi 20270
Date	07-06-2022
Technicien	m.m

Desmontration Purpose only Not real Numbers negative mass adjusted to Zero

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	60	344	345	35	346	342	343	32	3	340	341	19	346		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	103,9567	0,1280	0,1267	34,0044	94,6363	0,1275	0,1277	35,2288	61,4540	0,1276	0,1272	34,9631	0,1260	2022-06-06	17:00
Before (6)	103,9568	0,1281	0,1266	34,0045	94,6364	0,1276	0,1278	35,2287	61,4539	0,1275	0,1273	34,9630	0,1260	2022-06-07	09:00
After (1)	103,9578	0,1286	0,1266	34,0068	94,6375	0,1274	0,1274	35,2304	61,4545	0,1282	0,1270	34,9657	0,1260	2022-06-07	16:00
After (2)	103,9570	0,1286	0,1266	34,0055	94,6366	0,1274	0,1274	35,2295	61,4541	0,1282	0,1270	34,9645	0,1260	2022-06-13	09:00
After (3)	103,9570	0,1286	0,1266	34,0055	94,6365	0,1274	0,1274	35,2295	61,4540	0,1282	0,1270	34,9645	0,1260	2022-06-14	09:00
After (4)															
After (5)															
After (6)	103,9570	0,1286	0,1266	34,0055	94,6365	0,1276	0,1278	35,2295	61,4540	0,1282	0,1273	34,9645	0,1260	2022-06-14	09:00
Difference	0,0002	0,0005	0,0000	0,0010	0,0001	0,0000	0,0000	0,0008	0,0001	0,0007	0,0000	0,0015	0,0000		
Total (mg)		1,7				2,6				2,3			0		
Total ajusté (mg)		**1,70**				**2,60**				**2,30**					

Project nu.	pi 20270
Date	07-06-2022
Technicien	m.m

SFBA EPA EMISSION RESULTS

Test Duration: **177** min

PRESSURE FACTOR:	DGM 1	0,97136	
	DGM 2	0,97700	
	DGM 3	1,00029	
TEMPERATURE FACTORS	DGM 1	0,98042	
	DGM 2	0,97227	
	DGM 3	0,98090	
VOLUMES SAMPLED	DGM 1	33,149	SCft
	DGM 2	32,323	Scft
	DGM 3	27,403	SCft

TOTAL TUNNEL VOLUME : 60883

SAMPLE RATIOS

Sample Train 1:	1836,621
Sample Train 2:	1883,558

Paticulate concentration

Sample Train 1	**0,000060**	g/dscf
Sample Train 2	**0,000062**	g/dscf
Room	**0,000000**	g/dscf

TOTAL EMISSIONS

Sample Train 1	**3,67**	g
Sample Train 2	**3,77**	g

EMISSION RATES

Sample Train 1	**1,25**	g/hr
Sample Train 2	**1,28**	g/hr

1st hour emission rate **3,12** g/hr

	Train 1	Train 2
Cs	6,033E-05	6,18749E-05

RESULTS

Average emission rate: 1,26 g/hr

Burn Rate : 1,727 Dry kg/hr

BAROMETRIC PRESSURE

Average:	29,928644	in Hg
Start:	29,913879	in Hg
End:	29,943409	in Hg

DGM CONTROLLER VALUES

DGM 1	Final:	22847,535	Cuft
	Initial:	22812,953	Cuft
DGM 2	Final:	13950,463	Cuft
	Initial:	13916,620	Cuft
DGM #3	Final:	13525,969	Cuft
	Initial:	13497,707	Cuft

TEMPERATURES

DGM 1	538,544	°R
DGM 2	543,058	°R

CALIBRATION FACTORS

DGM 1	1,0066
DGM 2	1,0054
DGM #3	0,9882

TUNNEL FLOW RATE: 343,971 Dscfm

PARTICULATE CATCH

Total Sample Train 1:	2,00	mg
Total Sample Train 2:	2,00	mg
Total Sample Train 1 1st hour:	1,70	mg

DEVIATION: 1,26%

Elapsed Time min	Raw data row	Weight Remaining lbs	CO %	CO_2 %	O_2 %	Flue Gas °F	Room Temp °F	Tunnel Dry Bulb °F	Unit Top °F	Unit Back °F	Unit R.Side °F	Unit L.Side °F	Unit Bottom °F	Catalyst °F	Draw Dom 1 Reading in/Hg	DGM 1 Inlet T °F	DGM 1 Outlet T °F	Filter 1 Temp °F	Draw Dom 2 Reading in/Hg	DGM 2 Inlet T °F	DGM 2 Outlet T °F	Filter 2 Temp °F	Accum. static Pressure in wc	Flue draft Pressure in wc	Change in Surface Temp. °F

102,0	384,0	2,0	0,1	8,4	0,0	384,7	79,0	60,8	418,6	392,8	881,3	889,8	383,8	868,8	0,10	79,42	78,80	83,83	0,10	84,38	84,17	84,61	0,07	0,07	8,81666832
103,0	385,0	2,0	0,1	8,3	0,0	382,9	79,0	60,3	423,3	392,8	880,0	890,1	383,4	868,0	0,10	79,46	78,85	83,86	0,10	84,40	84,20	84,59	0,07	0,07	7,70705618
104,0	386,0	2,0	0,1	8,0	0,0	381,4	79,0	60,7	430,7	393,0	879,3	888,7	383,4	869,3	0,10	79,47	78,88	83,81	0,10	84,37	84,24	84,59	0,07	0,07	7,0347766
105,0	387,0	1,9	0,2	7,8	0,0	381,1	79,0	60,8	418,7	393,1	878,1	887,8	383,4	873,3	0,10	79,52	78,86	83,83	0,10	84,44	84,27	84,58	0,08	0,07	6,29977466
106,0	388,0	1,9	0,2	7,4	0,0	379,9	78,9	60,8	418,9	392,9	876,7	887,2	383,3	871,4	0,10	79,51	78,82	83,84	0,10	84,49	84,33	84,57	0,08	0,07	5,21846892
107,0	389,0	1,9	0,2	7,4	0,0	379,1	78,9	60,4	413,1	392,8	875,1	886,2	383,1	868,1	0,10	79,52	78,83	83,86	0,10	84,51	84,38	84,56	0,07	0,07	4,21035636
108,0	390,0	1,8	0,2	7,3	0,0	378,4	78,9	60,4	410,4	393,3	874,1	885,9	383,3	864,7	0,10	79,47	78,88	83,86	0,10	84,48	84,37	84,53	0,08	0,07	3,44790644
109,0	391,0	1,8	0,2	7,4	0,0	377,4	78,9	60,3	407,3	393,0	872,8	885,7	383,3	861,8	0,10	79,40	79,03	83,86	0,10	84,37	84,38	84,53	0,07	0,07	2,44338574
110,0	392,0	1,8	0,2	7,4	0,0	376,9	78,9	60,0	404,6	392,8	871,4	883,8	383,0	857,8	0,10	79,34	79,11	83,79	0,10	84,28	84,41	84,49	0,07	0,07	1,13954036
111,0	393,0	1,8	0,2	7,4	0,0	374,2	78,9	59,7	402,3	392,4	869,4	883,5	383,0	853,8	0,10	79,06	79,20	83,64	0,10	84,06	84,44	84,48	0,07	0,07	0,2301139
112,0	394,0	1,7	0,2	7,4	0,0	372,0	79,2	60,2	399,4	391,8	867,8	881,7	383,3	851,8	0,10	78,99	79,25	83,68	0,10	84,08	84,46	84,48	0,08	0,07	-1,1834579
113,0	395,0	1,7	0,2	7,4	0,0	372,1	79,1	60,3	396,4	391,3	865,6	880,8	383,4	849,4	0,10	78,98	79,27	83,69	0,10	84,07	84,57	84,48	0,08	0,06	-3,4628572
114,0	396,0	1,7	0,2	7,4	0,0	370,0	78,9	60,1	393,7	391,1	863,8	880,2	383,3	847,8	0,10	78,94	79,24	83,73	0,10	84,04	84,59	84,48	0,08	0,06	-5,8235884
115,0	397,0	1,7	0,2	7,4	0,0	370,1	78,9	60,2	391,1	390,7	862,2	879,7	383,2	846,7	0,10	78,79	79,34	83,73	0,10	84,00	84,57	84,46	0,07	0,06	-4,8436982
116,0	398,0	1,6	0,2	7,5	0,0	368,0	78,8	60,4	388,6	390,3	860,5	878,7	383,4	844,8	0,10	78,78	79,38	83,72	0,10	84,78	84,62	84,52	0,07	0,06	-9,101681
117,0	399,0	1,6	0,2	7,5	0,0	368,2	78,8	60,1	385,9	390,3	858,1	878,0	383,5	840,3	0,10	78,79	79,34	83,72	0,10	84,77	84,63	84,52	0,08	0,06	-7,2155363
118,0	400,0	1,6	0,2	7,7	0,0	367,1	78,8	60,0	383,4	389,4	856,2	876,8	383,6	838,8	0,10	78,75	79,36	83,74	0,10	84,82	84,64	84,47	0,08	0,06	-9,47868
119,0	401,0	1,6	0,2	7,8	0,0	365,2	79,1	60,1	380,8	389,2	854,6	875,2	383,6	833,8	0,10	78,80	79,38	83,78	0,10	84,88	84,67	84,47	0,07	0,06	-8,6885521
120,0	402,0	1,6	0,2	7,9	0,0	365,0	79,0	59,7	378,7	388,7	852,8	874,3	383,5	831,8	0,10	78,88	79,33	83,76	0,10	84,93	84,67	84,46	0,08	0,06	-11,013455
121,0	403,0	1,5	0,2	7,9	0,0	363,2	79,0	60,2	378,9	388,7	850,8	873,0	383,6	827,3	0,10	78,88	79,34	83,78	0,10	84,90	84,72	84,48	0,07	0,06	-12,063988
122,0	404,0	1,4	0,1	8,1	0,0	362,1	79,0	60,8	375,8	388,4	848,8	870,2	384,0	823,1	0,10	78,88	79,35	83,78	0,10	84,91	84,75	84,48	0,08	0,06	-13,18618
123,0	405,0	1,4	0,1	7,9	0,0	360,8	79,2	61,0	371,0	388,6	847,5	868,3	384,1	820,6	0,10	78,87	79,35	83,77	0,10	84,88	84,77	84,48	0,07	0,06	-14,085238
124,0	406,0	1,4	0,1	7,9	0,0	359,2	79,0	60,8	368,8	388,8	846,2	866,8	384,3	817,8	0,10	78,83	79,37	83,78	0,10	84,87	84,80	84,44	0,08	0,06	-15,36164
125,0	407,0	1,4	0,1	7,9	0,0	358,9	78,9	60,0	366,4	388,8	844,4	866,1	384,4	816,8	0,10	78,82	79,39	83,83	0,10	84,87	84,81	84,47	0,07	0,06	-16,00849
126,0	408,0	1,3	0,1	7,9	0,0	358,6	78,9	60,8	364,3	388,7	843,4	865,0	384,4	816,0	0,10	78,88	79,40	83,82	0,10	84,93	84,83	84,48	0,08	0,06	-16,8161
127,0	409,0	1,3	0,1	7,9	0,0	358,0	78,7	60,8	361,0	388,8	841,8	864,0	384,6	814,3	0,10	78,82	79,39	83,81	0,10	84,93	84,87	84,48	0,07	0,06	-17,60582
128,0	410,0	1,3	0,1	7,9	0,0	357,6	78,8	60,8	359,8	388,0	841,0	863,7	384,8	814,8	0,10	78,75	79,38	83,82	0,10	84,88	84,90	84,47	0,07	0,06	-18,29723
129,0	411,0	1,3	0,1	7,9	0,0	356,7	78,8	60,8	357,9	388,1	839,7	862,7	385,0	813,2	0,10	78,74	79,36	83,83	0,10	84,88	84,90	84,44	0,08	0,06	-19,10941
130,0	412,0	1,2	0,1	8,0	0,0	356,5	78,8	60,7	355,6	388,2	838,8	861,8	385,2	812,8	0,10	78,76	79,38	83,84	0,10	84,88	84,91	84,44	0,08	0,06	-19,89883
131,0	413,0	1,2	0,1	8,0	0,0	356,2	78,8	60,8	353,6	388,0	838,0	861,0	385,4	811,8	0,10	78,71	79,38	83,86	0,10	84,82	84,93	84,42	0,08	0,06	-20,37041
132,0	414,0	1,1	0,1	8,0	0,0	355,6	78,9	60,7	351,6	388,0	837,2	860,8	385,3	810,3	0,10	78,63	79,43	83,86	0,10	84,84	84,94	84,43	0,08	0,06	-21,02748
133,0	415,0	1,1	0,1	8,1	0,0	354,0	78,9	60,8	349,8	388,8	836,8	859,7	385,6	809,4	0,10	79,02	79,46	83,85	0,10	85,01	84,94	84,43	0,07	0,06	-21,49321
134,0	416,0	1,1	0,1	8,1	0,0	354,2	78,8	60,8	347,8	388,7	836,8	858,2	385,8	808,8	0,10	79,00	79,48	83,84	0,10	84,98	84,95	84,42	0,08	0,06	-22,22833
135,0	417,0	1,1	0,1	8,1	0,0	353,8	78,8	60,8	346,0	391,0	835,6	857,8	385,9	799,2	0,10	79,01	79,48	83,86	0,10	84,93	84,99	84,42	0,07	0,06	-22,69181
136,0	418,0	1,0	0,1	8,1	0,0	354,0	78,9	60,7	344,2	391,8	835,8	856,3	385,7	799,2	0,10	78,82	79,50	83,87	0,10	84,93	85,01	84,43	0,07	0,06	-23,20188
137,0	419,0	1,0	0,1	8,0	0,0	353,1	78,9	60,3	342,7	392,0	834,4	855,4	385,9	800,3	0,10	78,86	79,49	83,81	0,10	84,89	84,99	84,41	0,08	0,06	-23,88643
138,0	420,0	1,0	0,1	8,0	0,0	353,0	78,8	60,2	341,1	392,2	834,3	854,1	386,0	802,2	0,10	78,90	79,51	83,79	0,10	84,90	84,98	84,42	0,08	0,06	-24,48228
139,0	421,0	0,9	0,1	7,9	0,0	353,0	78,9	60,2	339,4	392,8	833,7	853,8	386,3	802,7	0,10	78,88	79,53	83,78	0,10	84,87	85,00	84,38	0,07	0,06	-24,79885
140,0	422,0	0,9	0,1	7,9	0,0	353,8	78,9	60,3	337,7	393,4	832,8	853,8	386,8	804,4	0,10	78,88	79,53	83,83	0,10	84,91	85,03	84,37	0,08	0,06	-25,12813
141,0	423,0	0,9	0,1	7,8	0,0	353,3	78,9	60,2	336,2	393,7	832,8	853,8	386,8	804,8	0,10	78,91	79,52	83,84	0,10	84,93	85,04	84,37	0,07	0,06	-25,61463
142,0	424,0	0,9	0,1	7,7	0,0	353,6	78,8	60,7	335,0	394,4	831,7	853,1	386,7	804,3	0,10	79,00	79,54	83,83	0,10	84,98	85,08	84,37	0,07	0,06	-25,88692
143,0	425,0	0,8	0,1	7,6	0,0	353,6	78,7	60,7	333,1	395,3	831,2	851,3	386,8	802,8	0,10	78,94	79,52	83,86	0,10	84,94	85,07	84,36	0,08	0,06	-26,46888
144,0	426,0	0,8	0,1	7,6	0,0	353,6	78,9	60,8	331,6	396,0	831,2	850,0	386,8	801,3	0,10	78,88	79,53	83,86	0,10	84,96	85,07	84,40	0,07	0,06	-26,79104
145,0	427,0	0,8	0,1	7,6	0,0	353,3	78,9	60,6	330,3	396,9	830,6	849,7	387,0	799,3	0,10	78,82	79,53	83,86	0,10	84,94	85,10	84,39	0,07	0,06	-27,03583
146,0	428,0	0,8	0,1	7,6	0,0	352,3	78,8	60,9	328,8	397,4	829,6	848,8	387,4	798,8	0,10	78,84	79,52	83,89	0,10	84,91	85,10	84,42	0,08	0,06	-27,5241
147,0	429,0	0,7	0,1	7,5	0,0	352,0	78,7	60,7	327,5	398,7	829,8	847,4	387,4	800,8	0,10	78,78	79,52	83,91	0,10	84,90	85,13	84,41	0,07	0,06	-27,81507
148,0	430,0	0,7	0,1	7,5	0,0	352,0	78,7	60,8	326,1	399,8	829,8	846,1	387,4	801,4	0,10	78,84	79,54	83,88	0,10	84,90	85,13	84,39	0,08	0,06	-28,1679
149,0	431,0	0,7	0,1	7,6	0,0	351,8	78,9	61,1	324,9	400,7	828,8	845,1	387,9	800,3	0,10	78,89	79,54	83,90	0,10	84,89	85,14	84,38	0,07	0,06	-28,54342
150,0	432,0	0,7	0,1	7,6	0,0	351,6	79,0	61,1	323,3	402,0	828,0	844,1	388,3	799,8	0,10	78,93	79,55	83,90	0,10	84,92	85,15	84,33	0,08	0,06	-28,88804
151,0	433,0	0,6	0,1	7,5	0,0	351,4	79,1	61,0	322,1	403,2	827,7	843,3	388,6	798,8	0,10	78,96	79,60	83,91	0,10	84,96	85,15	84,34	0,07	0,06	-29,2811
152,0	434,0	0,6	0,1	7,5	0,0	351,2	79,1	61,0	320,9	404,3	827,1	842,2	388,9	798,8	0,10	78,98	79,62	83,79	0,10	84,96	85,18	84,29	0,08	0,06	-29,1879
153,0	435,0	0,6	0,1	7,4	0,0	351,4	78,8	61,2	319,6	405,8	826,6	841,2	389,3	799,2	0,10	78,98	79,64	83,91	0,10	85,01	85,13	84,33	0,07	0,06	-29,64402
154,0	436,0	0,6	0,1	7,4	0,0	351,4	78,8	61,2	318,2	407,0	826,6	840,2	389,6	799,4	0,10	79,04	79,65	83,88	0,10	85,00	85,14	84,31	0,07	0,06	-29,86483
155,0	437,0	0,5	0,1	7,4	0,0	351,4	78,9	61,4	317,0	408,0	825,9	839,8	389,9	798,7	0,10	78,97	79,64	83,87	0,10	84,99	85,16	84,34	0,07	0,06	-30,32709
156,0	438,0	0,5	0,3	7,3	0,0	351,6	78,8	61,4	315,8	408,1	825,7	839,3	390,6	797,0	0,10	78,94	79,63	83,88	0,10	85,00	85,18	84,31	0,07	0,06	-30,33631
157,0	439,0	0,5	0,3	7,4	0,0	350,7	78,7	61,3	314,8	410,3	825,1	838,0	391,0	794,8	0,10	78,79	79,63	83,89	0,10	85,01	85,21	84,30	0,07	0,06	-30,84343
158,0	440,0	0,4	0,3	7,3	0,0	350,7	78,8	61,2	313,8	411,6	824,8	837,3	391,2	795,3	0,10	78,78	79,62	83,88	0,10	84,98	85,23	84,33	0,08	0,06	-30,7858
159,0	441,0	0,4	0,3	7,3	0,0	350,3	78,7	61,4	312,3	412,7	824,0	836,1	391,8	795,8	0,10	78,83	79,62	83,89	0,10	84,93	85,23	84,30	0,08	0,06	-31,17268
160,0	442,0	0,4	0,3	7,3	0,0	350,4	78,8	61,5	311,0	414,2	824,0	835,3	392,4	795,8	0,10	78,80	79,64	83,90	0,10	84,92	85,24	84,29	0,07	0,06	-31,3019
161,0	443,0	0,3	0,3	7,4	0,0	350,4	78,9	61,7	310,0	415,8	824,0	834,2	392,8	796,1	0,10	78,78	79,62	83,93	0,10	84,94	85,28	84,28	0,07	0,06	-31,60544
162,0	444,0	0,3	0,3	7,4	0,0	350,7	78,9	61,8	308,1	417,8	824,3	833,4	393,3	797,8	0,10	78,78	79,62	83,93	0,10	84,93	85,28	84,28	0,08	0,06	-31,71388
163,0	445,0	0,3	0,3	7,4	0,0	350,3	78,8	61,8	307,0	418,2	824,2	832,3	393,8	797,7	0,10	78,80	79,65	83,93	0,10	84,96	85,24	84,28	0,08	0,06	-32,3409
164,0	446,0	0,3	0,3	7,4	0,0	349,8	78,8	61,7	307,2	419,7	823,7	830,7	393,9	797,3	0,10	78,83	79,65	83,99	0,10	85,00	85,28	84,40	0,08	0,06	-32,83388
165,0	447,0	0,2	0,3	7,3	0,0	349,3	78,8	61,1	305,8	420,8	824,0	829,8	394,2	797,4	0,10	78,84	79,67	83,96	0,10	84,96	85,23	84,38	0,07	0,06	-32,89468
166,0	448,0	0,2	0,3	7,3	0,0	349,2	78,7	61,8	304,4	422,1	823,7	829,0	394,8	798,1	0,10	78,93	79,68	83,99	0,10	85,00	85,28	84,38	0,08	0,06	-33,16041
167,0	449,0	0,2	0,3	7,2	0,0	349,1	78,9	60,8	303,8	423,1	823,7	827,4	395,1	798,2	0,10	80,00	79,69	83,89	0,10	84,98	85,24	84,38	0,08	0,06	-33,58167
168,0	450,0	0,2	0,3	7,2	0,0	348,9	78,9	61,0	302,7	424,8	823,1	826,8	395,6	798,2	0,10	80,00	79,72	83,88	0,10	84,97	85,26	84,31	0,07	0,06	-33,90568
169,0	451,0	0,1	0,3	7,2	0,0	348,3	78,8	61,0	301,6	426,8	823,1	826,4	396,0	797,3	0,10	79,98	79,69	83,88	0,10	84,93	85,27	84,31	0,08	0,06	-33,85604
170,0	452,0	0,1	0,3	7,2	0,0	348,8	78,8	61,1	300,8	428,2	823,0	826,0	396,4	796,8	0,10	79,80	79,68	83,88	0,10	84,88	85,28	84,30	0,08	0,06	-34,20258
171,0	453,0	0,1	0,3	7,1	0,0	348,7	78,8	61,2	299,7	427,4	822,6	824,8	396,4	796,8	0,10	79,77	79,67	83,88	0,10	84,79	85,28	84,31	0,08	0,06	-34,04858
172,0	454,0	0,1	0,3	7,1	0,0	348,4	78,8	61,0	298,8	428,2	822,3	824,3	396,7	796,8	0,10	79,77	79,67	83,84	0,10	84,78	85,28	84,32	0,08	0,06	-34,67877
173,0	455,0	0,1	0,3	7,0	0,0	347,9	78,8	61,2	298,3	428,1	822,1	823,7	397,0	796,3	0,10	79,81	79,66	83,83	0,10	84,79	85,28	84,32	0,07	0,06	-35,20047
174,0	456,0	0,1	0,3	7,0	0,0	348,4	78,7	61,2	297,1	430,6	822,1	823,1	397,1	796,7	0,10	79,79	79,66	83,83	0,10	84,79	85,28	84,32	0,08	0,06	-35,38613
175,0	457,0	0,1	0,3	6,9	0,0	348,5	78,4	60,7	296,3	431,1	821,8	822,5	397,5	797,0	0,10	79,80	79,67	83,84	0,10	84,78	85,28	84,29	0,08	0,06	-35,84011
176,0	458,0	0,1	0,3	6,8	0,0	347,7	78,6	60,6	295,4	432,0	821,7	822,0	397,8	796,7	0,10	79,84	79,69	83,79	0,10	84,82	85,30	84,27	0,07	0,06	-36,41136
177,0	459,0	0,0	0,3	6,7	0,0	347,1	78,7	60,7	294,4	432,8	821,7	821,8	397,6	796,8	0,10	79,88	79,68	83,76	0,10	84,79	85,27	84,26	0,08	0,06	-36,76321

Manufacturer: hearthstone
Model: 8031

Run: 2
Project #: pi 20270
Test Duration: 177 min

	HHV	LHV
Eff	75,61%	81,72%
Comb Eff	98,54%	98,54%
HT Eff	76,73%	82,93%
Output	25 870	Btu/h
Burn Rate	1,73	kg/h
Grams CO	118	g
Input	34 215	Btu/h
RL wet	17,41	
Average	9,19	9,84

Note: In the "Input data", "Calc. % O_2", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [e], [b], [c], [h], [i], [e], [j], and [k] refer to their respective variables in Clauses

Ultimate CO_2
$CO_{2\,ult}$ 19,64
F_d
1,062

Overall Heating Efficiency: 75,61%
Combustion Efficiency: 98,54%
Heat Transfer Efficiency: 76,73%

Heat Output: 24 540 Btu/h
Heat Input: 32 457 Btu/h
Burn Duration: 2,95 h
Burn Rate: 3,81 lb/h
Stack Temp: 401,7 Deg. F

				1,15	20,28	10,35	205,26	25,71	0,99	0,76	0,75
INPUT DATA				Oxygen Calculation			Input Data		Combust	Heat	Net
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO_2 [d]	Excess Air EA	Meas O_2	Calc. % O_2 [g]	Flue Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %
0,00	6,17	0,24	2,85	497,5%	20,72	17,55	181,2	25,2	96,4%	57,8%	55,1%
1,00	6,07	0,31	2,95	503,3%	20,73	17,62	167,5	25,0	93,5%	59,6%	55,8%
2,00	6,07	0,14	4,39	333,3%	20,64	16,18	172,0	25,1	98,4%	68,2%	67,1%
3,00	6,02	0,11	5,49	250,9%	20,57	15,03	176,3	25,3	99,1%	71,7%	71,0%
4,00	5,98	0,10	6,03	220,3%	20,54	14,45	179,1	25,3	99,3%	72,8%	72,3%
5,00	5,93	0,11	6,42	200,6%	20,51	14,03	182,4	25,3	99,2%	73,4%	72,8%
6,00	5,89	0,11	7,09	172,8%	20,46	13,32	186,1	25,2	99,2%	74,4%	73,8%
7,00	5,84	0,12	6,55	194,3%	20,50	13,88	189,0	25,1	99,1%	73,0%	72,3%
8,00	5,80	0,13	7,13	170,4%	20,46	13,26	191,2	25,2	99,0%	74,0%	73,2%
9,00	5,80	0,14	7,40	160,7%	20,44	12,97	194,3	25,1	99,0%	74,2%	73,4%
10,00	5,71	0,14	7,28	164,5%	20,45	13,09	196,7	25,1	98,9%	73,8%	72,9%
11,00	5,66	0,16	7,62	152,4%	20,43	12,73	200,4	25,0	98,7%	74,0%	73,1%
12,00	5,62	0,15	10,53	86,0%	20,24	9,63	205,4	25,0	99,1%	77,5%	76,8%
13,00	5,53	0,17	11,01	75,7%	20,20	9,11	209,6	25,0	98,9%	77,7%	76,8%
14,00	5,48	0,16	10,43	85,5%	20,24	9,73	212,3	25,1	99,0%	76,9%	76,1%
15,00	5,43	0,16	10,21	89,4%	20,26	9,96	213,6	25,1	99,0%	76,6%	75,8%
16,00	5,39	0,15	9,99	93,8%	20,27	10,21	214,8	25,0	99,0%	76,3%	75,5%
17,00	5,30	0,16	9,90	95,3%	20,28	10,30	215,8	25,0	99,0%	76,1%	75,3%
18,00	5,25	0,16	10,11	91,2%	20,26	10,07	217,0	25,1	99,0%	76,2%	75,5%
19,00	5,16	0,14	10,43	85,8%	20,24	9,74	218,4	25,1	99,1%	76,5%	75,8%
20,00	5,12	0,14	10,63	82,4%	20,23	9,53	219,4	25,1	99,1%	76,6%	76,0%
21,00	5,07	0,14	10,89	78,1%	20,21	9,25	220,4	25,1	99,2%	76,8%	76,2%
22,00	4,98	0,14	11,09	75,0%	20,20	9,04	221,8	25,1	99,2%	76,9%	76,3%
23,00	4,94	0,13	11,48	69,1%	20,17	8,62	223,4	25,1	99,3%	77,2%	76,6%
24,00	4,84	0,14	11,78	64,8%	20,15	8,30	225,6	25,1	99,2%	77,3%	76,7%
25,00	4,80	0,15	12,11	60,3%	20,13	7,95	227,4	25,1	99,2%	77,5%	76,9%
26,00	4,71	0,15	12,34	57,2%	20,11	7,69	229,4	25,0	99,1%	77,5%	76,9%
27,00	4,66	0,16	12,48	55,5%	20,11	7,55	230,6	25,1	99,1%	77,6%	76,9%
28,00	4,62	0,16	12,94	49,9%	20,08	7,06	233,1	25,1	99,1%	77,8%	77,1%
29,00	4,50	0,17	13,48	43,8%	20,04	6,47	235,3	25,0	99,1%	78,1%	77,3%
30,00	4,44	0,21	13,93	38,9%	20,01	5,97	238,0	25,1	98,8%	78,2%	77,3%
31,00	4,35	0,27	14,34	35,4%	19,98	5,61	240,4	25,0	98,6%	78,3%	77,1%
32,00	4,30	0,34	14,52	33,2%	19,96	5,27	242,4	25,1	98,2%	78,3%	76,9%
33,00	4,21	0,42	14,80	29,1%	19,94	4,93	244,4	25,2	97,8%	78,3%	76,6%
34,00	4,12	0,48	14,89	27,8%	19,93	4,80	246,1	25,1	97,4%	78,3%	76,3%
35,00	4,07	0,47	14,85	28,2%	19,93	4,84	247,3	25,1	97,5%	78,2%	76,2%
36,00	3,98	0,38	14,97	26,0%	19,93	4,77	247,9	25,0	98,0%	78,3%	76,7%
37,00	3,94	0,38	14,93	26,3%	19,93	4,81	248,9	25,1	98,0%	78,2%	76,6%
38,00	3,85	0,32	14,88	29,2%	19,94	4,89	249,7	25,2	98,3%	78,1%	76,8%
39,00	3,76	0,32	14,97	28,5%	19,93	4,80	250,0	25,1	98,3%	78,2%	76,9%
40,00	3,71	0,36	15,11	26,9%	19,92	4,62	250,7	25,3	98,1%	78,2%	76,8%
41,00	3,62	0,39	15,30	25,2%	19,90	4,41	251,4	25,3	98,0%	78,3%	76,7%
42,00	3,53	0,46	15,36	24,2%	19,90	4,31	251,5	25,3	97,6%	78,3%	76,4%
43,00	3,48	0,56	15,46	22,6%	19,88	4,14	252,1	25,3	97,1%	78,3%	76,1%
44,00	3,39	0,61	15,49	21,9%	19,88	4,08	252,4	25,2	96,9%	78,3%	75,8%
45,00	3,30	0,74	15,48	21,1%	19,87	4,02	252,2	25,3	96,2%	78,3%	75,3%
46,00	3,26	0,82	15,51	20,3%	19,86	3,94	252,3	25,3	95,8%	78,2%	75,0%
47,00	3,16	0,83	15,59	19,6%	19,86	3,85	252,3	25,4	95,8%	78,3%	75,0%
48,00	3,12	0,87	15,61	19,2%	19,85	3,81	252,4	25,4	95,6%	78,3%	74,9%
49,00	3,03	0,79	15,58	20,0%	19,86	3,89	252,4	25,4	96,0%	78,3%	75,1%
50,00	2,94	0,74	15,53	20,8%	19,87	3,97	252,6	25,4	96,2%	78,3%	75,3%
51,00	2,89	0,84	15,59	19,5%	19,85	3,84	252,6	25,4	95,7%	78,3%	74,9%
52,00	2,81	1,03	15,71	17,3%	19,83	3,61	252,8	25,3	94,9%	78,3%	74,3%
53,00	2,76	1,18	15,76	16,0%	19,82	3,47	254,0	25,3	94,2%	78,2%	73,6%
54,00	2,67	0,88	14,87	28,8%	19,93	4,87	252,6	25,4	98,0%	78,0%	76,4%
55,00	2,62	0,15	13,56	43,3%	20,03	6,40	249,6	25,5	99,2%	77,3%	76,7%
56,00	2,57	0,07	12,56	55,5%	20,11	7,51	246,0	25,5	99,7%	76,8%	76,5%
57,00	2,53	0,05	12,21	60,2%	20,13	7,89	243,3	25,2	99,9%	76,6%	76,5%
58,00	2,48	0,05	12,26	59,6%	20,13	7,84	240,6	25,3	99,9%	76,8%	76,7%
59,00	2,39	0,04	12,54	56,1%	20,11	7,55	239,1	25,4	99,9%	77,2%	77,1%
60,00	2,35	0,04	12,74	53,7%	20,10	7,34	238,1	25,4	99,9%	77,4%	77,3%
61,00	2,30	0,05	12,84	52,4%	20,09	7,23	237,8	25,6	99,9%	77,5%	77,4%
62,00	2,26	0,05	13,01	50,4%	20,08	7,04	236,8	25,6	99,8%	77,7%	77,6%
63,00	2,21	0,04	13,02	50,4%	20,08	7,04	236,2	25,6	99,9%	77,7%	77,6%
64,00	2,17	0,05	13,15	48,8%	20,07	6,89	235,8	25,5	99,8%	77,9%	77,7%
65,00	2,12	0,06	13,28	47,3%	20,06	6,75	235,7	25,6	99,8%	78,0%	77,8%
66,00	2,03	0,06	13,30	46,1%	20,06	6,83	235,2	25,6	99,7%	77,9%	77,7%
67,00	1,98	0,07	13,07	49,5%	20,07	6,97	234,7	25,5	99,7%	77,9%	77,6%
68,00	1,94	0,06	12,86	52,1%	20,09	7,20	234,1	25,7	99,8%	77,7%	77,6%
69,00	1,89	0,05	12,72	53,8%	20,10	7,35	233,2	25,7	99,8%	77,7%	77,6%
70,00	1,85	0,05	12,47	56,9%	20,11	7,61	231,5	25,8	99,8%	77,6%	77,5%
71,00	1,80	0,05	12,12	61,5%	20,14	8,00	230,0	25,7	99,9%	77,4%	77,3%
72,00	1,80	0,04	11,69	67,5%	20,17	8,46	228,3	25,8	99,9%	77,1%	77,1%
73,00	1,76	0,05	11,42	71,3%	20,18	8,74	226,1	25,8	99,9%	77,0%	77,0%
74,00	1,71	0,04	11,21	74,6%	20,20	8,97	223,7	25,7	99,9%	77,0%	76,9%
75,00	1,71	0,04	10,99	78,0%	20,21	9,20	221,9	25,8	99,9%	76,9%	76,8%
76,00	1,62	0,05	10,75	81,9%	20,23	9,45	220,5	26,0	99,9%	76,8%	76,7%
77,00	1,58	0,05	10,65	83,5%	20,23	9,56	218,6	26,0	99,8%	76,8%	76,7%
78,00	1,55	0,05	10,62	84,1%	20,24	9,59	217,1	25,9	99,8%	76,9%	76,7%
79,00	1,53	0,05	10,63	83,8%	20,23	9,57	216,0	26,0	99,8%	77,0%	76,8%
80,00	1,49	0,06	10,55	85,1%	20,24	9,66	215,0	26,0	99,8%	77,0%	76,8%
81,00	1,49	0,06	10,56	84,8%	20,24	9,64	214,0	26,0	99,8%	77,0%	76,8%
82,00	1,44	0,07	10,61	83,9%	20,23	9,59	213,5	26,1	99,7%	77,1%	76,9%
83,00	1,39	0,07	10,68	82,7%	20,23	9,52	212,7	26,1	99,7%	77,2%	77,0%
84,00	1,35	0,07	10,81	80,5%	20,22	9,38	212,3	26,1	99,7%	77,4%	77,1%
85,00	1,30	0,08	10,83	80,2%	20,22	9,36	211,7	25,9	99,6%	77,4%	77,2%
86,00	1,30	0,09	10,84	79,8%	20,22	9,33	210,8	26,1	99,6%	77,5%	77,2%
87,00	1,26	0,09	10,59	83,8%	20,23	9,59	209,5	26,1	99,5%	77,4%	77,0%
88,00	1,26	0,09	10,33	90,3%	20,26	9,98	208,5	26,1	99,5%	77,1%	76,7%
89,00	1,21	0,09	10,07	93,4%	20,27	10,16	207,5	26,1	99,5%	77,0%	76,6%
90,00	1,17	0,10	10,00	94,5%	20,27	10,22	205,7	26,2	99,5%	77,0%	76,6%
91,00	1,14	0,09	9,87	97,1%	20,28	10,36	204,8	26,1	99,5%	76,9%	76,6%
92,00	1,12	0,10	9,67	100,9%	20,29	10,57	204,0	26,1	99,4%	76,8%	76,4%

93,00	1,12	0,10	9,61	102,3%	20,30	10,64	202,9	26,2	99,5%	76,8%	76,4%
94,00	1,08	0,10	9,50	104,7%	20,31	10,76	201,8	26,1	99,5%	76,7%	76,3%
95,00	1,08	0,10	9,37	107,6%	20,32	10,90	200,8	26,0	99,5%	76,7%	76,2%
96,00	1,03	0,11	9,15	112,0%	20,33	11,12	200,1	26,1	99,3%	76,4%	75,9%
97,00	1,01	0,12	9,08	113,5%	20,33	11,19	199,5	26,1	99,2%	76,4%	75,8%
98,00	0,99	0,13	9,05	114,1%	20,33	11,22	198,7	26,2	99,2%	76,4%	75,8%
99,00	0,96	0,13	8,96	116,0%	20,34	11,31	198,1	26,2	99,2%	76,4%	75,7%
100,00	0,94	0,13	8,90	117,6%	20,34	11,38	197,3	26,2	99,2%	76,4%	75,7%
101,00	0,94	0,13	8,79	120,4%	20,35	11,50	196,5	26,2	99,2%	76,3%	75,7%
102,00	0,90	0,13	8,64	124,8%	20,36	11,66	195,9	26,1	99,1%	76,1%	75,5%
103,00	0,90	0,14	8,31	132,4%	20,38	12,00	194,9	26,1	99,0%	75,7%	75,0%
104,00	0,90	0,16	7,98	141,3%	20,40	12,34	194,1	26,1	98,7%	75,3%	74,3%
105,00	0,85	0,18	7,50	155,7%	20,43	12,84	194,0	26,1	98,5%	74,5%	73,4%
106,00	0,85	0,19	7,36	159,9%	20,44	12,98	193,3	26,1	98,4%	74,3%	73,1%
107,00	0,85	0,20	7,36	159,8%	20,44	12,98	192,8	26,0	98,3%	74,3%	73,0%
108,00	0,81	0,20	7,35	160,2%	20,44	12,99	192,4	25,9	98,2%	74,3%	73,0%
109,00	0,81	0,21	7,36	159,5%	20,44	12,97	191,9	26,0	98,2%	74,4%	73,1%
110,00	0,81	0,21	7,39	158,4%	20,44	12,94	191,1	26,1	98,2%	74,6%	73,2%
111,00	0,81	0,20	7,40	158,4%	20,44	12,94	190,1	26,0	98,2%	74,6%	73,3%
112,00	0,76	0,21	7,41	157,9%	20,44	12,92	189,4	26,2	98,2%	74,7%	73,4%
113,00	0,76	0,21	7,39	158,4%	20,44	12,94	189,0	26,2	98,2%	74,8%	73,4%
114,00	0,76	0,21	7,39	158,5%	20,44	12,94	188,3	26,1	98,2%	74,8%	73,4%
115,00	0,76	0,21	7,40	158,3%	20,44	12,94	187,8	26,1	98,2%	74,9%	73,5%
116,00	0,71	0,21	7,46	156,1%	20,43	12,87	187,7	26,0	98,2%	75,0%	73,6%
117,00	0,71	0,21	7,53	154,0%	20,43	12,80	187,3	26,0	98,2%	75,1%	73,8%
118,00	0,71	0,19	7,73	148,2%	20,42	12,60	186,2	26,0	98,5%	75,6%	74,4%
119,00	0,71	0,17	7,81	146,0%	20,41	12,51	185,1	26,2	98,6%	75,8%	74,8%
120,00	0,67	0,16	7,90	143,7%	20,41	12,43	184,4	26,1	98,8%	76,0%	75,1%
121,00	0,67	0,16	7,93	142,8%	20,41	12,39	184,0	26,1	98,8%	76,1%	75,2%
122,00	0,63	0,14	8,08	139,0%	20,40	12,25	183,4	26,1	99,0%	76,4%	75,6%
123,00	0,62	0,13	7,86	145,9%	20,41	12,49	182,7	26,2	99,1%	76,1%	75,5%
124,00	0,62	0,13	7,86	145,7%	20,41	12,48	181,8	26,1	99,1%	76,2%	75,5%
125,00	0,62	0,13	7,86	145,6%	20,41	12,48	181,6	26,1	99,1%	76,2%	75,5%
126,00	0,58	0,12	7,89	145,1%	20,41	12,46	181,4	26,0	99,2%	76,3%	75,7%
127,00	0,58	0,12	7,91	144,8%	20,41	12,44	181,1	26,0	99,2%	76,3%	75,7%
128,00	0,58	0,11	7,92	144,5%	20,41	12,43	180,9	26,0	99,3%	76,4%	75,8%
129,00	0,58	0,11	7,94	144,0%	20,41	12,41	180,4	26,0	99,3%	76,4%	75,9%
130,00	0,53	0,10	7,96	143,7%	20,41	12,40	180,3	26,0	99,4%	76,5%	76,0%
131,00	0,53	0,10	7,96	143,7%	20,41	12,40	180,1	25,8	99,4%	76,5%	76,0%
132,00	0,49	0,10	8,01	142,4%	20,40	12,35	179,8	26,0	99,4%	76,6%	76,2%
133,00	0,49	0,09	8,05	141,1%	20,40	12,30	179,4	26,1	99,5%	76,7%	76,3%
134,00	0,49	0,09	8,07	140,7%	20,40	12,29	179,0	26,0	99,5%	76,8%	76,4%
135,00	0,49	0,09	8,06	141,2%	20,40	12,30	178,8	26,0	99,5%	76,7%	76,4%
136,00	0,44	0,09	8,05	141,1%	20,40	12,30	178,9	26,0	99,5%	76,7%	76,3%
137,00	0,44	0,09	8,00	142,6%	20,41	12,35	178,4	26,1	99,5%	76,7%	76,3%
138,00	0,44	0,10	7,99	142,8%	20,41	12,37	178,4	26,0	99,4%	76,7%	76,2%
139,00	0,40	0,10	7,89	145,7%	20,41	12,47	178,3	26,1	99,4%	76,5%	76,1%
140,00	0,40	0,11	7,86	146,6%	20,41	12,50	178,6	26,0	99,3%	76,5%	75,9%
141,00	0,40	0,12	7,81	147,9%	20,42	12,55	178,4	26,0	99,2%	76,4%	75,8%
142,00	0,40	0,12	7,70	151,3%	20,42	12,67	178,6	26,0	99,2%	76,2%	75,6%
143,00	0,35	0,12	7,63	153,5%	20,43	12,74	178,7	25,9	99,2%	76,1%	75,5%
144,00	0,35	0,12	7,61	153,9%	20,43	12,76	178,7	26,1	99,1%	76,1%	75,4%
145,00	0,35	0,13	7,60	154,3%	20,43	12,77	178,5	26,0	99,1%	76,1%	75,4%
146,00	0,35	0,13	7,58	154,6%	20,43	12,78	178,0	26,0	99,0%	76,1%	75,3%
147,00	0,34	0,13	7,52	156,8%	20,43	12,85	177,8	25,9	99,0%	76,0%	75,2%
148,00	0,30	0,13	7,55	155,7%	20,43	12,82	177,8	25,9	99,0%	76,1%	75,3%
149,00	0,30	0,13	7,58	154,6%	20,43	12,78	177,6	26,0	99,0%	76,1%	75,4%
150,00	0,30	0,14	7,56	155,1%	20,43	12,80	177,6	26,1	99,0%	76,1%	75,3%
151,00	0,26	0,14	7,52	156,7%	20,43	12,85	177,5	26,2	99,0%	76,1%	75,3%
152,00	0,26	0,14	7,47	158,1%	20,44	12,90	177,3	26,2	98,9%	76,0%	75,2%
153,00	0,26	0,15	7,43	159,2%	20,44	12,93	177,5	26,0	98,9%	75,9%	75,0%
154,00	0,22	0,15	7,40	160,1%	20,44	12,97	177,4	26,0	98,8%	75,8%	75,0%
155,00	0,22	0,15	7,38	160,8%	20,44	12,98	177,4	26,1	98,8%	75,8%	74,9%
156,00	0,22	0,15	7,33	162,4%	20,45	13,04	177,6	25,9	98,8%	75,7%	74,8%
157,00	0,22	0,15	7,35	161,8%	20,44	13,02	177,0	26,0	98,8%	75,8%	74,9%
158,00	0,18	0,15	7,32	163,0%	20,45	13,05	177,1	25,8	98,8%	75,7%	74,8%
159,00	0,17	0,15	7,34	162,3%	20,45	13,03	176,8	25,9	98,8%	75,8%	74,9%
160,00	0,17	0,16	7,34	162,2%	20,45	13,03	176,9	25,9	98,7%	75,8%	74,8%
161,00	0,12	0,16	7,35	161,5%	20,44	13,01	176,9	25,9	98,7%	75,8%	74,8%
162,00	0,12	0,16	7,42	159,0%	20,44	12,94	177,1	25,9	98,7%	75,9%	74,9%
163,00	0,12	0,16	7,44	158,5%	20,44	12,92	176,8	25,9	98,7%	75,9%	75,0%
164,00	0,12	0,16	7,36	161,3%	20,44	13,01	176,4	26,0	98,7%	75,9%	74,9%
165,00	0,08	0,16	7,31	163,0%	20,45	13,06	176,3	25,8	98,7%	75,8%	74,7%
166,00	0,08	0,17	7,27	164,0%	20,45	13,09	176,2	25,9	98,6%	75,7%	74,7%
167,00	0,08	0,17	7,22	165,8%	20,45	13,14	176,2	26,1	98,6%	75,7%	74,6%
168,00	0,08	0,17	7,21	166,4%	20,45	13,16	176,1	26,1	98,6%	75,6%	74,6%
169,00	0,04	0,17	7,20	166,4%	20,45	13,16	176,3	26,0	98,6%	75,6%	74,5%
170,00	0,03	0,17	7,21	166,3%	20,45	13,16	176,0	26,0	98,6%	75,6%	74,6%
171,00	0,03	0,17	7,19	166,8%	20,45	13,18	175,9	25,9	98,5%	75,6%	74,5%
172,00	0,03	0,18	7,14	168,4%	20,46	13,23	175,8	25,9	98,5%	75,5%	74,4%
173,00	0,03	0,18	7,03	172,6%	20,46	13,35	175,5	25,9	98,4%	75,4%	74,2%
174,00	0,03	0,19	6,97	174,3%	20,47	13,40	175,8	26,0	98,3%	75,2%	74,0%
175,00	0,03	0,19	6,88	177,9%	20,47	13,50	175,8	25,8	98,2%	75,0%	73,7%
176,00	0,03	0,20	6,79	181,0%	20,48	13,59	175,4	25,9	98,2%	74,9%	73,6%
177,00	0,00	0,20	6,74	182,8%	20,48	13,64	175,1	25,9	98,1%	74,9%	73,5%

Temps acquisition minutes	Flue temp °F	Room temp °F	Tunnel dry bulb °F	Catalyst °F	scale lbs	Right °F	Back °F	bottom °F	Top °F	Left °F
0	74,17	72,06	73,89	76,53	2,97	77,06	77,56	77,53	76,86	77,24
1	86,27	72,15	74,36	81,69	2,97	77,07	77,54	77,51	76,83	77,22
2	115,79	72,22	76,38	111,76	40,20	77,05	77,57	77,48	76,83	77,19
3	176,35	72,26	81,18	210,07	2,77	77,10	77,71	77,63	76,87	77,29
4	226,95	72,21	85,49	337,49	2,67	77,40	78,24	77,97	76,99	77,60
5	260,91	72,17	88,12	408,06	2,57	78,21	79,19	78,47	77,35	78,42
6	288,07	72,05	90,60	425,56	2,38	79,62	80,76	79,19	78,01	79,97
7	315,42	72,20	93,15	444,26	2,27	81,75	83,00	80,12	78,97	82,37
8	339,20	72,21	93,91	463,64	2,17	84,43	85,85	81,25	80,29	85,85
9	357,95	72,23	95,03	482,20	2,07	87,75	89,19	82,63	81,99	90,25
10	367,75	72,27	95,76	504,16	1,94	91,68	92,84	84,23	84,15	95,40
11	388,21	72,30	97,43	513,59	1,77	96,06	96,80	86,00	86,72	100,92
12	402,72	72,26	98,69	538,96	1,67	100,79	101,22	87,86	89,77	106,84
13	408,96	72,33	99,52	557,36	1,57	105,99	106,19	89,96	93,23	113,20
14	412,76	72,37	99,83	569,67	1,47	111,65	111,50	92,25	97,09	120,02
15	415,90	72,38	100,43	571,83	1,37	117,76	117,30	94,82	101,28	127,18
16	414,97	72,36	100,45	569,67	1,27	124,24	123,55	97,63	105,80	134,39
17	415,64	72,49	122,72	542,03	1,17	131,19	130,22	101,05	110,16	141,73
18	333,73	72,52	114,56	376,57	13,38	138,36	137,34	104,56	114,67	149,05
19	275,86	72,39	107,52	271,69	13,33	145,28	143,62	108,12	119,04	156,16
20	256,75	72,53	104,90	260,00	13,17	151,71	148,74	111,53	123,19	162,80
21	250,43	72,47	103,47	295,96	13,17	156,99	153,00	114,93	126,73	168,36
22	242,99	72,34	101,64	296,49	13,08	161,34	156,62	117,96	129,96	173,43
23	238,66	72,49	100,73	295,26	13,08	165,01	159,78	120,87	132,66	177,80
24	228,97	72,47	98,94	271,96	12,98	167,78	162,45	123,65	134,93	181,95
25	222,50	72,57	97,47	259,55	12,68	169,91	164,63	126,34	136,92	185,64
26	224,90	72,57	96,25	260,57	12,79	171,46	167,02	128,93	138,47	189,31
27	223,52	72,62	97,38	251,59	12,78	172,64	168,90	131,44	139,96	192,87
28	221,63	72,66	97,09	252,53	12,68	173,45	170,59	133,85	141,07	196,70
29	215,02	72,69	95,78	237,16	12,68	174,17	172,34	136,25	141,95	200,66
30	214,35	72,74	95,47	243,22	12,57	174,57	173,70	138,59	142,79	205,13
31	215,76	72,69	95,91	267,71	12,48	174,85	174,96	141,07	143,40	209,42
32	248,10	72,71	101,76	379,90	12,38	174,99	176,54	143,57	143,83	213,59
33	279,00	72,73	107,33	534,69	12,18	175,26	178,41	146,21	144,29	217,54
34	298,46	72,83	111,48	588,83	11,98	175,87	180,79	148,91	144,83	221,27
35	360,55	72,82	100,63	652,83	11,78	177,03	183,53	151,38	145,03	224,83
36	319,45	72,86	90,23	554,60	11,68	178,97	186,31	154,20	145,57	228,51
37	296,95	72,88	87,32	504,22	11,58	181,45	188,77	156,96	146,32	232,05
38	279,82	72,96	85,67	467,84	11,58	184,13	190,92	159,75	147,46	235,43
39	266,82	72,99	84,68	438,95	11,48	186,70	192,81	162,55	148,64	238,10
40	256,81	72,98	83,86	419,40	11,48	189,04	194,30	165,23	149,92	240,20
41	256,67	72,96	83,63	413,56	11,38	191,15	195,40	167,71	151,16	241,85
42	251,25	72,94	83,51	405,76	11,38	193,30	196,27	170,04	152,43	242,63
43	256,06	72,94	83,34	414,21	11,29	195,54	196,84	172,14	153,63	243,31
44	244,26	72,98	82,73	393,26	11,27	197,86	197,15	173,93	154,69	243,39
45	233,86	72,99	82,16	374,60	11,27	199,96	197,26	175,57	156,02	243,06
46	226,44	72,95	81,86	362,92	11,27	201,85	197,17	177,15	157,10	242,46
47	220,31	72,99	81,16	353,73	11,27	203,44	197,07	178,46	158,17	241,67
48	216,05	72,94	81,16	344,00	11,71	204,53	196,84	179,74	158,93	240,68
49	223,27	73,00	84,23	344,06	11,17	205,67	196,54	180,77	159,73	239,76
50	216,67	73,11	86,32	307,82	11,17	206,49	196,17	181,91	160,48	238,67
51	202,30	73,10	90,10	241,49	11,17	207,09	195,62	183,09	161,05	237,42
52	193,86	73,06	92,17	207,76	11,08	207,53	195,35	184,15	161,58	236,04
53	201,83	73,10	94,43	206,53	11,08	207,89	195,07	185,14	161,91	234,49
54	195,96	73,11	93,40	218,20	11,08	207,87	194,56	186,10	162,15	232,86
55	193,90	73,12	93,06	213,80	11,08	207,64	194,34	187,04	162,19	231,15
56	183,27	73,12	91,59	206,73	10,98	207,23	193,69	187,98	162,17	229,36
57	174,79	73,14	90,31	193,72	10,98	206,65	193,50	188,95	161,99	227,59
58	174,02	73,14	90,39	192,96	10,98	205,90	192,85	189,92	161,66	225,97
59	189,70	73,11	93,30	203,51	10,88	205,11	192,34	190,99	161,27	224,19
60	190,37	73,11	92,45	202,36	10,88	204,26	191,69	192,09	160,82	222,31
61	186,61	73,16	91,68	200,35	10,78	203,23	191,49	193,29	160,27	220,51
62	210,37	73,20	96,04	224,54	10,68	202,25	190,82	194,53	159,77	218,79
63	210,81	73,22	94,01	251,86	10,68	201,15	190,37	195,76	159,24	217,12
64	197,64	73,24	92,03	242,73	10,65	200,16	189,74	197,13	158,66	215,54
65	213,65	73,21	96,18	210,13	10,57	199,19	189,20	198,56	158,18	214,07
66	210,59	73,23	95,92	206,19	10,47	198,28	188,83	200,01	157,65	212,93
67	219,91	73,24	97,54	210,56	10,47	197,39	188,43	201,40	157,24	211,94
68	223,39	73,24	98,13	205,21	10,38	196,53	187,94	202,62	156,73	211,07
69	229,13	73,31	99,23	230,86	10,38	195,80	187,60	203,73	156,34	210,37
70	224,31	73,30	98,57	229,05	10,28	195,05	187,66	204,68	155,94	209,97
71	233,22	73,29	99,83	273,39	10,18	194,27	187,51	205,41	155,51	209,48
72	261,40	73,35	104,88	284,67	10,05	193,55	187,62	206,19	155,10	209,36
73	292,74	73,38	109,92	328,42	9,97	192,96	188,13	206,99	154,65	209,56
74	314,76	73,50	101,50	382,41	9,77	192,64	189,36	207,24	154,44	209,96
75	339,45	73,44	99,18	538,84	9,58	192,52	191,00	207,63	154,52	210,52
76	347,33	73,47	93,26	554,21	9,58	193,06	193,09	208,13	154,67	212,09
77	346,03	73,54	89,56	543,05	9,37	194,06	195,39	208,11	155,13	214,51
78	346,28	73,53	89,01	542,52	9,27	195,61	197,68	208,76	156,07	216,92
79	360,10	73,61	89,42	549,56	9,17	197,40	200,16	209,38	157,42	219,86
80	384,61	73,57	91,12	578,90	9,07	199,32	202,72	209,83	159,36	222,96
81	412,23	73,62	91,71	624,72	8,88	201,10	205,40	210,19	161,77	226,25
82	437,71	73,72	93,02	667,52	8,67	203,36	208,25	210,47	164,89	229,81
83	466,66	73,70	94,82	706,22	8,57	205,96	211,42	210,42	169,05	233,73
84	472,68	73,87	96,10	732,71	8,37	209,05	214,78	210,62	174,23	237,99
85	488,36	73,90	97,31	749,72	8,18	212,79	218,27	211,88	180,07	242,31
86	503,27	73,85	98,27	765,56	7,97	217,07	222,31	212,55	186,64	246,94
87	526,72	73,92	100,26	787,80	7,77	221,93	226,59	213,30	194,10	252,18

88	541,33	74,04	102,23	815,66	7,58	227,32	231,51	214,05	202,54	257,95
89	553,75	74,16	103,55	842,37	7,37	233,13	236,46	214,95	211,76	264,31
90	577,59	74,25	105,54	895,18	7,17	239,52	241,66	215,87	221,83	271,15
91	592,62	74,39	107,28	929,80	6,88	246,18	247,22	216,72	232,56	278,50
92	598,37	74,49	107,67	947,55	6,67	253,29	253,22	217,31	243,65	286,25
93	595,96	74,32	107,22	950,55	6,47	260,67	259,77	218,16	255,60	294,29
94	592,71	74,60	107,45	948,63	6,27	269,03	266,43	219,39	268,17	302,77
95	592,93	74,63	108,36	949,83	6,07	277,44	273,51	220,58	280,32	311,64
96	593,60	74,59	108,53	951,83	5,87	286,50	280,49	222,47	292,28	320,55
97	592,64	74,69	108,82	956,60	5,67	295,95	288,02	224,19	303,45	329,36
98	593,25	74,79	108,59	954,72	5,48	305,31	295,76	226,19	314,69	338,29
99	591,06	74,61	107,66	953,44	5,37	314,66	303,69	227,68	325,63	347,12
100	588,92	74,54	107,97	953,06	5,17	324,06	311,61	229,58	335,79	355,29
101	585,55	74,65	107,45	954,97	4,97	333,37	319,45	231,97	346,11	363,97
102	581,76	74,84	106,94	953,16	4,77	342,73	327,10	234,93	356,21	372,45
103	574,06	74,83	105,93	945,27	4,67	351,03	334,97	238,07	365,10	380,02
104	569,43	75,02	105,41	939,91	4,57	360,56	342,93	241,55	373,79	387,80
105	562,37	75,10	104,32	931,10	4,37	369,73	351,12	245,28	383,08	394,74
106	554,24	75,12	105,15	917,00	4,27	378,87	359,39	249,40	391,39	402,06
107	546,60	75,27	105,05	902,75	4,17	387,61	367,44	253,97	399,11	408,66
108	540,36	74,94	104,69	890,39	3,97	396,67	376,02	258,10	406,30	414,71
109	534,66	75,14	104,33	882,82	3,87	404,04	383,93	262,95	412,55	421,00
110	528,67	75,17	103,35	875,96	3,87	411,52	391,66	267,48	418,56	426,75
111	523,92	75,01	103,36	870,31	3,67	419,03	399,71	271,94	423,40	432,28
112	519,24	75,20	103,29	865,01	3,67	426,36	407,14	276,59	427,33	437,53
113	513,70	75,20	102,67	858,41	3,47	433,30	414,67	281,17	432,34	442,79
114	509,06	75,52	102,29	852,28	3,47	439,90	421,76	285,66	436,85	447,47
115	504,06	75,50	101,97	846,09	3,35	446,37	428,54	290,07	439,81	452,02
116	501,92	75,47	102,24	841,95	3,27	452,50	435,09	294,64	442,30	455,89
117	498,60	75,53	102,13	839,11	3,17	459,14	440,85	299,33	445,12	459,12
118	495,44	75,68	101,19	837,23	3,07	465,19	446,47	303,93	447,01	462,30
119	493,46	75,59	100,66	835,04	2,97	470,29	452,20	308,28	448,43	465,52
120	492,47	75,33	101,90	835,99	6,01	475,16	457,43	312,58	450,09	468,10
121	530,01	76,04	154,43	882,36	2,87	480,92	462,55	317,90	451,52	471,56
122	470,92	75,46	125,39	549,06	14,78	485,79	468,84	322,03	451,41	473,82
123	470,30	75,57	107,16	649,92	14,58	489,96	472,24	326,15	450,59	475,01
124	482,21	75,67	102,15	763,31	14,38	492,75	472,92	329,94	442,59	476,99
125	511,58	75,80	102,85	839,74	14,18	494,56	471,62	333,54	437,85	477,44
126	500,46	75,97	100,41	1040,96	13,98	495,69	468,88	336,69	434,75	476,89
127	489,57	75,98	96,78	1069,89	13,85	495,96	465,00	339,45	431,90	476,21
128	486,07	75,56	99,11	1066,49	13,68	496,65	460,45	341,24	430,29	475,03
129	487,64	75,91	99,08	1106,57	13,48	496,16	455,78	343,35	428,78	473,70
130	490,33	75,96	98,59	1122,33	13,28	493,89	450,49	345,20	427,77	471,80
131	494,88	75,89	98,80	1134,57	13,08	492,47	446,25	347,07	427,47	470,19
132	497,81	75,85	99,32	1142,24	12,88	490,84	440,19	348,46	427,78	468,12
133	501,10	75,92	99,72	1146,00	12,68	488,86	435,06	349,41	428,65	465,57
134	503,35	75,82	99,50	1151,69	12,48	487,54	430,24	349,97	429,52	462,80
135	504,76	75,88	99,44	1157,98	12,28	485,92	425,94	350,93	430,38	460,64
136	506,49	75,68	98,93	1161,69	12,08	483,92	421,78	351,52	432,04	459,42
137	509,39	76,05	99,48	1166,49	11,78	483,13	417,38	351,64	435,09	458,78
138	510,17	75,99	99,51	1165,42	11,68	482,24	413,59	352,01	437,03	454,93
139	509,96	76,06	99,74	1165,45	11,48	480,44	409,90	352,51	438,03	454,36
140	510,90	75,90	100,11	1168,11	11,28	479,33	406,71	353,01	440,55	454,03
141	510,70	76,23	99,95	1169,80	11,04	478,61	403,56	353,20	442,75	453,42
142	510,77	76,11	99,86	1173,36	10,86	478,41	400,78	353,25	445,02	453,29
143	511,69	76,34	100,58	1177,15	10,65	478,12	398,30	353,95	447,03	453,57
144	512,46	76,43	100,54	1182,54	10,38	478,49	396,09	354,15	449,19	453,89
145	512,58	76,41	100,12	1184,13	10,28	478,51	394,06	354,48	451,49	454,23
146	512,30	76,50	100,12	1185,89	9,98	478,92	392,31	354,67	453,99	454,90
147	511,96	76,47	100,11	1185,65	9,87	479,66	390,67	354,81	456,67	455,59
148	511,53	76,62	100,54	1185,82	9,62	480,49	389,42	355,06	459,06	456,59
149	510,70	76,65	100,29	1188,37	9,38	481,65	388,78	355,15	461,66	457,66
150	509,71	76,35	99,90	1192,53	9,24	482,39	387,70	355,04	464,21	458,82
151	510,06	76,58	99,83	1196,00	8,98	483,82	387,21	355,16	467,15	460,31
152	508,46	76,71	99,96	1192,26	8,78	485,10	386,67	355,20	469,97	461,54
153	507,09	76,85	100,10	1192,31	8,58	486,57	386,38	355,08	472,31	463,13
154	506,91	76,87	100,07	1191,74	8,37	488,73	386,12	355,51	474,85	465,00
155	504,36	76,56	100,26	1186,62	8,28	490,73	385,95	355,76	477,26	466,95
156	502,59	76,84	100,01	1183,53	7,98	492,87	386,10	355,89	480,28	468,71
157	499,94	76,65	99,60	1178,09	7,88	495,60	386,23	355,97	481,93	469,56
158	497,70	76,97	99,58	1178,86	7,67	498,39	386,83	356,72	484,30	472,41
159	496,31	76,71	99,73	1174,62	7,48	501,24	387,06	356,56	486,39	474,57
160	494,43	77,10	99,40	1175,37	7,28	504,75	387,80	357,69	488,77	477,05
161	491,47	76,96	99,14	1171,00	7,07	508,16	388,41	358,14	490,91	479,29
162	489,17	77,21	98,59	1164,76	6,88	511,79	389,20	358,38	492,44	481,49
163	487,39	77,03	98,70	1160,69	6,78	516,00	390,09	359,39	494,55	484,27
164	484,93	77,14	98,19	1159,17	6,58	520,17	391,18	360,18	496,35	487,23
165	483,15	77,03	97,70	1160,06	6,47	524,73	392,40	360,89	498,47	489,79
166	482,50	76,95	97,07	1163,63	6,27	528,50	393,67	361,63	500,86	493,47
167	481,50	77,24	97,51	1169,00	6,18	533,69	395,08	362,50	502,56	495,58
168	480,67	76,92	96,74	1177,82	5,98	537,46	396,40	363,19	503,16	496,82
169	478,67	77,05	96,85	1184,05	5,88	542,73	398,05	363,99	504,79	501,51
170	477,14	77,05	96,81	1174,13	5,77	547,42	399,69	364,83	505,01	503,86
171	475,55	77,34	96,62	1150,32	5,67	550,85	401,43	365,73	507,81	505,86
172	474,31	77,26	96,04	1133,78	5,57	554,32	403,16	366,59	509,13	508,94
173	472,57	77,22	96,28	1113,25	5,48	557,60	404,45	367,42	510,91	512,22
174	470,83	77,52	96,49	1099,35	5,38	560,64	406,50	368,18	512,01	515,16
175	468,33	77,50	96,02	1091,54	5,28	563,79	408,16	369,01	513,47	517,82
176	466,24	77,57	95,91	1089,71	5,17	566,56	409,77	369,59	514,82	521,04
177	463,67	77,47	95,86	1080,51	5,07	569,19	411,57	370,67	516,52	523,41
178	461,46	77,69	95,36	1072,71	4,97	571,38	413,37	371,51	517,19	526,22

179	459,14	77,76	95,43	1062,89	4,97	573,55	415,42	372,69	517,26	528,50
180	456,76	77,57	95,41	1047,43	4,87	576,15	417,42	374,05	517,16	531,27
181	452,76	77,65	95,25	1033,82	4,78	578,23	419,83	375,47	516,55	534,18
182	447,99	77,74	95,12	1017,81	4,77	580,16	422,11	376,93	516,37	536,81
183	443,34	77,54	94,51	1006,30	4,68	581,74	424,32	378,22	516,22	538,74
184	438,33	77,46	94,21	995,85	4,58	583,45	426,91	380,03	516,10	540,94
185	433,61	77,95	93,82	986,17	4,58	584,73	429,24	381,29	515,89	541,54
186	429,14	77,77	93,53	972,75	4,47	586,25	431,66	383,19	513,04	543,75
187	425,66	77,86	93,75	959,74	4,47	587,79	434,42	385,10	511,51	546,27
188	421,23	77,62	93,57	948,44	4,37	588,66	436,64	386,64	509,19	547,42
189	417,39	77,79	93,33	935,11	4,37	589,93	438,98	388,60	507,05	549,11
190	413,37	77,72	92,63	923,57	4,33	591,17	440,96	390,55	505,46	550,70
191	409,41	77,99	92,26	913,87	4,27	591,50	442,87	391,70	502,54	551,33
192	406,64	78,15	92,52	908,29	4,27	591,66	444,78	393,87	498,25	551,95
193	404,37	77,88	92,53	904,86	4,18	592,42	446,50	395,93	495,47	553,06
194	401,76	77,91	92,55	901,81	4,17	592,83	448,04	398,17	492,44	554,49
195	399,84	77,98	92,40	894,97	4,17	593,53	449,61	400,22	488,40	554,96
196	397,40	78,03	92,37	889,54	4,17	593,26	450,81	402,19	484,78	555,36
197	395,91	77,82	92,25	886,96	4,17	592,88	451,80	404,29	481,31	556,18
198	393,46	77,85	92,08	883,75	4,08	593,18	452,33	405,77	477,53	556,66
199	391,46	77,96	91,83	881,54	4,08	592,25	452,71	408,05	474,37	557,36
200	389,93	77,75	91,54	879,53	3,98	592,06	452,84	409,83	469,41	557,82
201	388,35	77,95	91,50	876,17	3,98	591,61	453,30	411,44	464,78	557,66
202	385,72	77,97	91,08	869,76	3,98	591,00	453,25	412,47	461,18	557,06
203	384,16	77,88	91,19	864,86	3,88	589,86	453,07	414,40	456,67	556,25
204	382,73	77,83	91,14	863,75	3,88	588,96	452,75	415,83	453,01	557,82
205	381,93	77,77	90,96	864,90	3,88	588,02	452,15	417,47	449,20	558,42
206	379,81	77,69	90,58	858,56	3,83	586,74	451,69	418,48	444,75	557,27
207	378,20	77,72	90,55	852,66	3,77	585,75	451,10	420,24	441,23	557,51
208	376,40	77,83	90,22	849,71	3,77	584,93	450,52	421,67	438,69	556,77
209	375,37	78,01	90,29	850,47	3,77	583,19	449,99	422,28	434,05	555,53
210	374,28	77,83	90,14	848,47	3,71	581,96	449,49	424,19	430,44	555,24
211	372,85	78,00	90,02	845,15	3,67	580,96	448,90	425,22	425,65	553,41
212	371,23	77,54	90,51	842,22	3,67	579,99	448,52	426,29	421,54	551,75
213	371,31	77,82	90,19	842,41	3,67	578,58	447,56	427,98	418,31	551,38
214	370,77	77,90	89,59	841,61	3,57	577,36	446,97	428,61	414,66	550,20
215	369,44	77,71	89,83	838,36	3,57	576,14	446,47	430,15	411,26	549,46
216	367,91	77,81	89,98	834,22	3,47	575,49	446,04	431,24	407,37	547,93
217	366,94	77,49	89,74	831,74	3,47	573,76	445,42	432,58	403,81	547,43
218	364,73	77,65	89,99	823,26	3,47	572,74	444,97	433,21	401,00	545,86
219	362,29	77,33	89,49	817,39	3,47	571,53	444,12	434,14	397,54	543,30
220	360,26	77,64	89,33	814,75	3,47	569,91	443,79	435,33	394,70	542,77
221	359,13	77,44	89,20	815,75	3,39	568,45	443,41	436,41	392,18	542,04
222	358,11	77,60	89,49	815,49	3,38	568,32	442,74	437,20	388,32	540,50
223	357,73	77,55	89,36	815,27	3,38	566,84	442,35	438,29	385,46	539,13
224	356,94	77,43	89,04	814,57	3,32	566,06	441,55	438,70	382,51	536,75
225	356,71	77,26	89,11	815,47	3,28	563,60	440,96	440,19	380,12	536,02
226	355,51	77,23	88,96	812,46	3,28	562,49	440,32	441,12	377,08	534,42
227	354,32	77,44	88,85	799,55	3,28	561,26	439,91	442,14	374,44	533,65
228	352,72	77,09	89,00	793,72	3,28	559,41	439,25	443,04	371,89	531,85
229	351,66	77,07	88,64	789,18	3,17	558,50	438,67	444,07	369,03	530,81
230	350,24	77,02	88,66	785,73	3,17	556,92	437,52	444,65	366,51	528,85
231	349,34	77,40	88,64	784,57	3,17	555,24	436,83	445,65	363,95	527,57
232	348,77	77,36	88,50	783,13	3,17	554,02	435,86	446,47	361,48	525,86
233	348,05	77,61	88,59	781,85	3,17	552,55	435,24	447,07	358,85	524,37
234	353,81	77,43	94,53	622,76	3,07	550,51	434,19	447,89	357,06	522,80
235	344,55	77,46	89,71	729,14	3,07	549,22	433,55	448,36	354,42	521,03

POLYTESTS
TESTING THROUGH YOUR REALITY

Date: 2022-06-08 Manufacturer: Hearth stone Model: 8031
Project #: PI 20270 Run: 3 Tech: MM Reviewer: DP

- kindling 300LBS start Fire
- by pass open
- Fan off
- At 120LBS insert 1st preload
- At 10,91LBS close Door
- At 3,00LBS Second preload
- At 4,5LBS close air inlet completely, open Fan low
and close bypass
- At 31LBS Rack coal Bed
At 3,00LB insert load ~~close D~~
- close Door and Bypass Immediatly
- At 5 min close air inlet completely

TEST LOAD CONFIGURATION

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE / POST CHECKS

Date: 2022-06-08 Manufacturer: Hearthstone Model: 8031

Project #: PT 2670 Run: 3 Tech: MP Reviewer: DP

Moisture Meter Calibration Check:	Equipment #	Time	12%	22%
	EM-334	7:00	ok	ok

Pre-Test Post-Test

Facility Conditions:

	Pre-Test	Post-Test
Air Velocity from less than 2 feet	0 (max50 Fpm)	0 (max50 Fpm)
Smoke Capture Check (tunnel velocity)	OK	NA
Picture	4 sides ok	ok

Wood Heater Conditions:

Date Wood Heater Stack Cleaned	2022-06-06
Date Dilution Tunnel Cleaned	2022-06-06
Induced Draft Check (max 0.005 H2O)	ok
Traverse before ignition	ok

Temperature System:

Ambient (65°-90°F)	ok °F

Proportional Checks:

Thermocouple check	ok
Pitot Clean	ok
Pitot verification	ok
Pictures for report: Side	ok
Coal bed	ok
Load	ok
Load in stove	ok
Fuel adjustment	ok
Load Length approximately 5/6 of firebox Lenght	ok

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 2022-06-08 Manufacturer: Hearthstone Model: 8031
Project #: PT 20670 Run: 3 Tech: MR Reviewer: DP

Leakage Checks Tunnel Samplers

	System 1st hour		System 1		System 2	
Unplugged Flow Rate = .25cfm	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)
Vacuum (inches Hg.)	-10	-10	-10	-10	-10	-10
Final 1minute DGM (Liter)	646971.38	649018.65	646971.52	649018.76	395035.26	397031.65
Initial 1minute DGM (Liter)	646971.35	649018.60	646971.50	649018.76	395035.15	397031.60
Change (Liter)	0.03	0.05	0.02	∅	0.11	0.05
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)	0.20	0.20	0.20	0.20	0.20	0.20
Check OK	ok	ok	ok	ok	ok	ok

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 2022-06-08 Manufacturer: Hearthstone Model: 8031

Project #: PT 2022 Run: 3 Tech: JM Reviewer: DP

Leakage Checks Flue Gas Sampler

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

Leakage Checks Pitot

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

Scales checks

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Platform	EM-205	10,35 kg, Class F	10,35 kg lbs
Wood	EM-090	440 lbs, Class F	440 lbs
Analytical	EM-335	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%

POLYTESTS
TESTING THROUGH YOUR REALITY

CONTINUOUS ANALYZERS

Date: 2022-06-08 Manufacturer: Hearthstone Model: 8031

Project #: pT 20270 Run: 3 Tech: MM Reviewer: DP

FOR TUNNELS < 12 in

Barometric pressure (P_{bar}) 100.8 (KPa.) Static pressure (P_q) 0.18 (inches w.c.)
Inside diameter: Port A _____ Port B ____.
Tunnel cross sectional area: .1963Ft^2
Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H_2O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.072	71.48
B - Centroid	3.00	3.50	4	0.071	71.31
A-1	0.40	0.50	0.50	0.058	71.48
A-2	1.50	1.75	2	0.073	71.22
A-3	4.50	5.25	6	0.066	71.22
A-4	5.60	6.5	7.5	0.058	71.26
B-1	0.40	0.50	0.50	0.059	71.31
B-2	1.50	1.75	2	0.063	71.44
B-3	4.50	5.25	6	0.078	71.44
B-4	5.60	6.5	7.5	0.060	71.28
				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 H_2O)
T_s = average absolute dilution tunnel temperature (°F + 460)
P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{eg}$
P_q = static pressure $\frac{\text{in. } H_2O}{\{\ 13.6\ \}}$
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.

POLYTESTS
TESTING THROUGH YOUR REALITY

CONTINUOUS ANALYZERS

Date: 2022-06-08 Manufacturer: Hearthstone Model: 8031

Project #: PE 2270 Run: 3 Tech: MA Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
CO	0	0	3028	3.00	1024	1.00
Tolerance CO	0	+/- 0.02	0028	+/- 0.15	0024	+/- 0.05
CO_2	0	0	17.98	18.00	9.84	10.00
Tolerance CO2	0	+/- 0.02	002	+/- 0.5	016	+/- 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	3021	1009	0	0.02	0007	0.15	0015	0.05	✓	
CO_2	0	17.92	9.88	0	0.02	006	0.5	004	0.5	✓	

POLYTESTS
TESTING THROUGH YOUR REALITY

TEST DATA LOG

Date: 2024-06-08 Manufacturer: Hearthstone Model: 8031

Project #: PI 24-70 Run: 3 Tech: MM Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blanck
Final (Liter)	649018,11	397030,31	384703,18
Initial (Liter)	646972,37	375035,11	383012,78

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	100,8	100,6
Dry Bulb (F):	70,6	71,4
Humidity (%):	58,6	51,9

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

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

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2022-06-08 Manufacturer: Hearthstone Model: 8031

Project #: PE 20270 Run: 3 Tech: MA Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
1 ¼ x 3¼ x 14 in.	1086 lbs.	19.0	20.1	20.1	20.2	19.9
1 ¼ x 3¼ x 14 in.	1056 lbs.	22.0	21.6	22.3	22.4	22.3
1 ¼ x 3¼ x 14 in.	1442 lbs.	19.4	19.3	19.4	19.8	19.9
1 ¼ x 3¼ x 14 in.	1150 lbs.	21.6	21.3	21.4	22	21.8
1 ¼ x 3¼ x 14 in.	1500 lbs.	22.4	22.0	22.3	22.4	22.3
1 ¼ x 3¼ x 14 in.	1592 lbs.	21.4	21.3	21.6	21.2	21.3
1 ¼ x 3¼ x 14 in.	1418 lbs.	21.6	21.3	21.3	21.2	21.0
1 ¼ x 3¼ x 14 in.	1482 lbs.	19.1	19.3	19.6	19.8	19.4
1 ¼ x 3¼ x 14 in.	1546 lbs.	20.1	20.3	20.4	[illegible]	21.3
x x in.	lbs.					
1 ¼ x 3¼ x 14 in.	1238 lbs.	22.3	23.1	23.1	22.9	22.8
1 ¼ x 3¼ x 14 in.	1140 lbs.	22.4	22.6	22.8	22.7	21.3
1 ¼ x 3¼ x 14 in.	1136 lbs.	23.0	22.1	22.4	22.6	22.8
1 ¼ x 3¼ x 14 in.	1346 lbs.	20.1	20.2	20.4	20.6	20.3
1 ¼ x 3¼ x 14 in.	1482 lbs.	19.1	19.3	19.4	19.3	19.8
1 ¼ x 3¼ x 14 in.	1440 lbs.	19.4	19.8	19.7	19.7	19.6
1 ¼ x 3¼ x 14 in.	1390 lbs.	20.1	20.2	20.4	20.5	20.5
1 ¼ x 3¼ x 14 in.	1494 lbs.	19.6	19.7	19.6	19.8	19.8
1 ¼ x 3¼ x 14 in.	1436 lbs.	20.0	20.3	20.3	20.6	20.4
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 1226 + 12.13 lbs

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2022-06-08 Manufacturer: Hearthstone Model: 8031

Project #: PT 20 170 Run: 2 Tech: MP Reviewer: DP

FUEL DESCRIPTION:

Type of wood :

TEST LOAD

Piece Size	Weight		Meter Moisture Content (% dry)*				
1 ½ x 3 ½ x 15 in.	1398	lbs.	22	21	21	22	22
1 ½ x 3 ½ x 15 in.	1378	lbs.	23	23	23	23	22
1 ½ x 3 ½ x 15 in.	1322	lbs.	23	22	22	22	22
1 ½ x 3 ½ x 15 in.	3474	lbs.	23	22	22	22	23
1 ½ x 3 ½ x 15 in.	2652	lbs.	22	22	22	22	22
x x in.		lbs.					
1 ½ x ¾ x 5 in.	0128	lbs.			20		
1 ½ x ¾ x 5 in.	0128	lbs.			20		
1 ½ x ¾ x 5 in.	0164	lbs.			19		
1 ½ x ¾ x 5 in.	0140	lbs.			19		
1 ½ x ¾ x 5 in.	0134	lbs.			19		
1 ½ x ¾ x 5 in.	0128	lbs.			20		
1 ½ x ¾ x 5 in.	0138	lbs.			20		
1 ½ x ¾ x 5 in.	0140	lbs.			20		
1 ½ x ¾ x 5 in.	0128	lbs.			20		
1 ½ x ¾ x 5 in.	0138	lbs.			19		
1 ½ x ¾ x 5 in.	0116	lbs.			19		
1 ½ x ¾ x 5 in.	0118	lbs.			19		
1 ½ x ¾ x 5 in.	0116	lbs.			19		
1 ½ x ¾ x 5 in.	0158	lbs.			19		
1 ½ x ¾ x 5 in.	0168	lbs.			20		
1 ½ x ¾ x 5 in.	0148	lbs.			20		
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					

TEST LOAD WEIGHT: 14,29 lbs Min 20%: 2,86 Max 25%: 3,57

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2022-06-07 Manufacturer: Hearthstone Model: 8031

Project #: PI 20270 Run: 3 Tech: MM Reviewer: DP

		SYSTEM 1 – 1st 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	Blanck
Date	Time	17	300	301	4	18	302	303	8	306
2022-06-07	17:00	108 9464	0 1270	0 1271	34 4795	108 9466	0 1287	0 1270	34 9461	0 1288
2022-06-08	9:30	108 9424	0 1270	0 1270	34 4794	108 9467	0 1286	0 1269	34 9462	0 1288

		SYSTEM 1 – 1st 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	Blanck
Date	Time	17	300	301	4	18	302	303	8	306
2022-06-08	20:00	1089434	0 1282	0 1264	34 4840	108 9478	0 1288	0 1267	34 9506	0 1289
2022-06-13	9:00	108 9426	0 1282	0 1264	34 4809	108 9469	0 1287	0 1267	34 9475	0 1288
2022-06-14	9:00	108 9425	0 1282	0 1264	34 4809	108 9468	0 1287	0 1267	34 9475	0 1288

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2022-06-07 Manufacturer: Hearthstone Model: 8031

Project #: PT 20270 Run: 3 Tech: MA Reviewer: JP

		SYSTEM 2			
Pre-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	32	~~305~~ 304	305	41
2022-06-07	17:30	110,1286	0.1282	0.1256	34,9410
2022-06-08	9:00	110,1785	0.1283	0.1255	34,9409

		SYSTEM 2			
Post-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	32	304	305	41
2022-06-08	20:00	110,1793	0.1301	0.1250	34,9437
2022-06-13	9:30	110,1787	0.1299	0.1249	34,9428
2022-06-14	9:30	110,1787	0.1299	0.1250	34,9429

Paramètres

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

Code verrouillage:	HEA	

Description du test

Test standard	EPA	
Run #	3	
Date	08-06-2022	
Technicien	M.M	
Project #	PI 20270	

Description de l'unité

Manufacturier	HEARTHSTONE	
Modèle	8031	
Combustion system	Cat	
Appliance type	WOOD STOVE	
Firebox volume	1,9	cu ft.
Appliance weight empty	N.A	lbs
Appliance weight full	N.A	lbs

Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	N.A	BTU/h Donnée fournie par le manfacturier
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):	1,007	Dimensionless
Equipment number (DGM #1):	EM 178	
Calibration Factor (DGM #2):	1,005	Dimensionless
Equipment number (DGM #2):	EM 318	
Calibration Factor (DGM #3):	0,988	
Equipment number (DGM #3):	EM 179	Dimensionless

Tunnel

Targeted tunnel flow rate	350	scfm
Tunnel diameter	8	in.
Molecular weight	29	29 as per ASTM E2515
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	PI 20270
Date	08-06-2022
Technicien	M.M

Fuel data

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

Default Fuel Values

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

	Start	End
Barometer (kPa):	100,8	100,6
Barometer (in.Hg):	29,766229	29,70716882
Dry Bulb (F):	70,6	71,4
Humidity (%):	58,6	51,9
Air velocity (ft/min)	0	0

DGM #1	Final:	22919,859	cuft	Final:	649018,110	Liter
	Initial:	22847,614	cuft	Initial:	646972,370	Liter
DGM #2	Final:	14020,993	cuft	Final:	397030,310	Liter
	Initial:	13950,534	cuft	Initial:	395035,110	Liter
DGM room	Final:	13585,665	cuft	Final:	384703,180	Liter
	Initial:	13525,969	cuft	Initial:	383012,780	Liter

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent: 257

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

Project nu.	PI 20270
Date	08-06-2022
Technicien	M.M

Preload data sheet

Test Load Weight:

Lower	Ideal	Upper
11,97	13,30	14,63

Load Volume: 0,7401 cu. ft

Number of Spaces:

Spacer weight (lbs):

Loading Density: 12,839 lbs./ft3

Load Density (wet): 32,960 lbs./ft3

Dry Wood Density: 27,285935

Piece Size (in): Thick	Wide	x Length	Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x Weight	Volume Cubic Inches
1,5	3,5	14	1,086	19	20,1	20,1	20,2	19,9	21,56796	73,50
1,5	3,5	14	1,056	22	21,6	22,3	22,4	22,3	23,35872	73,50
1,5	3,5	14	1,442	19,4	19,3	19,4	19,8	19,9	28,20552	73,50
1,5	3,5	14	1,15	21,6	21,3	21,4	22	21,8	24,863	73,50
1,5	3,5	14	1,5	22,4	22	22,3	22,4	22,3	33,42	73,50
1,5	3,5	14	1,592	21,4	21,3	21,6	21,2	21,3	34,00512	73,50
1,5	3,5	14	1,418	21,6	21,3	21,3	21,2	21	30,17504	73,50
1,5	3,5	14	1,482	19,1	19,3	19,6	19,8	19,4	28,81008	73,50
1,5	3,5	14	1,546	20,1	20,3	20,4	21,4	21,3	32,0022	73,50
										0,00
1,4	3,5	14	1,238	22,3	23,1	23,1	22,9	22,8	28,27592	68,60
1,4	3,5	14	1,14	22,4	22,6	22,8	22,7	21,3	25,4904	68,60
1,4	3,5	14	1,136	23	22,1	22,4	22,6	22,8	25,65088	68,60
1,4	3,5	14	1,366	20,1	20,2	20,4	20,6	20,3	27,75712	68,60
1,4	3,5	14	1,482	19,1	19,3	19,4	19,3	19,8	28,72116	68,60
1,4	3,5	14	1,44	19,4	19,8	19,7	19,7	19,6	28,2816	68,60
1,4	3,5	14	1,39	20,1	20,2	20,4	20,5	20,5	28,2726	68,60
1,4	3,5	14	1,494	19,6	19,7	19,6	19,5	19,5	29,25252	68,60
1,4	3,5	14	1,436	20	20,3	20,3	20,6	20,4	29,17952	68,60
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
								SUM MC:	507,28936	

PreTest Load Weight: 24,39 lbs.

Dry Weight: 9,16 kg.

Average Moisture Content: %

Dry: 20,80

20,80
Must be 18-28

Wet: 17,22
must be 15,2-22

Project nu.	PI 20270
Date	08-06-2022
Technicien	M.M

FUEL LOAD DATA SHEET, CSA B415

Test Load Weight:

Lower	Ideal	Upper
12,0	13,3	14,6

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

Load Volume: 0,35 cu. ft

Loading Density: 7,5 lbs./ft3

Number of Spaces: 16

Spacer weight: lbs

Load Density (wet): 34,4 lbs./ft3

Dry Wood Density: 28,2 lbs./ft3

Piece Size (in): Thick	Wide	Length	Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x Weight	Volume Cubic Inches	Ave. MC %
1,5	3,5	15	1,40	22,10	21,90	21,80	22,30	22,10	30,81192	78,75	22,0
1,5	3,5	15	1,78	23,40	23,00	23,10	23,00	22,90	41,03624	78,75	23,1
1,5	3,5	15	1,72	23,10	22,80	22,80	22,40	22,30	39,05496	78,75	22,7
3,5	3,5	15	3,47	23,50	22,80	22,60	22,70	23,00	79,62408	183,75	22,9
3,5	3,5	15	3,65	22,50	22,60	22,00	22,30	22,40	81,65872	183,75	22,4
										0,00	
										0,00	
										0,00	

1,5	0,75	5	0,13			20,70			2,6496	5,63	20,7
1,5	0,75	5	0,13			20,30			2,5984	5,63	20,3
1,5	0,75	5	0,16			19,60			3,2144	5,63	19,6
1,5	0,75	5	0,15			19,80			2,8908	5,63	19,8
1,5	0,75	5	0,13			19,90			2,6666	5,63	19,9
1,5	0,75	5	0,13			20,00			2,56	5,63	20,0
1,5	0,75	5	0,14			20,10			2,7738	5,63	20,1
1,5	0,75	5	0,14			20,10			2,814	5,63	20,1
1,5	0,75	5	0,13			20,00			2,56	5,63	20,0
1,5	0,75	5	0,14			19,80			2,7324	5,63	19,8
1,5	0,75	5	0,12			19,70			2,2852	5,63	19,7
1,5	0,75	5	0,12			19,60			2,3128	5,63	19,6
1,5	0,75	5	0,17			19,80			3,2868	5,63	19,8
1,5	0,75	5	0,16			19,90			3,1442	5,63	19,9
1,5	0,75	5	0,17			20,00			3,36	5,63	20,0
1,5	0,75	5	0,17			20,00			3,36	5,63	20,0
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
								SUM MCx	317,39492		20,6 %

Test Load Weight: 14,29 lbs.

Dry Weight: 5,30 kg.

Average Moisture Content: %

Dry: 22,21 Dry(EPA) 22,21

Dry(B415 22,21

22,21
Must be 19-25

Wet: 18,17
must be 15,2-22

Coal Bed Range: 2,9 lbs. to 3,6 lbs.

TEST CHARGE:

Coal bed weight: 3 lbs.

Project nu.	PI 20270
Date	08-06-2022
Technicien	M.M

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	17	300	301	4	18	302	303	8	32	304	305	41	306		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	108,9424	0,1270	0,1271	34,4795	108,9466	0,1287	0,1270	34,9461	110,1786	0,1282	0,1256	34,9410	0,1288	2022-06-07	17:00
Before (6)	108,9424	0,1270	0,1270	34,4794	108,9467	0,1286	0,1269	34,9462	110,1785	0,1283	0,1255	34,9409	0,1288	2022-06-08	09:00
After (1)	108,9434	0,1282	0,1264	34,4840	108,9478	0,1288	0,1267	34,9506	110,1793	0,1301	0,1250	34,9437	0,1289	2022-06-08	20:00
After (2)	108,9426	0,1282	0,1264	34,4809	108,9469	0,1287	0,1267	34,9475	110,1787	0,1299	0,1249	34,9428	0,1288	2022-06-13	09:00
After (3)	108,9425	0,1282	0,1264	34,4809	108,9468	0,1287	0,1267	34,9475	110,1787	0,1299	0,1250	34,9429	0,1288	2022-06-14	09:00
After (4)															
After (5)															
After (6)	108,9425	0,1282	0,1264	34,4809	108,9468	0,1287	0,1267	34,9475	110,1787	0,1299	0,1250	34,9429	0,1288	2022-06-14	09:00
Difference	0,0001	0,0012	-0,0006	0,0015	0,0001	0,0001	-0,0002	0,0013	0,0002	0,0016	-0,0005	0,0020	0,0000		
Total (mg)		2,2				3,5				3,3			0		
Total ajusté (mg)		**2,20**				**3,50**				**3,30**					

Project nu.	PI 20270
Date	08-06-2022
Technicien	M.M

Demonstration Purpose Only Not real Numbers negative mass adjusted to Zero

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	17	300	301	4	18	302	303	8	32	304	305	41	306		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	108,9424	0,1270	0,1271	34,4795	108,9466	0,1287	0,1270	34,9461	110,1786	0,1282	0,1256	34,9410	0,1288	2022-06-07	17:00
Before (6)	108,9424	0,1270	0,1270	34,4794	108,9467	0,1286	0,1269	34,9462	110,1785	0,1283	0,1255	34,9409	0,1288	2022-06-08	09:00
After (1)	108,9434	0,1282	0,1264	34,4840	108,9478	0,1288	0,1267	34,9506	110,1793	0,1301	0,1250	34,9437	0,1289	2022-06-08	20:00
After (2)	108,9426	0,1282	0,1264	34,4809	108,9469	0,1287	0,1267	34,9475	110,1787	0,1299	0,1249	34,9428	0,1288	2022-06-13	09:00
After (3)	108,9425	0,1282	0,1264	34,4809	108,9468	0,1287	0,1267	34,9475	110,1787	0,1299	0,1250	34,9429	0,1288	2022-06-14	09:00
After (4)															
After (5)															
After (6)	108,9425	0,1282	0,1270	34,4809	108,9468	0,1287	0,1269	34,9475	110,1787	0,1299	0,1255	34,9429	0,1288	2022-06-14	09:00
Difference	0,0001	0,0012	0,0000	0,0015	0,0001	0,0001	0,0000	0,0013	0,0002	0,0016	0,0000	0,0020	0,0000		
Total (mg)		2,8				4,3				3,8			0		
Total ajusté (mg)		**2,80**				**4,30**				**3,80**					

Project nu.	PI 20270
Date	08-06-2022
Technicien	M.M

SFBA EPA EMISSION RESULTS

Test Duration: **375** min

PRESSURE FACTOR:	DGM 1	0,96486	
	DGM 2	0,96819	
	DGM 3	0,99387	
TEMPERATURE FACTORS	DGM 1	0,98492	
	DGM 2	0,97540	
	DGM 3	0,98564	
VOLUMES SAMPLED	DGM 1	69,105	SCft
	DGM 2	66,903	Scft
	DGM 3	57,787	SCft
TOTAL TUNNEL VOLUME :		132271	
SAMPLE RATIOS			
Sample Train 1:		1914,066	
Sample Train 2:		1977,057	
Paticulate concentration			
	Sample Train 1	**0,000051**	g/dscf
	Sample Train 2	**0,000049**	g/dscf
	Room	**0,000000**	g/dscf
TOTAL EMISSIONS			
Sample Train 1		**6,70**	g
Sample Train 2		**6,52**	g
EMISSION RATES			
Sample Train 1		**1,07**	g/hr
Sample Train 2		**1,04**	g/hr
1st hour emission rate		**4,21**	g/hr

	Train 1	Train 2
Cs	5,065E-05	4,93252E-05

RESULTS

Average emission rate: 1,1 g/hr

Burn Rate : 0,849 Dry kg/hr

BAROMETRIC PRESSURE

Average:	29,736699	In Hg
Start:	29,766229	In Hg
End:	29,707169	In Hg

DGM CONTROLLER VALUES

DGM 1	Final:	22919,859	Cuft
	Initial:	22847,614	Cuft
DGM 2	Final:	14020,993	Cuft
	Initial:	13950,534	Cuft
DGM #3	Final:	13585,665	Cuft
	Initial:	13525,969	Cuft

TEMPERATURES

DGM 1	536,084	°R
DGM 2	541,315	°R

CALIBRATION FACTORS

DGM 1	1,0066
DGM 2	1,0054
DGM #3	0,9882

TUNNEL FLOW RATE: 352,722 Dscfm

PARTICULATE CATCH

Total Sample Train 1:	3,50	mg
Total Sample Train 2:	3,30	mg
Total Sample Train 1 1st hour:	2,20	mg

DEVIATION: 1,32%

#		#	#	#	#	X1	X2	X3	X4	X5	X6	X7	X8	#	Zone Zone 1	ZONE 2	ZONE 3	Other 1	Zone Zone 2	ZONE 2	ZONE 3	Other 1	Vacuum in	Vacuum in	Vacuum in
Elapsed		Weight				Flue	Room	Tunnel	Limit	Limit	Limit	Limit	Limit	Cetal yet	Heating	Outlet T	Temp	Heating	Outlet T	Outlet T	Temp	Vessel Gas	Flue Gas	Surface
Time	New data row	Remaining	CO	CO_2	O_2	Gas	Temp	Dry Bulb	Time	Rate/s	Δ Rate	Rate/minute										Pressure	Pressure	Temp.
mm:ss		lbs	%	%	%	°F	°F	°F	hh:mm:ss	lbs	lbs	lbs	lbs	hh:mm:ss		°F	°F		°F	°F	°F	in wc	in wc	°F
0,00	2157,00	14,3	0,0	0,0	21,4	370,0	71,3	93,0	348,8	400,3	442,4	444,8	433,4	388,0	0,18	70,33	70,81	74,10	0,18	71,02	71,67	74,84	0,07	0,05	0
1,0	2158,0	14,2	0,4	1,8	412,3	361,2	71,6	80,8	346,8	400,0	440,4	443,8	431,1	444,6	0,18	70,81	70,80	73,80	0,18	71,24	72,82	74,41	0,07	0,05	-1,8020963
2,0	2159,0	14,1	0,3	3,4	410,7	370,1	71,4	80,0	344,4	397,1	439,4	441,8	430,8	446,8	0,18	70,81	70,97	73,40	0,18	71,48	72,82	74,31	0,08	0,06	-3,8113372
3,0	2160,0	14,1	0,1	3,6	408,8	378,0	71,3	80,0	346,0	393,7	437,7	439,8	430,8	885,2	0,18	70,67	71,01	73,48	0,18	71,68	73,03	74,34	0,08	0,06	-5,3339868
4,0	2161,0	14,0	0,1	3,0	408,4	386,0	71,4	81,3	341,3	390,1	434,3	437,7	429,4	446,3	0,18	70,75	71,03	73,60	0,18	71,84	73,14	74,38	0,08	0,06	-7,8458689
5,0	2162,0	14,0	0,1	4,3	407,4	370,8	71,4	78,8	338,8	386,8	430,1	433,8	427,8	442,8	0,18	70,79	71,07	73,40	0,18	72,06	73,23	74,23	0,08	0,06	-10,785700
6,0	2163,0	14,0	0,1	3,3	405,3	370,0	71,4	77,3	338,7	383,1	428,3	430,8	424,0	618,7	0,18	70,88	71,11	73,21	0,18	72,24	73,38	74,31	0,08	0,06	-14,027866
7,0	2164,0	13,9	0,0	1,9	397,1	342,0	71,6	77,0	333,7	378,9	421,3	427,3	424,8	888,8	0,18	71,13	71,18	73,17	0,18	72,67	73,80	73,86	0,08	0,06	-17,068841
8,0	2165,0	14,0	0,0	1,7	394,6	333,6	71,3	77,4	333,1	374,8	418,3	423,8	423,1	940,3	0,18	71,18	71,21	73,16	0,18	72,89	73,83	73,80	0,08	0,05	-19,5879
9,0	2166,0	13,9	0,1	1,7	391,6	336,8	71,4	77,4	331,8	371,1	414,8	419,8	423,1	824,4	0,18	71,19	71,21	73,20	0,18	73,08	73,72	73,89	0,08	0,05	-22,630363
10,0	2167,0	13,9	0,1	1,8	387,7	332,2	71,5	77,0	327,2	367,4	408,7	415,8	419,8	813,8	0,18	71,31	71,24	73,18	0,18	73,34	73,88	73,89	0,08	0,05	-24,445238
11,0	2168,0	13,8	0,1	1,8	384,6	317,3	71,3	76,0	328,3	362,8	404,0	411,4	417,8	832,8	0,18	71,39	71,28	73,14	0,18	73,48	73,99	73,82	0,08	0,04	-26,990312
12,0	2169,0	13,8	0,1	1,8	381,8	313,0	71,3	76,8	323,7	359,0	401,2	407,4	415,8	884,0	0,18	71,13	71,28	73,11	0,18	73,58	74,04	73,77	0,08	0,04	-32,638233
13,0	2170,0	13,8	0,1	1,8	378,4	306,3	71,1	76,4	322,0	355,2	398,4	403,0	413,8	884,7	0,18	71,08	71,23	73,11	0,18	73,67	74,11	73,73	0,07	0,04	-38,7972
14,0	2171,0	13,8	0,1	1,8	376,2	304,0	71,0	76,3	319,3	351,8	395,8	399,0	411,2	878,4	0,18	71,07	71,28	73,10	0,18	73,81	74,17	73,71	0,08	0,04	-39,037012
15,0	2172,0	13,8	0,2	1,7	371,7	303,4	71,2	76,3	315,8	347,8	389,8	395,2	410,8	884,1	0,18	71,13	71,23	73,03	0,18	74,02	74,28	73,67	0,08	0,04	-42,800231
16,0	2173,0	13,8	0,2	1,8	368,8	301,2	71,2	76,3	313,8	344,2	384,1	391,8	408,8	888,1	0,18	71,14	71,23	73,08	0,18	74,18	74,33	73,68	0,08	0,04	-45,338772
17,0	2174,0	13,8	0,1	1,8	365,4	299,3	71,0	76,3	310,6	340,8	380,1	387,3	407,8	838,7	0,18	71,38	71,34	73,04	0,18	74,41	74,44	73,68	0,08	0,04	-48,846827
18,0	2175,0	13,7	0,2	1,8	362,3	298,0	71,0	76,8	307,2	337,4	377,1	383,4	406,1	837,8	0,18	71,68	71,31	73,08	0,18	74,78	74,88	73,66	0,07	0,04	-51,65211
19,0	2176,0	13,7	0,3	1,7	359,2	296,7	70,9	77,4	304,3	333,8	373,7	379,8	404,8	836,8	0,18	71,83	71,37	73,14	0,18	75,03	74,73	73,78	0,07	0,04	-54,065308
20,0	2177,0	13,7	0,3	1,7	356,2	295,0	71,2	77,8	301,7	330,3	369,8	376,2	403,0	833,0	0,18	72,07	71,43	73,20	0,18	75,32	74,86	73,83	0,08	0,04	-57,098574
21,0	2178,0	13,7	0,3	1,7	352,8	293,0	71,4	77,8	299,8	327,3	365,8	372,3	401,7	482,3	0,18	72,31	71,81	73,28	0,18	75,67	75,04	73,89	0,08	0,04	-61,135866
22,0	2179,0	13,6	0,3	1,7	350,0	291,0	71,4	77,6	297,3	323,8	360,1	368,8	400,2	478,4	0,18	72,49	71,89	73,30	0,18	76,02	75,20	73,86	0,08	0,04	-64,181233
23,0	2180,0	13,6	0,2	1,7	347,2	288,0	71,6	77,8	294,8	320,4	356,7	365,4	398,7	481,0	0,18	72,70	71,66	73,34	0,18	76,17	75,27	73,87	0,08	0,04	-66,837808
24,0	2181,0	13,6	0,2	1,8	344,4	287,1	71,8	77,8	292,1	317,3	353,8	362,1	397,2	448,3	0,18	72,87	71,74	73,38	0,18	76,43	75,58	74,01	0,08	0,04	-69,756827
25,0	2182,0	13,6	0,2	2,0	341,6	286,0	71,8	77,7	289,7	314,3	349,8	358,8	396,7	443,8	0,18	73,03	71,83	73,44	0,18	76,68	75,88	74,07	0,08	0,04	-72,80141
26,0	2183,0	13,6	0,2	2,0	339,1	285,6	72,1	78,0	287,3	312,0	347,7	356,1	396,1	450,2	0,18	73,17	71,90	73,48	0,18	76,92	76,13	74,13	0,08	0,04	-75,845741
27,0	2184,0	13,6	0,3	2,0	336,3	285,2	72,3	77,8	285,0	307,8	344,3	353,4	395,4	478,3	0,18	73,31	72,01	73,58	0,18	77,13	76,38	74,18	0,08	0,04	-77,644464
28,0	2185,0	13,4	0,3	3,0	333,6	287,8	73,0	78,0	282,6	304,8	342,7	349,4	393,0	526,3	0,19	73,44	72,06	73,69	0,18	77,30	76,06	74,19	0,07	0,04	-80,27378
29,0	2186,0	13,4	0,3	3,8	331,8	290,6	73,0	78,2	280,7	301,8	340,6	346,8	388,2	574,1	0,19	73,33	72,11	73,68	0,18	77,30	76,18	74,28	0,08	0,04	-82,624636
30,0	2187,0	13,4	0,3	4,8	328,3	294,8	73,1	77,8	278,2	299,0	334,2	343,8	384,7	618,4	0,18	73,41	72,17	73,69	0,18	77,48	76,33	74,27	0,07	0,04	-85,886803
31,0	2188,0	13,3	0,1	3,8	324,1	296,8	73,1	78,2	276,2	296,3	332,2	340,8	383,2	687,8	0,19	73,61	72,24	73,72	0,18	77,72	76,47	74,31	0,08	0,04	-88,100004
32,0	2189,0	13,3	0,1	3,2	323,8	300,6	73,0	78,3	274,4	293,8	329,8	337,8	383,6	842,6	0,18	73,74	72,31	73,79	0,18	77,88	76,58	74,41	0,07	0,04	-90,405855
33,0	2190,0	13,3	0,1	3,1	321,3	300,0	73,3	78,0	271,7	290,8	327,8	336,3	382,0	817,8	0,18	73,81	72,37	73,83	0,18	77,99	76,71	74,40	0,08	0,04	-92,686671
34,0	2191,0	13,2	0,2	3,1	319,2	298,3	73,4	78,8	269,3	288,1	325,8	332,8	380,4	808,8	0,19	73,82	72,43	73,88	0,18	78,09	76,79	74,48	0,08	0,04	-95,022262
35,0	2192,0	13,2	0,2	3,1	317,2	296,1	73,3	78,4	267,8	285,8	324,2	330,4	378,4	484,8	0,19	73,88	72,48	73,92	0,18	78,23	76,89	74,53	0,08	0,04	-96,985949
36,0	2193,0	13,2	0,3	3,0	315,1	293,6	73,4	78,6	265,9	283,1	321,8	328,0	376,7	488,8	0,18	73,90	72,54	73,98	0,18	78,30	76,98	74,58	0,07	0,04	-99,0816
37,0	2194,0	13,2	0,3	3,0	312,8	291,6	73,4	78,6	263,7	280,8	319,4	325,3	374,1	492,8	0,18	73,94	72,59	74,03	0,18	78,36	77,04	74,63	0,08	0,04	-101,24468
38,0	2195,0	13,1	0,3	3,0	310,8	289,7	73,5	78,4	261,8	278,3	317,1	323,0	372,0	478,8	0,18	73,98	72,64	74,08	0,18	78,49	77,17	74,63	0,08	0,04	-103,43338
39,0	2196,0	13,1	0,4	3,1	308,7	288,4	73,4	78,4	259,8	276,2	314,8	320,6	372,0	418,8	0,18	74,00	72,71	74,11	0,18	78,56	77,28	74,68	0,07	0,03	-105,5166
40,0	2197,0	13,1	0,4	3,1	304,8	274,8	73,4	78,3	257,9	273,8	312,7	318,3	370,4	408,8	0,19	74,08	72,78	74,14	0,18	78,63	77,37	74,68	0,08	0,03	-107,6008
41,0	2198,0	13,0	0,4	3,2	304,8	272,8	73,4	78,4	256,1	271,8	310,4	314,1	368,8	408,1	0,18	74,09	72,79	74,18	0,18	78,70	77,42	74,72	0,08	0,03	-109,8799
42,0	2199,0	13,0	0,4	3,4	302,6	271,0	73,4	78,4	254,0	269,8	308,3	314,0	367,4	408,8	0,19	74,08	72,86	74,21	0,18	78,76	77,51	74,73	0,08	0,03	-111,9813
43,0	2200,0	13,0	0,4	3,7	300,8	270,1	73,5	78,2	252,8	267,3	306,8	311,8	365,8	416,1	0,19	74,16	72,89	74,23	0,18	78,87	77,58	74,74	0,08	0,04	-113,40884
44,0	2201,0	12,9	0,4	4,1	299,1	277,3	73,5	78,8	251,6	265,8	304,8	309,8	364,2	434,3	0,19	74,22	72,91	74,28	0,18	78,98	77,66	74,78	0,08	0,04	-118,0917
45,0	2202,0	12,9	0,4	4,3	297,3	283,6	73,5	78,7	249,8	263,1	302,7	307,8	362,7	506,3	0,19	74,27	73,00	74,34	0,18	79,06	77,76	74,84	0,08	0,04	-117,0454
46,0	2203,0	12,8	0,3	4,7	295,8	292,8	73,5	78,8	248,3	261,8	301,0	306,0	361,1	625,7	0,19	74,32	73,04	74,39	0,18	79,10	77,80	74,89	0,08	0,04	-118,7213
47,0	2204,0	12,7	0,2	5,0	293,7	302,8	73,5	79,2	246,7	259,3	299,3	304,3	359,8	668,3	0,19	74,33	73,07	74,46	0,18	79,13	77,84	74,93	0,08	0,04	-120,3015
48,0	2205,0	12,7	0,1	6,7	291,2	311,1	73,5	79,4	245,3	257,3	297,3	302,1	358,0	730,3	0,19	74,38	73,12	74,51	0,18	79,16	77,90	74,91	0,08	0,04	-122,12543
49,0	2206,0	12,7	0,1	7,1	290,8	318,0	73,6	79,7	244,6	255,8	295,8	300,4	356,3	761,1	0,19	74,38	73,16	74,57	0,18	79,18	77,94	75,06	0,08	0,05	-123,68
50,0	2207,0	12,6	0,1	7,0	289,0	323,0	73,8	79,8	243,4	253,7	294,2	298,8	354,8	774,0	0,19	74,39	73,19	74,62	0,18	79,22	77,99	75,18	0,08	0,05	-125,1867
51,0	2208,0	12,6	0,1	7,3	287,8	328,3	73,9	79,3	242,7	252,3	292,1	297,3	353,8	781,8	0,19	74,40	73,21	74,68	0,18	79,26	78,08	75,16	0,08	0,05	-126,6287
52,0	2209,0	12,4	0,1	7,2	286,8	332,3	73,1	78,6	242,7	250,3	291,3	296,3	351,7	769,8	0,19	74,38	73,28	74,68	0,18	79,28	78,14	75,18	0,07	0,05	-127,7413
53,0	2210,0	12,4	0,1	6,4	285,4	333,7	72,7	78,1	244,0	248,8	290,1	293,8	349,8	782,4	0,19	74,01	73,23	74,60	0,18	79,02	78,12	75,09	0,07	0,05	-128,8468
54,0	2211,0	12,4	0,1	6,2	284,1	336,6	73,0	78,0	242,8	247,8	288,4	292,8	348,8	799,8	0,19	73,94	73,23	74,64	0,18	78,86	78,18	75,12	0,07	0,05	-130,0676
55,0	2212,0	12,3	0,1	6,8	282,8	338,1	73,3	79,1	242,7	246,8	286,8	291,8	347,0	792,8	0,18	74,06	73,23	74,67	0,18	78,68	78,20	75,17	0,08	0,05	-131,3217
56,0	2213,0	12,2	0,1	7,0	282,2	341,0	73,3	78,8	244,6	245,3	285,3	290,6	345,8	828,7	0,18	74,17	73,28	74,72	0,18	79,02	78,28	75,28	0,08	0,05	-132,0031
57,0	2214,0	12,1	0,1	7,3	281,3	346,3	73,4	79,0	243,7	244,3	284,3	289,3	344,8	848,8	0,18	74,28	73,34	74,81	0,18	79,31	78,31	75,37	0,08	0,05	-132,9988
58,0	2215,0	12,1	0,1	7,6	280,3	349,3	73,5	80,2	243,0	242,8	282,8	287,8	343,6	857,8	0,18	74,37	73,32	74,91	0,18	79,17	78,44	75,46	0,08	0,05	-134,0163
59,0	2216,0	12,0	0,1	7,4	279,4	352,8	73,6	80,2	242,4	242,4	282,8	287,4	341,8	888,2	0,18	74,41	73,38	74,88	0,18	79,24	78,42	75,51	0,08	0,05	-134,8341
60,0	2217,0	11,9	0,1	8,3	278,7	357,0	73,8	80,8	244,7	241,8	280,8	286,4	340,6	881,0	0,18	74,43	73,41	75,09	0,18	79,27	78,81	75,86	0,08	0,05	-136,8238
61,0	2218,0	11,8	0,1	10,8	278,3	362,7	73,7	81,1	245,8	240,8	280,3	285,8	339,0	901,1	0,18	74,47	73,45	75,16	0,18	79,34	78,83	75,69	0,08	0,06	-138,9488
62,0	2219,0	11,7	0,1	11,4	277,9	368,3	73,7	81,1	247,1	239,8	279,8	284,8	337,7	906,8	0,18	74,47	73,47	75,26	0,18	79,37	78,90	75,77	0,08	0,06	-136,3178
63,0	2220,0	11,6	0,1	11,3	277,8	373,1	73,7	81,6	248,8	238,8	279,0	284,2	336,8	928,7	0,18	74,41	73,49	75,38	0,18	79,38	78,85	75,87	0,08	0,06	-136,6892
64,0	2221,0	11,5	0,1	11,2	277,8	378,5	73,7	81,6	250,0	238,0	278,0	283,4	335,2	924,2	0,18	74,41	73,52	75,40	0,18	79,40	78,87	75,84	0,08	0,06	-136,7061
65,0	2222,0	11,4	0,1	11,8	277,8	383,1	73,8	81,0	264,3	238,7	279,3	282,8	333,8	928,8	0,18	74,43	73,56	75,47	0,18	79,43	78,71	76,04	0,08	0,06	-136,4354
66,0	2223,0	11,3	0,1	11,7	277,0	387,0	73,8	82,8	256,8	238,7	278,8	282,3	332,8	934,8	0,18	74,47	73,57	75,55	0,18	79,48	78,75	76,13	0,08	0,06	-136,3063
67,0	2224,0	11,2	0,1	12,0	276,4	392,1	73,9	82,3	260,7	238,5	278,3	282,1	331,4	930,1	0,18	74,51	73,62	75,68	0,18	79,53	78,80	76,22	0,08	0,06	-136,7973
68,0	2225,0	11,1	0,1	11,8	276,1	396,4	73,9	82,3	264,3	238,7	278,3	282,1	330,8	935,7	0,18	74,57	73,64	75,71	0,18	79,59	78,84	76,27	0,07	0,06	-136,3138
69,0	2226,0	11,0	0,1	11,7	276,8	394,0	74,0	82,4	268,1	238,8	278,8	281,8	330,2	900,3	0,18	74,63	73,71	75,81	0,18	79,63	78,88	76,37	0,08	0,06	-134,7048
70,0	2227,0	10,9	0,1	11,8	280,4	396,0	74,0	82,8	272,4	238,0	280,2	282,1	329,1	884,2	0,18	74,69	73,70	75,84	0,18	79,63	78,85	76,42	0,08	0,06	-133,6138
71,0	2228,0	10,9	0,1	11,7	281,1	397,2	74,0	82,8	276,0	238,4	280,8	282,4	327,8	888,2	0,18	74,69	73,74	75,88	0,18	79,62	78,84	76,52	0,07	0,06	-133,1171
72,0	2229,0	10,8	0,1	11,8	282,2	397,8	74,0	82,0	280,6	238,8	281,6	282,8	326,6	877,8	0,18	74,78	73,77	76,04	0,18	79,68	79,00	76,62	0,08	0,06	-132,0248
73,0	2230,0	10,7	0,1	11,6	283,1	397,7	74,0	82,6	284,4	240,4	282,6	283,2	324,7	871,2	0,18	74,78	73,80	76,07	0,18	79,68	79,02	76,63	0,08	0,06	-131,1488
74,0	2231,0	10,6	0,1	11,1	284,3	397,1	74,1	82,8	288,3	240,8	283,7	284,1	323,8	868,7	0,19	74,78	73,83	76,14	0,18	79,66	79,08	76,72	0,08	0,06	-129,8646
75,0	2232,0	10,5	0,1	10,3	285,2	396,5	74,0	82,8	292,7	241,8	284,3	284,8	322,6	871,7	0,18	74,78	73,88	76,21	0,18	79,69	79,08	76,78	0,08	0,06	-129,0079
76,0	2233,0	10,4	0,1	9,7	286,4	395,6	74,0	82,7	297,1	242,2	285,6	285,8	321,4	869,1	0,18	74,72	73,89	76,24	0,18	79,70	79,13	76,81	0,08	0,06	-127,8103
77,0	2234,0	10,4	0,1	9,4	287,8	395,8	73,8	82,8	301,8	242,8	286,8	286,8	320,1	863,1	0,18	74,71	73,89	76,24	0,18	79,70	79,14	76,83	0,08	0,06	-126,6034
78,0	2235,0	10,3	0,1	9,4	288,7	392,8	74,0	83,0	305,8	243,8	288,1	287,8	319,0	862,4	0,18	74,68	73,91	76,43	0,18	79,70	79,13	76,86	0,08	0,06	-125,4778
79,0	2236,0	10,2	0,1	9,8	289,8	392,8	74,0	83,0	308,3	244,4	288,8	288,3	318,1	858,4	0,18	74,68	74,01	76,61	0,18	79,84	79,10	76,87	0,08	0,06	-124,4388
80,0	2237,0	10,1	0,1	10,0	290,7	391,0	74,3	82,8	312,4	248,0	289,6	288,8	317,1	857,3	0,18	74,68	74,03	76,63	0,18	79,83	79,28	76,87	0,08	0,06	-123,4836
81,0	2238,0	10,0	0,1	10,8	291,8	392,1	74,3	83,2	315,7	248,8	290,8	289,4	316,1	859,3	0,18	75,18	74,11	76,68	0,18	80,07	79,29	77,07	0,08	0,06	-122,4419
82,0	2239,0	9,9	0,1	11,1	292,7	392,8	74,4	83,3	318,8	248,8	291,2	291,2	315,1	861,8	0,18	75,21	74,13	76,19	0,18	80,10	79,34	77,13	0,08	0,05	-121,4762
83,0	2240,0	9,8	0,1	11,4	293,6	393,2	74,2	83,0	321,6	247,1	292,8	292,3	314,3	866,8	0,18	75,18	74,16	76,29	0,18	80,11	79,42	77,18	0,08	0,06	-120,8799
84,0	2241,0	9,8	0,1	11,6	294,4	395,2	74,2	83,0	323,8	247,8	293,6	293,2	313,3	872,1	0,18	75,28	74,19	76,38	0,18	80,14	79,52	77,18	0,08	0,06	-119,7918
85,0	2242,0	9,7	0,1	11,7	295,4	396,4	74,4	83,8	327,0	248,8	294,8	294,3	312,3	876,8	0,18	75,40	74,24	76,48	0,18	80,28	79,59	77,24	0,08	0,06	-118,8121
86,0	2243,0	9,6	0,1	11,7	296,8	396,6	74,6	83,8	330,6	249,3	296,6	295,3	311,3	884,2	0,18	75,44	74,29	76,62	0,18	80,30	79,62	77,28	0,07	0,06	-117,8821
87,0	2244,0	9,6	0,1	11,7	297,4	397,8	74,6	83,7	333,4	250,1	297,7	296,8	310,4	888,0	0,18	75,39	74,33	76,71	0,18	80,28	79,69	77,41	0,08	0,06	-116,778
88,0	2245,0	9,6	0,1	11,7	298,6	398,4	74,6	83,6	335,8	250,7	298,4	297,8	309,6	892,2	0,18	75,34	74,34	76,80	0,18	80,32	79,71	77,48	0,08	0,06	-116,0803
89,0	2246,0	9,5	0,1	11,7	299,8	398,7	74,7	83,6	338,8	251,8	301,1	299,1	308,8	894,7	0,18	75,33	74,37	76,91	0,18	80,34	79,75	77,55	0,08	0,06	-114,4382
90,0	2247,0	9,3	0,1	11,6	301,1	399,8	74,8	83,7	342,3	252,3	301,8	300,3	307,8	898,7	0,18	75,30	74,39	76,99	0,18	80,31	79,78	77,63	0,08	0,06	-113,1267
91,0	2248,0	9,1	0,1	11,6	302,2	399,0	74,8	83,0	344,6	253,1	304,8	301,8	306,7	883,3	0,19	75,29	74,41	76,10	0,18	80,32	79,80	77,89	0,08	0,06	-112,0044
92,0	2249,0	9,1	0,1	11,3	303,3	399,4	74,8	83,0	346,8	253,8	306,4	303,1	305,8	888,6	0,18	75,28	74,40	76,17	0,18	80,31	79,80	77,82	0,08	0,06	-110,0964
93,0	2250,0	9,0	0,1	11,3	304,8	399,8	74,8	83,0	350,3	254,7	308,3	304,8	304,8	888,2	0,18	75,29	74,43	76,28	0,18	80,30	79,82	77,88	0,08	0,06	-109,4748
94,0	2251,0	8,9	0,1	11,8	305,7	399,3	74,8	83,0	352,9	255,8	309,8	305,8	304,1	889,3	0,19	75,23	74,43	76,34	0,18	80,28	79,85	77,89	0,08	0,06	-108,8484
95,0	2252,0	8,8	0,1	11,8	306,8	399,3	74,8	84,0	355,6	256,3	311,8	307,3	303,3	893,3	0,19	75,21	74,47	76,41	0,18	80,32	79,86	77,76	0,07	0,06	-107,3483
96,0	2253,0	8,7	0,1	12,1	308,0	399,7	74,8	84,2	358,4	257,1	313,3	308,7	302,8	900,8	0,

108,0	483,0	3,4	0,2	7,4	378,6	236,0	76,8	83,7	347,3	383,8	434,3	441,4	301,2	740,8	0,10	77,00	76,88	78,66	0,18	82,46	82,71	79,41	0,08	0,04	-38,63368
109,0	484,0	3,4	0,2	7,5	374,7	236,7	76,8	83,4	346,0	382,5	433,0	440,8	301,3	739,4	0,10	77,03	76,87	78,68	0,18	82,52	82,74	79,42	0,08	0,04	-39,48833
110,0	487,0	3,4	0,2	7,5	373,6	236,1	76,8	83,6	343,8	381,8	431,7	439,7	301,5	737,6	0,10	77,04	76,80	78,68	0,18	82,54	82,74	79,40	0,08	0,04	-40,88828
111,0	488,0	3,4	0,2	7,4	372,8	236,0	76,8	83,4	342,4	380,8	431,1	438,8	301,5	737,7	0,10	77,04	76,80	78,60	0,18	82,51	82,76	79,38	0,08	0,04	-41,33767
112,0	489,0	3,3	0,2	7,5	372,0	234,6	76,8	83,4	341,1	380,1	430,2	438,1	301,6	738,7	0,10	76,99	76,88	78,64	0,18	82,44	82,76	79,38	0,08	0,04	-41,10388
113,0	470,0	3,3	0,2	7,4	371,1	234,6	76,8	83,3	339,6	348,1	426,2	437,3	301,6	738,8	0,10	76,98	76,82	78,64	0,18	82,44	82,77	79,40	0,08	0,03	-43,0879
114,0	471,0	3,3	0,2	7,5	370,3	234,6	76,8	83,5	338,0	348,8	426,7	436,7	301,7	739,3	0,10	77,03	76,81	78,68	0,18	82,50	82,80	79,40	0,08	0,04	-43,67903
115,0	472,0	3,3	0,2	7,4	369,4	234,6	76,8	83,2	336,7	348,0	427,2	435,4	301,7	741,6	0,10	77,00	76,83	78,64	0,18	82,51	82,78	79,40	0,08	0,04	-44,8011
116,0	473,0	3,3	0,2	7,4	368,6	233,8	76,8	83,2	335,8	346,8	426,4	434,4	301,8	742,1	0,10	77,23	76,87	78,64	0,18	82,59	82,77	79,38	0,08	0,04	-45,75899
117,0	474,0	3,3	0,2	7,4	367,8	233,8	76,7	82,7	334,6	345,7	426,3	433,8	301,8	741,8	0,10	77,29	76,70	78,63	0,18	82,59	82,77	79,36	0,08	0,04	-46,43079
118,0	475,0	3,3	0,3	7,3	367,1	233,8	76,7	83,8	333,8	342,7	424,7	433,8	301,8	742,8	0,10	77,21	76,69	78,64	0,18	82,58	82,78	79,36	0,08	0,04	-47,0791
119,0	476,0	3,3	0,2	7,2	366,4	233,8	76,7	83,6	332,8	341,8	423,6	432,2	301,8	744,8	0,10	77,17	76,70	78,67	0,18	82,64	82,78	79,39	0,08	0,04	-47,80869
120,0	477,0	3,2	0,3	7,4	365,6	233,7	76,7	83,4	331,0	340,8	423,0	431,8	301,8	748,8	0,10	77,14	76,71	78,69	0,18	82,58	82,83	79,40	0,08	0,04	-48,57926
121,0	478,0	3,2	0,3	7,4	364,8	233,6	76,8	83,0	329,7	339,7	420,7	430,2	302,0	748,7	0,10	77,19	76,72	78,69	0,18	82,61	82,83	79,40	0,08	0,04	-49,74892
122,0	479,0	3,2	0,3	7,5	363,4	233,7	76,8	82,9	327,7	338,8	419,3	429,3	302,1	748,7	0,10	77,48	76,77	78,63	0,18	82,77	82,81	79,32	0,08	0,04	-50,77731
123,0	480,0	3,2	0,3	7,4	362,6	233,8	76,8	83,1	327,1	337,7	418,0	428,8	302,1	748,7	0,10	77,48	76,79	78,64	0,18	82,77	82,84	79,38	0,08	0,04	-51,24518
124,0	481,0	3,2	0,3	7,3	361,8	234,3	76,8	83,4	326,3	336,6	416,2	428,2	302,0	748,0	0,10	77,37	76,80	78,68	0,18	82,73	82,87	79,36	0,08	0,04	-51,75028
125,0	482,0	3,2	0,3	7,3	361,4	234,3	76,8	83,6	325,0	335,7	418,3	427,2	302,0	748,6	0,10	77,28	76,80	78,67	0,18	82,66	82,80	79,32	0,08	0,04	-52,26456
126,0	483,0	3,2	0,3	7,3	360,8	234,2	76,8	83,6	323,9	334,8	418,1	426,3	302,0	749,5	0,10	77,41	76,84	78,68	0,18	82,73	82,80	79,32	0,08	0,04	-52,75418
127,0	484,0	3,1	0,2	7,4	360,4	234,1	76,7	83,8	323,6	333,6	417,2	426,2	302,0	752,5	0,10	77,43	76,84	79,00	0,18	82,73	82,83	79,36	0,08	0,04	-53,75818
128,0	485,0	3,1	0,3	7,4	359,8	233,8	76,8	83,4	321,8	332,8	416,3	424,7	302,0	754,8	0,10	77,38	76,88	78,99	0,18	82,71	82,82	79,38	0,07	0,04	-54,64464
129,0	486,0	3,1	0,3	7,4	359,0	233,8	76,8	83,8	321,3	332,0	415,8	424,1	301,9	755,0	0,10	77,33	76,88	79,01	0,18	82,71	82,85	79,40	0,08	0,04	-55,10655
130,0	487,0	3,1	0,3	7,4	358,2	233,8	76,8	83,4	319,8	331,4	414,8	423,1	302,0	753,4	0,10	77,34	76,87	79,02	0,18	82,73	82,84	79,40	0,08	0,04	-55,67834
131,0	488,0	3,0	0,3	7,4	357,7	233,0	76,4	83,3	319,6	330,8	413,7	422,3	302,1	748,8	0,10	77,39	76,87	79,03	0,18	82,78	82,87	79,42	0,08	0,04	-56,04888
132,0	489,0	3,1	0,3	7,4	356,8	232,7	76,8	83,2	317,6	329,8	412,8	421,7	302,1	743,2	0,10	77,48	76,89	79,08	0,18	82,78	83,01	79,40	0,08	0,04	-57,35881
133,0	490,0	3,0	0,3	7,4	356,2	232,3	76,7	83,4	316,4	328,2	411,8	420,8	302,3	740,3	0,10	77,40	76,81	79,08	0,18	82,78	83,02	79,41	0,08	0,04	-57,85862
134,0	491,0	3,0	0,3	7,4	355,7	232,1	76,8	83,8	315,7	328,7	411,8	420,1	302,3	740,3	0,10	77,37	76,81	79,08	0,18	82,78	83,03	79,42	0,08	0,04	-58,47379
135,0	492,0	3,0	0,2	7,4	355,0	231,6	76,7	83,2	315,0	328,2	410,3	419,1	302,3	741,1	0,10	77,40	76,81	79,08	0,18	82,78	83,04	79,42	0,08	0,04	-59,21842
136,0	493,0	3,0	0,2	7,4	354,5	231,6	76,7	83,2	313,4	327,7	410,3	418,6	302,4	741,8	0,10	77,40	76,81	79,04	0,18	82,81	83,06	79,42	0,08	0,04	-59,74144
137,0	494,0	3,0	0,2	7,3	353,8	231,6	76,8	83,3	313,0	326,7	409,7	418,0	302,5	741,8	0,10	77,40	76,81	79,04	0,18	82,79	83,08	79,42	0,08	0,04	-60,34618
138,0	495,0	3,0	0,2	7,3	353,3	231,3	76,8	83,1	311,6	326,7	409,0	417,1	302,3	739,8	0,10	77,37	76,84	79,09	0,18	82,73	83,03	79,42	0,08	0,04	-60,8982
139,0	496,0	3,0	0,2	7,3	352,8	231,6	76,8	83,3	310,9	326,4	408,3	416,3	302,1	739,1	0,10	77,41	76,83	79,07	0,18	82,78	83,03	79,43	0,08	0,04	-61,41184
140,0	497,0	3,0	0,3	7,3	352,1	232,7	76,8	83,2	311,0	326,1	408,4	416,0	302,0	738,3	0,10	77,48	76,84	79,11	0,18	82,80	83,02	79,46	0,07	0,04	-62,10709
141,0	498,0	1,0	0,3	7,3	351,6	230,1	76,8	83,4	309,8	325,8	408,1	414,4	301,8	736,7	0,10	77,39	76,87	79,11	0,18	82,84	83,06	79,48	0,08	0,04	-62,5738
142,0	499,0	1,0	0,3	7,2	351,1	229,8	76,8	83,3	308,6	325,8	408,3	413,8	301,7	736,8	0,10	77,64	77,00	79,09	0,18	82,90	83,10	79,44	0,08	0,04	-63,11216
143,0	500,0	1,0	0,3	7,2	350,4	230,3	76,8	83,3	307,1	325,2	408,3	413,8	301,6	743,8	0,10	77,82	77,08	79,13	0,18	83,03	83,08	79,48	0,08	0,04	-63,80622
144,0	501,0	1,0	0,2	7,2	350,1	231,2	77,0	83,1	307,0	324,7	408,3	411,8	301,3	748,3	0,10	77,86	77,06	79,12	0,18	83,08	83,00	79,43	0,08	0,04	-64,16858
145,0	502,0	1,0	0,2	7,2	349,8	231,4	77,0	83,5	304,5	324,4	404,8	411,8	301,3	749,8	0,10	77,77	77,08	79,18	0,18	83,04	83,03	79,48	0,08	0,04	-64,40859
146,0	503,0	1,0	0,2	7,2	349,3	231,0	77,0	83,7	304,6	324,1	404,8	410,8	301,1	750,2	0,10	77,71	77,11	79,21	0,18	83,12	83,07	79,46	0,07	0,04	-64,66413
147,0	504,0	1,0	0,2	7,2	348,9	231,6	77,0	83,6	304,0	324,0	404,0	410,8	300,9	750,1	0,10	77,71	77,13	79,23	0,18	83,12	83,11	79,47	0,08	0,04	-65,31841
148,0	505,0	1,0	0,2	7,2	348,3	231,8	76,8	83,2	303,7	323,8	403,8	409,8	300,8	749,3	0,10	77,63	77,10	79,17	0,18	83,08	83,13	79,47	0,08	0,04	-65,86014
149,0	506,0	1,0	0,2	7,2	347,7	232,1	76,8	83,0	302,8	323,4	402,4	409,2	300,8	748,1	0,10	77,61	77,11	79,18	0,18	83,03	83,12	79,47	0,08	0,04	-66,5368
150,0	507,0	1,0	0,2	7,1	347,2	232,1	76,8	83,1	301,3	323,2	402,1	408,8	300,7	747,2	0,10	77,60	77,11	79,18	0,18	82,97	83,12	79,47	0,08	0,04	-67,02678
151,0	508,0	1,0	0,3	7,1	346,8	232,1	76,8	83,4	301,4	322,8	401,8	407,8	300,8	747,3	0,10	77,64	77,09	79,22	0,18	82,96	83,11	79,47	0,08	0,04	-67,32347
152,0	509,0	1,0	0,3	7,1	346,4	232,2	76,8	83,8	300,8	322,8	401,3	407,3	300,8	747,3	0,10	77,83	77,10	79,24	0,18	82,96	83,18	79,53	0,08	0,04	-67,78941
153,0	510,0	1,0	0,3	7,1	346,0	232,2	76,8	83,3	299,9	322,3	400,8	406,8	300,4	748,2	0,10	77,88	77,13	79,23	0,18	82,98	83,18	79,51	0,08	0,04	-68,23188
154,0	511,0	1,0	0,3	7,1	345,6	232,7	76,8	83,1	299,1	322,3	400,8	406,8	300,3	749,4	0,10	77,88	77,13	79,23	0,18	82,98	83,16	79,51	0,08	0,04	-68,62462
155,0	512,0	1,7	0,3	7,1	345,1	232,0	76,8	83,2	298,3	321,8	400,0	406,1	300,3	749,3	0,10	77,84	77,13	79,24	0,18	83,02	83,18	79,51	0,08	0,04	-68,1379
156,0	513,0	1,7	0,3	7,1	344,7	232,6	76,8	83,2	297,8	321,5	399,8	404,4	300,0	749,0	0,10	77,85	77,14	79,26	0,18	83,03	83,20	79,51	0,08	0,04	-69,80293
157,0	514,0	1,7	0,3	7,1	344,4	232,6	76,8	83,3	297,7	321,4	399,8	404,4	299,8	748,7	0,10	77,87	77,16	79,27	0,18	83,08	83,20	79,52	0,08	0,04	-69,80118
158,0	515,0	1,7	0,3	7,0	344,0	232,1	76,8	83,8	297,2	321,0	399,6	403,8	299,6	731,3	0,10	77,82	77,17	79,28	0,18	83,13	83,20	79,54	0,08	0,04	-70,2499
159,0	516,0	1,7	0,3	6,8	343,4	231,8	76,8	83,7	296,3	320,7	398,8	402,3	299,4	738,0	0,10	77,68	77,19	79,31	0,18	83,18	83,21	79,56	0,08	0,04	-70,77814
160,0	517,0	1,7	0,3	6,8	342,9	231,0	76,8	83,6	295,3	320,5	397,9	401,8	299,2	744,0	0,10	77,69	77,20	79,34	0,18	83,18	83,23	79,57	0,08	0,04	-71,28281
161,0	518,0	1,6	0,3	6,8	342,5	231,0	76,8	83,6	295,0	320,2	397,5	401,0	299,0	749,2	0,10	77,70	77,22	79,38	0,18	83,18	83,23	79,58	0,08	0,04	-71,66042
162,0	519,0	1,6	0,3	6,8	341,8	232,3	76,8	83,4	294,3	320,1	396,8	400,1	298,8	754,3	0,10	77,78	77,24	79,38	0,18	83,23	83,22	79,57	0,08	0,04	-72,41881
163,0	520,0	1,6	0,4	6,8	341,3	232,5	76,8	83,6	292,7	319,8	396,6	399,3	298,8	758,3	0,10	77,81	77,27	79,38	0,18	83,26	83,17	79,59	0,08	0,04	-72,84612
164,0	521,0	1,6	0,4	6,8	341,0	233,0	76,8	83,6	292,8	319,6	396,3	398,8	298,7	758,8	0,10	77,86	77,29	79,38	0,18	83,23	83,18	79,61	0,08	0,04	-73,21282
165,0	522,0	1,6	0,4	6,8	340,6	233,1	76,8	83,7	292,3	319,3	396,2	398,0	298,4	759,3	0,10	77,82	77,30	79,36	0,18	83,24	83,17	79,62	0,08	0,04	-73,61778
166,0	523,0	1,6	0,4	6,8	340,3	233,6	76,8	83,8	291,8	318,8	394,7	397,3	298,2	759,8	0,10	77,79	77,30	79,40	0,18	83,29	83,21	79,65	0,07	0,04	-73,99011
167,0	524,0	1,6	0,4	6,8	339,8	233,8	76,8	83,3	291,4	318,8	393,9	396,8	298,1	759,8	0,10	77,76	77,32	79,42	0,18	83,28	83,19	79,63	0,08	0,04	-74,44703
168,0	525,0	1,6	0,4	6,8	339,5	233,7	76,8	83,5	290,1	318,2	393,7	396,5	297,9	759,8	0,10	77,80	77,34	79,38	0,18	83,28	83,21	79,63	0,08	0,04	-74,89693
169,0	526,0	1,6	0,4	6,8	338,8	234,1	77,0	83,7	289,3	318,2	393,2	395,3	297,8	759,8	0,10	77,88	77,33	79,39	0,18	83,28	83,16	79,63	0,08	0,04	-75,66584
170,0	527,0	1,6	0,4	7,2	338,2	234,6	76,8	83,6	288,6	318,2	391,6	394,7	297,7	763,1	0,10	77,81	77,33	79,42	0,18	83,21	83,18	79,65	0,08	0,04	-76,0477
171,0	528,0	1,6	0,3	7,3	337,9	234,6	76,8	83,8	288,4	317,8	391,5	394,2	297,6	742,3	0,10	77,79	77,34	79,42	0,18	83,23	83,17	79,67	0,08	0,04	-76,34182
172,0	529,0	1,6	0,3	7,2	337,3	232,8	76,8	83,7	287,4	317,7	390,7	393,3	297,4	720,1	0,10	77,79	77,35	79,43	0,18	83,21	83,20	79,68	0,08	0,04	-76,89811
173,0	530,0	1,6	0,3	7,2	337,1	232,2	77,0	83,8	287,6	317,4	390,5	392,8	297,2	713,8	0,10	77,83	77,37	79,42	0,18	83,24	83,20	79,69	0,08	0,04	-77,12009
174,0	531,0	1,6	0,3	7,1	336,9	231,1	76,8	83,4	286,1	317,3	389,8	392,1	297,1	712,3	0,10	77,79	77,36	79,43	0,18	83,21	83,22	79,68	0,08	0,04	-77,31112
175,0	532,0	1,6	0,3	7,1	336,3	229,9	76,8	83,3	286,7	317,2	389,3	391,4	296,9	711,6	0,10	77,86	77,38	79,40	0,18	83,20	83,24	79,68	0,08	0,04	-77,86444
176,0	533,0	1,4	0,3	7,0	336,0	229,0	76,8	83,8	286,6	317,2	389,1	390,8	296,7	710,8	0,10	77,83	77,40	79,39	0,18	83,28	83,23	79,67	0,08	0,04	-78,22241
177,0	534,0	1,4	0,3	6,9	335,7	228,4	77,0	83,8	286,4	316,8	388,8	390,4	296,6	710,1	0,10	77,82	77,41	79,39	0,18	83,28	83,24	79,68	0,08	0,04	-78,47035
178,0	535,0	1,4	0,3	7,0	335,3	228,1	76,8	83,6	286,3	316,8	388,3	389,8	296,3	709,3	0,10	77,84	77,41	79,40	0,18	83,22	83,24	79,67	0,08	0,04	-78,71268
179,0	536,0	1,4	0,3	7,0	335,0	228,1	76,7	83,6	286,3	316,7	388,0	389,4	296,2	731,8	0,10	77,84	77,40	79,43	0,18	83,21	83,26	79,68	0,08	0,04	-78,95528
180,0	537,0	1,4	0,3	7,0	334,4	228,0	76,8	83,7	284,8	316,6	386,0	387,8	296,7	733,8	0,10	77,82	77,48	79,47	0,18	83,23	83,30	79,70	0,08	0,04	-79,82084
181,0	538,0	1,4	0,3	7,1	333,8	228,8	77,0	83,3	283,7	316,6	385,8	387,1	296,4	734,6	0,10	78,04	77,47	79,44	0,18	83,32	83,37	79,68	0,08	0,04	-80,28808
182,0	539,0	1,3	0,3	7,0	333,6	228,0	77,0	83,7	283,3	316,0	385,6	386,8	296,4	734,2	0,10	78,10	77,80	79,46	0,18	83,36	83,38	79,71	0,08	0,04	-80,68681
183,0	540,0	1,3	0,3	7,0	333,4	228,0	77,1	83,8	283,2	315,8	385,4	386,2	296,3	733,0	0,10	78,07	77,47	79,46	0,18	83,37	83,36	79,70	0,07	0,04	-80,80382
184,0	541,0	1,3	0,3	6,9	332,8	228,6	76,9	83,7	282,3	315,8	384,6	385,8	296,4	732,4	0,10	78,06	77,80	79,49	0,18	83,38	83,39	79,74	0,08	0,04	-81,20239
185,0	542,0	1,3	0,3	6,9	332,4	228,2	76,8	83,4	281,8	315,7	385,3	384,9	296,4	732,3	0,10	78,07	77,83	79,47	0,18	83,37	83,43	79,73	0,08	0,04	-81,7579
186,0	543,0	1,3	0,3	7,0	332,3	227,9	77,1	83,8	281,7	315,5	385,4	384,4	296,4	732,1	0,10	78,14	77,83	79,49	0,18	83,40	83,44	79,72	0,08	0,04	-81,83591
187,0	544,0	1,3	0,3	7,0	332,0	228,2	77,0	83,7	282,3	315,3	385,4	384,0	296,1	732,1	0,10	78,14	77,85	79,48	0,18	83,40	83,43	79,73	0,07	0,04	-81,88837
188,0	545,0	1,3	0,3	7,0	331,8	228,1	77,0	83,8	281,8	315,2	385,1	383,5	296,1	731,4	0,10	78,06	77,83	79,53	0,18	83,38	83,45	79,74	0,08	0,04	-82,30445
189,0	546,0	1,2	0,3	7,0	331,5	228,1	76,8	83,6	280,6	315,1	382,4	383,1	296,1	731,1	0,10	78,07	77,84	79,54	0,18	83,37	83,43	79,77	0,08	0,04	-82,71314
190,0	547,0	1,2	0,3	7,0	330,8	228,1	76,7	83,7	279,7	315,0	381,8	382,2	296,0	730,0	0,10	78,17	77,85	79,53	0,18	83,38	83,39	79,78	0,08	0,04	-83,29392
191,0	548,0	1,2	0,3	7,0	330,7	227,7	77,0	83,8	279,4	314,7	381,1	382,2	296,0	728,8	0,10	78,23	77,87	79,58	0,18	83,40	83,39	79,81	0,08	0,04	-83,83466
192,0	549,0	1,2	0,3	7,0	330,4	227,7	77,1	83,9	279,6	314,6	380,7	381,4	296,0	727,4	0,10	78,20	77,89	79,62	0,18	83,42	83,40	79,83	0,08	0,04	-83,78817
193,0	550,0	1,2	0,3	6,9	330,1	227,7	77,2	84,0	279,1	314,3	380,4	380,8	295,9	728,2	0,10	78,16	77,88	79,61	0,18	83,44	83,40	79,83	0,08	0,04	-84,06281
194,0	551,0	1,2	0,3	7,0	329,7	228,3	77,1	84,0	278,3	314,2	379,8	380,3	295,8	722,3	0,10	78,13	77,88	79,60	0,18	83,48	83,42	79,86	0,08	0,04	-84,49181
195,0	552,0	1,1	0,2	6,1	329,5	227,2	77,1	84,0	278,2	314,0	379,6	379,8	295,6	687,3	0,10	78,12	77,81	79,63	0,18	83,48	83,43	79,89	0,08	0,04	-84,78578
196,0	553,0	1,1	0,2	7,0	329,3	228,4	77,1	84,0	278,2	313,8	379,6	379,3	295,6	682,4	0,10	78,08	77,82	79,63	0,18	83,48	83,39	79,89	0,08	0,04	-84,84768
197,0	554,0	1,1	0,2	7,7	329,1	224,0	77,1	83,8	277,8	313,7	379,2	379,3	295,6	677,5	0,10	78,07	77,82	79,64	0,18	83,48	83,42	79,91	0,08	0,04	-85,14432
198,0	555,0	1,1	0,2	7,6	328,8	222,7	77,1	83,6	277,4	313,7	378,8	378,8	295,6	674,3	0,10	78,04	77,83	79,64	0,18	83,48	83,43	79,89	0,08	0,04	-85,45648
199,0	556,0	1,0	0,2	7,5	328,6	222,0	77,1	83,6	277,0	313,2	378,8	378,4	295,7	676,2	0,10	78,08	77,82	79,64	0,18	83,37	83,40	79,88	0,08	0,04	-85,64416
200,0	557,0	1,0	0,2	7,4	328,2	221,1	77,0	83,4	276,4	313,1	377,9	378,0	295,8	678,8	0,10	78,04	77,83	79,68	0,18	83,36	83,41	79,87	0,08	0,04	-85,87434
201,0	558,0	1,0	0,2	7,4	327,8	220,6	77,1	83,7	276,0	312,7	377,4	377,7	295,8	678,1	0,10	78,04	77,82	79,67	0,18	83,34	83,40	79,86	0,08	0,04	-86,27092
202,0	559,0	1,0	0,3	7,4	327,8	219,6	77,1	83,6	275,3	312,3	377,0	377,3	296,0	676,3	0,10	78,04	77,81	79,68	0,18	83,30	83,40	79,80	0,08	0,04	-86,48188
203,0	560,0	1,0	0,3	7,3	327,7	219,4	77,1	83,6	275,4	311,8	376,3	377,3	295,8	677,7	0,10	78,02	77,81	79,71	0,18	83,31	83,41	79,80	0,08	0,04	-86,68809
204,0	561,0	1,0	0,3	7,3	327,6	218,8	77,1	83,7	275,3	311,8	376,3	377,2	296,0	677,8	0,10	78,02	77,81	79,71	0,18	83,38	83,42	79,88	0,08	0,04	-86,88915
205,0	562,0	1,0	0,3	7,1	327,7	219,0	77,1	83,4	275,7	311,5	376,3	376,8	296,1	678,8	0,10	78,04	77,84	79,72	0,18	83,37	83,44	79,81	0,08	0,04	-86,89117
206,0	563,0	1,0	0,3	7,0	327,4	218,6	77,0	83,7	275,0	311,7	376,3	376,8	296,1	678,8	0,10	78,01	77,86	79,71	0,18	83,37	83,46	79,81	0,08	0,04	-86,8099
207,0	564,0	1,0	0,3	7,0	327,1	218,0	77,1	83,7	274,1	310,4	376,3	376,3	296,3	677,7	0,10	78,00	77,86	79,73	0,18

314,0	571,0	0,0	0,2	7,0	324,3	317,8	77,3	83,8	272,4	307,8	378,7	378,2	267,6	478,4	0,10	78,32	77,77	79,01	0,18	83,43	83,38	79,88	0,08	0,04	-87,85848
315,0	572,0	0,0	0,2	7,1	324,0	317,1	77,2	83,8	271,7	307,3	378,3	378,1	267,8	479,4	0,10	78,32	77,76	79,00	0,18	83,48	83,39	79,88	0,08	0,04	-88,16716
316,0	573,0	0,0	0,2	7,0	323,7	316,4	77,0	83,4	271,2	307,2	377,1	374,7	268,3	481,0	0,10	78,37	77,76	79,78	0,18	83,46	83,39	79,88	0,08	0,04	-88,81337
317,0	574,0	0,0	0,2	7,0	323,7	316,1	77,0	83,3	271,3	306,7	377,2	374,8	268,6	483,3	0,10	78,34	77,81	79,81	0,18	83,54	83,39	79,83	0,08	0,04	-88,8082
318,0	575,0	0,8	0,2	6,9	323,8	316,3	77,3	83,6	270,4	306,3	377,5	374,8	269,0	485,1	0,10	78,38	77,88	79,82	0,18	83,60	83,42	79,86	0,07	0,04	-88,66089
319,0	576,0	0,8	0,2	7,0	323,3	316,1	77,2	83,6	269,8	306,0	377,3	374,2	269,4	486,4	0,10	78,36	77,87	79,86	0,18	83,64	83,43	80,00	0,08	0,04	-88,88833
320,0	577,0	0,8	0,2	7,0	323,4	316,3	77,1	83,7	269,0	305,8	377,8	374,1	269,7	488,3	0,10	78,48	77,88	79,84	0,18	83,61	83,48	79,87	0,08	0,04	-88,76764
321,0	578,0	0,8	0,2	7,0	323,1	316,0	77,4	83,8	269,0	305,1	377,3	374,1	300,1	488,8	0,10	78,48	77,81	79,87	0,18	83,62	83,48	80,00	0,08	0,04	-89,04611
322,0	579,0	0,8	0,2	7,0	323,1	316,2	77,4	83,6	268,6	304,8	377,6	373,8	300,4	489,2	0,10	78,47	77,83	79,86	0,18	83,62	83,53	79,90	0,07	0,04	-89,067735
323,0	580,0	0,7	0,2	7,0	323,7	316,1	77,2	83,4	268,3	304,5	376,8	373,4	300,8	488,8	0,10	78,50	77,82	79,88	0,18	83,68	83,53	80,00	0,08	0,04	-89,46798
324,0	581,0	0,7	0,2	7,1	324,7	315,9	77,2	83,6	267,8	304,1	376,7	373,8	301,2	488,8	0,10	78,54	77,83	79,86	0,18	83,72	83,51	80,02	0,08	0,04	-89,81122
325,0	582,0	0,7	0,2	7,1	324,8	315,8	77,3	83,6	267,3	303,8	376,4	373,3	301,7	484,8	0,10	78,55	77,85	79,86	0,18	83,71	83,52	80,01	0,08	0,04	-89,71807
326,0	583,0	0,7	0,2	7,2	324,8	315,6	77,3	83,6	267,3	303,4	376,7	373,3	302,0	485,3	0,10	78,57	77,84	79,88	0,18	83,72	83,50	80,01	0,08	0,04	-89,66871
327,0	584,0	0,7	0,2	7,2	324,4	315,7	77,3	83,7	266,7	303,0	376,6	373,2	302,4	484,8	0,10	78,50	77,87	79,87	0,18	83,73	83,51	80,07	0,08	0,04	-89,62443
328,0	585,0	0,7	0,2	7,2	324,3	316,0	77,3	83,7	266,8	302,8	376,7	373,1	302,7	479,2	0,10	78,42	77,84	79,86	0,18	83,71	83,47	80,04	0,07	0,04	-89,85634
329,0	586,0	0,7	0,2	7,2	324,3	315,6	77,3	83,8	266,0	302,6	376,7	372,9	303,1	481,8	0,10	78,37	77,82	79,88	0,18	83,70	83,46	80,06	0,08	0,04	-89,82158
330,0	587,0	0,7	0,2	7,1	324,2	314,6	77,3	83,7	265,7	302,3	376,7	373,0	303,6	488,0	0,10	78,38	77,83	79,88	0,18	83,70	83,43	80,08	0,08	0,04	-89,84758
331,0	588,0	0,6	0,2	7,0	324,1	313,7	77,3	83,8	265,3	301,8	376,6	373,0	303,9	482,8	0,10	78,40	77,82	79,88	0,18	83,71	83,40	80,08	0,07	0,04	-90,0857
332,0	589,0	0,6	0,2	7,0	324,2	313,1	77,1	83,6	265,2	301,8	376,3	373,1	304,4	482,1	0,10	78,42	77,83	79,88	0,18	83,78	83,40	80,08	0,08	0,04	-90,05858
333,0	590,0	0,6	0,2	7,0	324,1	312,8	77,1	83,7	264,8	301,6	376,4	373,1	304,8	483,6	0,10	78,48	77,83	79,84	0,18	83,78	83,40	80,09	0,08	0,04	-90,03803
334,0	591,0	0,6	0,2	7,0	324,2	312,6	77,1	83,8	264,8	301,4	376,4	373,2	305,3	488,4	0,10	78,44	77,82	79,88	0,18	83,78	83,37	80,10	0,08	0,04	-90,08179
335,0	592,0	0,6	0,2	7,1	324,1	312,2	77,1	83,8	264,3	301,3	376,1	373,3	305,7	486,4	0,10	78,48	77,84	79,86	0,18	83,82	83,39	80,09	0,08	0,04	-90,06622
336,0	593,0	0,6	0,2	7,1	324,0	312,1	77,1	83,8	263,7	301,0	375,8	373,4	306,2	487,6	0,10	78,47	77,84	79,88	0,18	83,81	83,40	80,07	0,08	0,04	-90,18068
337,0	594,0	0,6	0,2	7,1	324,0	311,8	77,2	83,6	263,4	300,7	375,8	373,8	306,7	486,8	0,10	78,47	77,84	79,88	0,18	83,83	83,42	80,10	0,08	0,04	-90,16721
338,0	595,0	0,6	0,2	7,1	324,0	311,5	77,2	83,6	262,9	300,8	375,8	373,7	307,2	488,4	0,10	78,51	77,87	79,84	0,18	83,80	83,43	80,09	0,07	0,04	-90,17888
339,0	596,0	0,6	0,2	7,1	324,1	311,3	77,1	83,6	262,8	300,8	375,8	373,8	307,7	486,1	0,10	78,53	77,88	79,86	0,18	83,81	83,42	80,10	0,08	0,04	-90,07812
340,0	597,0	0,6	0,2	7,1	324,1	311,1	77,2	83,7	262,4	300,3	375,2	374,1	308,2	487,8	0,18	78,53	77,88	79,87	0,18	83,80	83,42	80,12	0,08	0,04	-90,1494
341,0	598,0	0,6	0,2	7,2	324,1	311,3	77,2	83,6	262,1	300,1	375,3	374,4	308,8	486,7	0,18	78,50	77,89	79,83	0,18	83,88	83,44	80,13	0,08	0,04	-90,08655
342,0	599,0	0,6	0,2	7,2	324,1	311,2	77,2	83,6	261,8	300,0	375,1	374,8	309,3	481,2	0,10	78,54	77,90	79,88	0,18	83,89	83,42	80,13	0,08	0,04	-90,0611
343,0	600,0	0,6	0,2	7,2	324,1	311,2	77,1	83,5	261,3	299,8	374,7	374,8	309,8	481,8	0,10	78,51	77,90	79,88	0,18	83,91	83,45	80,14	0,08	0,04	-90,11883
344,0	601,0	0,6	0,2	7,2	324,1	311,2	77,1	83,6	260,8	299,7	374,8	375,1	310,4	480,0	0,10	78,52	77,88	79,84	0,18	83,92	83,46	80,13	0,08	0,04	-90,1378
345,0	602,0	0,6	0,2	7,2	324,1	311,5	77,1	83,7	260,8	299,4	374,1	375,5	310,8	480,1	0,10	78,50	77,88	79,86	0,18	83,91	83,46	80,18	0,08	0,04	-90,12672
346,0	603,0	0,4	0,2	7,2	324,0	311,2	77,1	83,6	260,0	299,3	373,7	375,7	311,4	480,3	0,10	78,51	77,89	79,84	0,18	83,98	83,47	80,13	0,07	0,04	-90,16888
347,0	604,0	0,4	0,2	7,2	324,1	311,2	77,1	83,5	259,8	299,2	373,7	376,0	312,0	480,2	0,18	78,53	78,01	79,84	0,18	83,98	83,50	80,13	0,08	0,04	-90,07967
348,0	605,0	0,4	0,2	7,1	324,1	311,3	77,1	83,5	259,5	299,1	373,4	376,1	312,5	480,8	0,10	78,55	78,04	79,85	0,18	84,03	83,51	80,13	0,08	0,04	-90,08439
349,0	606,0	0,4	0,2	7,1	324,1	311,2	77,1	83,4	259,1	299,0	373,3	376,4	313,0	480,4	0,10	78,54	78,03	79,84	0,18	84,03	83,52	80,14	0,08	0,04	-90,04108
350,0	607,0	0,4	0,2	7,1	324,2	311,4	77,1	83,5	258,8	298,8	373,0	376,7	313,4	480,1	0,10	78,53	78,08	79,84	0,18	84,08	83,53	80,14	0,07	0,04	-90,00489
351,0	608,0	0,4	0,2	7,2	324,3	311,5	77,1	83,6	258,5	298,8	372,8	376,8	313,8	480,3	0,10	78,55	78,08	79,87	0,18	84,08	83,51	80,18	0,07	0,04	-90,04858
352,0	609,0	0,3	0,2	7,1	324,1	311,4	77,1	83,7	258,0	298,7	372,4	377,1	314,4	482,4	0,10	78,54	78,04	79,87	0,18	84,09	83,53	80,17	0,07	0,04	-90,09038
353,0	610,0	0,3	0,2	7,1	324,0	311,6	77,1	83,6	257,4	298,4	371,7	377,2	314,8	484,2	0,10	78,56	78,07	79,87	0,18	84,10	83,54	80,16	0,08	0,04	-90,24831
354,0	611,0	0,3	0,2	7,1	324,0	311,5	77,0	83,6	257,4	298,5	371,3	377,4	315,3	484,3	0,10	78,55	78,07	79,86	0,18	84,08	83,52	80,18	0,08	0,04	-90,23233
355,0	612,0	0,3	0,2	7,1	323,8	311,8	76,9	83,6	256,8	298,5	370,7	377,5	315,9	483,0	0,10	78,48	78,04	79,88	0,18	83,97	83,58	80,16	0,08	0,04	-90,30988
356,0	613,0	0,3	0,2	7,1	323,8	311,8	77,1	83,6	256,3	298,3	370,4	377,4	316,4	483,2	0,10	78,53	78,04	79,88	0,18	84,02	83,57	80,14	0,08	0,04	-90,4058
357,0	614,0	0,3	0,2	7,1	323,8	311,7	77,2	83,5	256,3	298,1	370,0	377,8	316,9	483,3	0,10	78,57	78,06	79,88	0,18	84,02	83,59	80,18	0,08	0,04	-90,42287
358,0	615,0	0,3	0,2	7,2	323,7	311,6	77,1	83,4	256,1	298,0	369,6	377,4	317,3	482,7	0,10	78,50	78,08	79,83	0,18	83,96	83,58	80,18	0,08	0,04	-90,46722
359,0	616,0	0,2	0,2	7,2	323,7	311,6	77,1	83,5	255,8	297,8	369,7	377,2	317,6	484,2	0,10	78,48	78,07	79,88	0,18	83,96	83,57	80,14	0,08	0,04	-90,48627
360,0	617,0	0,2	0,2	7,2	323,6	311,8	77,1	83,6	255,3	297,7	369,1	377,8	318,0	484,3	0,10	78,48	78,08	79,86	0,18	83,96	83,55	80,18	0,08	0,04	-90,43856
361,0	618,0	0,2	0,2	7,2	323,7	312,0	77,1	83,7	255,3	297,6	369,3	377,8	318,4	486,8	0,10	78,47	78,10	79,88	0,18	83,97	83,54	80,18	0,07	0,04	-90,5198
362,0	619,0	0,2	0,2	7,2	323,8	312,4	77,1	83,6	254,9	297,3	368,8	378,0	318,8	487,8	0,10	78,48	78,10	79,88	0,18	83,98	83,53	80,18	0,07	0,04	-90,45448
363,0	620,0	0,2	0,2	7,2	323,8	312,4	77,1	83,5	254,5	297,3	368,8	377,8	319,1	488,2	0,10	78,49	78,08	79,87	0,18	83,98	83,54	80,18	0,08	0,04	-90,71211
364,0	621,0	0,2	0,2	7,2	323,4	312,6	77,1	83,7	254,4	297,2	368,3	378,0	319,5	488,2	0,10	78,54	78,09	79,89	0,18	84,01	83,53	80,18	0,08	0,04	-90,78662
365,0	622,0	0,2	0,2	7,0	323,4	312,8	77,1	83,7	254,1	297,2	367,8	378,1	319,8	488,3	0,10	78,54	78,08	79,88	0,18	83,99	83,54	80,18	0,08	0,04	-90,78067
366,0	623,0	0,1	0,2	6,9	323,4	312,9	77,1	83,8	254,2	297,2	367,8	378,1	320,1	470,8	0,10	78,54	78,07	79,89	0,18	83,98	83,54	80,23	0,08	0,04	-90,80264
367,0	624,0	0,1	0,2	6,8	323,3	313,2	77,1	83,6	254,0	297,1	367,1	378,1	320,5	474,7	0,10	78,57	78,10	79,89	0,18	84,01	83,55	80,21	0,08	0,04	-90,85567
368,0	625,0	0,1	0,2	6,7	323,3	313,3	77,2	83,6	253,9	296,9	366,9	378,1	320,8	478,1	0,10	78,58	78,08	79,87	0,18	84,01	83,54	80,21	0,08	0,04	-90,8781
369,0	626,0	0,1	0,2	6,7	323,3	313,0	77,1	83,8	253,8	296,8	366,5	378,1	321,1	479,8	0,10	78,58	78,08	79,91	0,18	84,08	83,56	80,23	0,08	0,04	-90,84436
370,0	627,0	0,1	0,2	6,7	323,2	314,2	77,1	83,6	253,8	296,8	366,1	377,8	321,3	480,8	0,10	78,59	78,08	79,87	0,18	84,08	83,58	80,21	0,07	0,04	-91,03456
371,0	628,0	0,1	0,2	6,6	323,1	314,8	77,1	83,7	253,7	296,7	365,8	377,8	321,6	480,8	0,10	78,61	78,11	79,90	0,18	84,10	83,60	80,23	0,08	0,04	-91,09182
372,0	629,0	0,1	0,2	6,4	323,0	315,1	77,1	83,6	253,4	296,6	365,6	377,6	321,8	481,8	0,10	78,61	78,12	79,91	0,18	84,11	83,61	80,24	0,08	0,04	-91,13044
373,0	630,0	0,1	0,2	6,5	322,8	315,4	77,2	83,7	253,3	296,6	364,8	377,3	322,0	482,4	0,10	78,58	78,12	79,91	0,18	84,08	83,62	80,23	0,07	0,04	-91,42056
374,0	631,0	0,1	0,3	6,3	322,8	315,7	77,2	83,8	253,0	296,5	364,5	377,2	322,3	483,5	0,10	78,61	78,12	79,90	0,18	84,08	83,62	80,23	0,08	0,04	-91,83304
375,0	632,0	0,0	0,3	6,2	322,8	315,8	77,1	83,8	252,8	296,4	364,1	376,7	322,3	484,1	0,10	78,59	78,14	79,91	0,18	84,04	83,68	80,26	0,07	0,04	-91,74838

Manufacturer: HEARTHSTONE
Model: 8031

Run: 3
Project #: PI 20270
Test Duration: 375 min

	HHV	LHV
Eff	78,37%	84,29%
Comb Eff	97,55%	97,55%
HT Eff	80,34%	86,43%
Output	13 178	Btu/h
Burn Rate	0,85	kg/h
Grams CO	210	g
Input	16 816	Btu/h
MC wet	18,17	
Averages	6,25	6,07

Note: In the "Input data", "Calc. % O_2", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [e], [b], [c], [h], [d], [e], [j], and [k] refer to their respective variables in Clauses

Ultimate CO_2
$CO_{2\,ult}$ 19,64
F_d
1,061

Overall Heating Efficiency: 78,37%
Combustion Efficiency: 97,55%
Heat Transfer Efficiency: 80,34%

Heat Output: 12 501 Btu/h
Heat Input: 15 952 Btu/h

Burn Duration: 6,25 h

Burn Rate: 1,87 lb/h

Stack Temp: 248,0 Deg. F

				2,37	20,34	12,20	126,00	24,27	0,98	0,80	0,78
INPUT DATA				Oxygen Calculation			Input Data		Combust	Heat	Net
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO_2 [d]	Excess Air EA	Meas O_2	Calc. % O_2 [g]	Flue Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %
0,00	6,48	0,28	2,04	747,5%	20,79	18,61	122,7	23,9	92,1%	98,7%	92,2%
1,00	6,43	0,35	1,54	935,8%	20,81	19,09	127,3	22,0	87,3%	49,5%	43,2%
2,00	6,39	0,16	2,40	668,7%	20,77	18,30	133,4	21,9	96,8%	61,0%	59,1%
3,00	6,36	0,10	2,44	675,5%	20,77	18,29	137,7	21,8	98,9%	60,3%	59,6%
4,00	6,37	0,09	3,03	530,6%	20,73	17,66	143,3	21,9	99,2%	64,5%	64,1%
5,00	6,34	0,07	4,33	345,8%	20,65	16,28	132,6	21,8	99,7%	73,2%	73,0%
6,00	6,34	0,05	2,33	722,7%	20,78	18,42	123,3	22,0	100,4%	62,9%	63,2%
7,00	6,30	0,05	1,90	907,8%	20,81	18,89	116,7	22,0	100,7%	59,4%	59,8%
8,00	6,34	0,05	1,73	1004,6%	20,82	19,07	112,0	21,8	100,9%	58,1%	58,6%
9,00	6,30	0,06	1,66	1046,5%	20,83	19,14	108,2	21,9	100,5%	58,2%	58,5%
10,00	6,30	0,07	1,63	1053,6%	20,83	19,16	105,7	21,9	99,6%	58,7%	58,4%
11,00	6,27	0,09	1,62	1046,1%	20,83	19,16	103,0	21,9	98,8%	59,6%	58,9%
12,00	6,30	0,11	1,62	1033,6%	20,83	19,15	100,6	21,8	97,8%	60,5%	59,1%
13,00	6,25	0,13	1,61	1032,0%	20,83	19,15	98,5	21,7	96,9%	60,9%	59,0%
14,00	6,25	0,15	1,64	996,7%	20,82	19,10	96,6	21,7	96,1%	62,3%	59,9%
15,00	6,25	0,16	1,68	971,1%	20,82	19,06	95,2	21,8	95,8%	63,3%	60,6%
16,00	6,25	0,15	1,77	923,5%	20,81	18,97	94,0	21,7	96,3%	64,9%	62,5%
17,00	6,25	0,15	1,76	930,0%	20,81	18,98	92,9	22,0	96,4%	65,3%	62,9%
18,00	6,21	0,15	1,79	912,0%	20,81	18,95	92,2	22,1	96,2%	65,9%	63,5%
19,00	6,21	0,15	1,73	942,4%	20,82	19,01	91,5	22,2	96,0%	65,5%	62,8%
20,00	6,21	0,16	1,69	958,0%	20,82	19,04	90,6	22,3	95,6%	65,4%	62,5%
21,00	6,21	0,16	1,71	951,4%	20,82	19,03	89,5	22,5	95,7%	66,0%	63,1%
22,00	6,16	0,18	1,72	932,6%	20,81	19,00	88,3	22,5	94,9%	66,6%	63,2%
23,00	6,16	0,21	1,69	932,5%	20,81	19,02	87,3	22,5	93,6%	66,6%	62,4%
24,00	6,12	0,21	1,75	902,5%	20,81	18,95	86,2	22,6	93,9%	67,7%	63,6%
25,00	6,11	0,22	1,97	795,5%	20,80	18,71	85,6	22,7	94,0%	70,2%	66,0%
26,00	6,11	0,25	2,32	664,9%	20,77	18,33	85,2	22,6	93,8%	72,9%	68,4%
27,00	6,11	0,27	2,87	525,3%	20,73	17,72	85,4	22,7	94,5%	75,9%	71,7%
28,00	6,07	0,27	3,03	494,0%	20,72	17,55	86,4	22,8	94,6%	76,3%	72,2%
29,00	6,07	0,27	3,51	419,7%	20,69	17,04	88,1	22,8	95,3%	77,7%	74,0%
30,00	6,07	0,27	4,53	309,4%	20,62	15,96	90,3	22,8	96,2%	78,9%	76,9%
31,00	6,02	0,12	2,50	647,8%	20,77	18,20	91,0	22,8	98,0%	72,8%	71,3%
32,00	6,02	0,10	2,16	771,8%	20,79	18,59	89,8	22,8	98,7%	70,6%	69,7%
33,00	6,02	0,12	2,09	789,5%	20,79	18,65	88,3	23,0	97,8%	70,5%	68,9%
34,00	5,98	0,17	2,06	780,5%	20,79	18,65	86,8	23,0	96,1%	70,7%	67,9%
35,00	5,98	0,20	2,06	768,8%	20,79	18,63	85,6	22,9	94,9%	71,0%	67,3%
36,00	5,98	0,24	2,04	761,6%	20,79	18,63	84,2	23,0	93,3%	71,2%	66,4%
37,00	5,98	0,29	2,04	744,0%	20,79	18,60	82,8	23,0	91,8%	71,6%	65,7%
38,00	5,94	0,34	2,04	725,8%	20,78	18,57	81,5	23,0	90,3%	72,0%	65,0%
39,00	5,93	0,37	2,05	709,2%	20,78	18,54	80,2	23,0	89,2%	72,4%	64,6%
40,00	5,93	0,41	2,11	679,9%	20,77	18,46	79,2	23,0	88,6%	73,1%	64,7%
41,00	5,90	0,43	2,17	654,5%	20,77	18,38	78,2	23,0	88,1%	73,7%	65,0%
42,00	5,89	0,44	2,36	601,2%	20,76	18,17	77,7	23,0	88,7%	75,0%	66,5%
43,00	5,89	0,43	3,67	378,9%	20,67	16,78	78,4	23,1	92,4%	78,7%	73,6%
44,00	5,86	0,37	4,11	337,8%	20,64	16,34	80,7	23,1	94,0%	80,4%	75,6%
45,00	5,84	0,38	5,29	246,2%	20,57	15,08	84,2	23,0	95,1%	81,8%	77,8%
46,00	5,80	0,32	6,70	179,9%	20,48	13,62	89,1	23,1	96,8%	82,9%	80,2%
47,00	5,77	0,17	6,48	195,5%	20,50	13,94	94,7	23,0	98,4%	82,2%	80,9%
48,00	5,75	0,12	6,70	187,9%	20,49	13,73	99,5	23,1	99,1%	82,0%	81,2%
49,00	5,75	0,11	7,07	173,6%	20,47	13,34	103,3	23,1	99,2%	82,0%	81,3%
50,00	5,71	0,11	7,03	175,2%	20,47	13,38	106,6	23,0	99,3%	81,6%	81,0%
51,00	5,66	0,11	7,28	165,9%	20,45	13,12	109,6	23,0	99,3%	81,6%	81,0%
52,00	5,62	0,10	7,17	170,5%	20,46	13,25	111,3	22,8	99,4%	81,3%	80,8%
53,00	5,62	0,08	6,37	204,6%	20,51	14,10	112,1	22,6	99,6%	80,3%	80,0%
54,00	5,62	0,08	6,18	214,2%	20,53	14,31	113,1	22,8	99,6%	79,9%	79,7%
55,00	5,57	0,09	6,77	186,5%	20,49	13,67	114,5	22,9	99,5%	80,6%	80,1%
56,00	5,52	0,10	7,02	175,8%	20,47	13,40	116,1	22,9	99,3%	80,7%	80,1%
57,00	5,51	0,11	7,21	168,2%	20,46	13,19	118,4	23,0	99,3%	80,7%	80,1%
58,00	5,48	0,11	7,57	155,8%	20,43	12,81	120,7	23,0	99,2%	80,8%	80,2%
59,00	5,43	0,12	8,08	139,6%	20,40	12,26	122,7	23,1	99,2%	81,2%	80,5%
60,00	5,39	0,11	9,31	108,6%	20,32	10,96	125,0	23,1	99,3%	82,0%	81,4%
61,00	5,34	0,12	10,51	86,8%	20,24	9,66	128,2	23,2	99,3%	82,5%	82,0%
62,00	5,30	0,13	11,42	70,0%	20,18	8,69	131,3	23,2	99,2%	82,8%	82,1%
63,00	5,25	0,12	11,27	72,4%	20,19	8,85	133,9	23,2	99,3%	82,5%	82,0%
64,00	5,21	0,12	11,21	73,4%	20,19	8,93	136,9	23,2	99,3%	82,3%	81,8%
65,00	5,16	0,12	11,63	67,0%	20,16	8,47	139,5	23,2	99,3%	82,4%	81,8%
66,00	5,12	0,14	11,65	66,6%	20,16	8,44	142,1	23,2	99,2%	82,2%	81,6%
67,00	5,07	0,14	12,01	61,6%	20,14	8,06	144,5	23,3	99,2%	82,3%	81,6%
68,00	5,03	0,11	12,06	61,3%	20,14	8,02	145,2	23,3	99,4%	82,2%	81,8%
69,00	4,98	0,12	11,72	66,0%	20,16	8,38	146,1	23,3	99,4%	82,0%	81,5%
70,00	4,97	0,12	11,53	68,6%	20,17	8,58	146,6	23,3	99,4%	81,9%	81,4%
71,00	4,94	0,11	11,67	66,7%	20,16	8,44	147,3	23,3	99,4%	81,9%	81,4%
72,00	4,89	0,10	11,80	65,1%	20,15	8,31	147,7	23,4	99,5%	82,0%	81,6%
73,00	4,84	0,08	11,59	68,3%	20,17	8,54	147,6	23,4	99,6%	81,9%	81,5%
74,00	4,80	0,07	11,12	75,5%	20,20	9,04	147,3	23,4	99,7%	81,6%	81,4%
75,00	4,75	0,07	10,32	89,0%	20,25	9,90	146,9	23,4	99,7%	81,1%	80,9%
76,00	4,71	0,07	9,73	100,3%	20,29	10,52	146,4	23,4	99,7%	80,7%	80,5%
77,00	4,71	0,08	9,43	106,5%	20,31	10,84	145,4	23,2	99,6%	80,6%	80,3%
78,00	4,66	0,08	9,37	107,8%	20,32	10,91	144,9	23,3	99,6%	80,5%	80,2%
79,00	4,62	0,08	9,59	103,2%	20,30	10,68	144,8	23,5	99,6%	80,7%	80,4%
80,00	4,57	0,08	10,00	95,0%	20,27	10,24	144,4	23,4	99,6%	81,1%	80,8%
81,00	4,53	0,08	10,50	85,8%	20,24	9,71	144,5	23,5	99,7%	81,4%	81,1%
82,00	4,48	0,08	11,07	76,2%	20,20	9,09	144,7	23,6	99,7%	81,8%	81,5%
83,00	4,43	0,07	11,42	70,9%	20,18	8,72	145,1	23,4	99,7%	81,9%	81,7%
84,00	4,43	0,07	11,60	68,3%	20,17	8,53	146,2	23,5	99,7%	82,0%	81,7%
85,00	4,39	0,07	11,68	67,2%	20,16	8,45	146,4	23,6	99,7%	82,0%	81,8%
86,00	4,35	0,07	11,73	66,4%	20,16	8,39	147,0	23,6	99,7%	82,0%	81,8%
87,00	4,30	0,08	11,72	66,6%	20,16	8,41	147,5	23,6	99,7%	82,0%	81,7%
88,00	4,25	0,08	11,67	67,2%	20,16	8,46	148,1	23,7	99,6%	81,9%	81,6%
89,00	4,21	0,08	11,70	66,7%	20,16	8,42	148,7	23,7	99,6%	81,9%	81,6%
90,00	4,16	0,08	11,58	68,5%	20,17	8,55	149,2	23,7	99,7%	81,8%	81,5%
91,00	4,12	0,08	11,37	71,5%	20,18	8,77	149,4	23,7	99,6%	81,7%	81,4%
92,00	4,12	0,07	11,27	73,1%	20,19	8,88	149,7	23,7	99,7%	81,6%	81,3%

93,00	4,07	0,07	11,27	73,1%	20,19	8,88	149,7	23,7	99,7%	81,6%	81,3%
94,00	4,03	0,07	11,50	69,7%	20,18	8,64	150,2	23,7	99,7%	81,7%	81,4%
95,00	3,98	0,07	11,83	65,0%	20,15	8,28	150,7	23,7	99,7%	81,8%	81,6%
96,00	3,94	0,08	12,13	60,9%	20,13	7,96	151,5	23,7	99,6%	81,9%	81,6%
97,00	3,89	0,10	12,70	53,6%	20,10	7,35	153,0	23,7	99,5%	82,1%	81,7%
98,00	3,85	0,14	13,38	45,4%	20,05	6,60	155,0	23,7	99,3%	82,3%	81,7%
99,00	3,80	0,24	13,91	38,8%	20,01	5,98	157,1	23,8	98,7%	82,4%	81,3%
100,00	3,76	0,23	13,88	39,2%	20,01	6,02	159,0	23,8	98,7%	82,3%	81,2%
101,00	3,71	0,13	13,56	43,4%	20,04	6,41	160,4	23,8	99,3%	82,1%	81,5%
102,00	3,66	0,25	13,50	42,9%	20,03	6,41	161,2	23,8	98,6%	82,0%	80,8%
103,00	3,62	0,19	13,01	48,8%	20,07	6,96	161,2	23,8	98,9%	81,8%	80,9%
104,00	3,57	0,12	12,38	57,2%	20,12	7,68	160,5	23,9	99,4%	81,5%	81,0%
105,00	3,53	0,08	11,83	64,9%	20,15	8,28	159,5	23,9	99,6%	81,3%	81,0%
106,00	3,48	0,06	11,32	72,5%	20,19	8,83	158,1	23,9	99,8%	81,1%	80,9%
107,00	3,44	0,06	10,88	79,6%	20,22	9,31	156,5	23,9	99,8%	80,9%	80,7%
108,00	3,39	0,06	10,60	84,3%	20,24	9,61	155,1	23,8	99,8%	80,8%	80,6%
109,00	3,35	0,07	10,42	87,3%	20,25	9,80	153,5	23,9	99,7%	80,8%	80,6%
110,00	3,30	0,08	10,47	86,3%	20,24	9,74	152,7	24,0	99,7%	80,9%	80,6%
111,00	3,26	0,08	11,14	75,2%	20,20	9,02	151,8	24,0	99,7%	81,4%	81,1%
112,00	3,26	0,10	11,96	62,9%	20,14	8,13	152,0	24,0	99,5%	81,8%	81,4%
113,00	3,21	0,12	13,02	49,5%	20,07	6,99	153,4	24,0	99,4%	82,3%	81,7%
114,00	3,21	0,20	13,71	40,2%	20,02	6,16	155,6	24,0	98,3%	82,4%	81,0%
115,00	3,16	0,75	13,88	34,3%	19,97	5,72	157,8	24,0	95,8%	82,2%	78,7%
116,00	3,11	1,07	14,14	29,1%	19,94	5,26	159,7	24,0	94,2%	82,1%	77,3%
117,00	3,03	1,29	14,19	26,9%	19,92	5,08	161,4	23,9	93,1%	81,9%	76,2%
118,00	2,98	1,32	14,21	26,5%	19,91	5,04	162,8	24,0	92,9%	81,8%	76,0%
119,00	2,94	1,36	14,26	25,8%	19,91	4,97	163,9	24,1	92,8%	81,8%	75,9%
120,00	2,89	1,38	14,29	24,6%	19,90	4,82	164,5	23,9	92,7%	81,8%	75,8%
121,00	2,85	1,52	14,32	24,0%	19,89	4,81	165,5	24,1	92,0%	81,7%	75,2%
122,00	2,80	1,69	14,33	22,7%	19,88	4,72	166,3	24,0	91,2%	81,6%	74,4%
123,00	2,72	1,79	14,32	21,9%	19,88	4,66	166,7	24,2	90,8%	81,5%	74,0%
124,00	2,71	1,87	14,32	21,4%	19,87	4,62	167,3	24,0	90,4%	81,5%	73,6%
125,00	2,62	2,00	14,26	20,8%	19,87	4,61	167,3	24,2	89,8%	81,4%	73,1%
126,00	2,58	2,00	14,24	21,0%	19,87	4,63	167,7	24,1	89,8%	81,4%	73,1%
127,00	2,53	1,98	14,27	20,9%	19,87	4,61	168,2	24,1	89,9%	81,4%	73,2%
128,00	2,48	1,91	14,26	21,5%	19,87	4,66	167,8	24,3	90,2%	81,4%	73,4%
129,00	2,44	1,57	14,37	23,2%	19,89	4,73	167,5	24,1	91,8%	81,6%	74,9%
130,00	2,39	1,35	14,34	25,2%	19,90	4,89	166,8	24,2	92,9%	81,7%	75,9%
131,00	2,35	1,16	14,30	27,0%	19,92	5,04	166,4	24,2	93,8%	81,7%	76,7%
132,00	2,30	0,89	14,16	30,6%	19,95	5,35	165,6	24,3	95,1%	81,8%	77,9%
133,00	2,26	0,68	14,01	33,7%	19,97	5,62	164,6	24,2	96,2%	81,9%	78,8%
134,00	2,21	0,48	13,84	37,1%	19,99	5,91	164,1	24,4	97,2%	81,9%	79,7%
135,00	2,21	0,37	13,69	39,6%	20,01	6,13	163,3	24,3	97,9%	81,9%	80,2%
136,00	2,17	0,25	13,63	41,6%	20,02	6,27	162,3	24,4	98,6%	82,0%	80,9%
137,00	2,17	0,23	13,53	42,8%	20,03	6,39	161,6	24,4	98,7%	82,0%	81,0%
138,00	2,12	0,19	13,45	44,0%	20,04	6,49	161,1	24,3	99,0%	82,0%	81,2%
139,00	2,08	0,19	13,43	44,2%	20,04	6,51	160,8	24,4	99,0%	82,0%	81,2%
140,00	2,03	0,21	13,41	44,2%	20,04	6,52	160,3	24,4	98,9%	82,0%	81,1%
141,00	1,98	0,24	13,45	43,5%	20,04	6,47	160,1	24,5	98,7%	82,1%	81,0%
142,00	1,98	0,29	13,48	42,6%	20,03	6,40	160,2	24,4	98,3%	82,0%	80,7%
143,00	1,94	0,36	13,50	41,8%	20,03	6,35	159,7	24,4	98,0%	82,1%	80,4%
144,00	1,89	0,42	13,46	41,5%	20,02	6,35	159,8	24,4	97,6%	82,0%	80,0%
145,00	1,85	0,40	13,46	41,7%	20,02	6,36	159,5	24,4	97,7%	82,0%	80,1%
146,00	1,84	0,24	13,51	42,0%	20,03	6,40	158,7	24,4	98,6%	82,2%	81,0%
147,00	1,80	0,14	13,32	46,0%	20,05	6,66	158,0	24,5	99,3%	82,2%	81,5%
148,00	1,76	0,11	13,10	48,7%	20,07	6,91	157,2	24,4	99,4%	82,1%	81,7%
149,00	1,76	0,09	12,69	53,7%	20,10	7,36	156,2	24,4	99,6%	82,0%	81,6%
150,00	1,71	0,08	12,33	58,4%	20,12	7,76	155,4	24,4	99,6%	81,8%	81,6%
151,00	1,67	0,08	11,90	64,0%	20,15	8,21	154,4	24,5	99,6%	81,7%	81,4%
152,00	1,67	0,09	11,68	66,9%	20,16	8,44	153,5	24,7	99,5%	81,6%	81,3%
153,00	1,67	0,09	11,57	68,5%	20,17	8,56	152,6	24,7	99,5%	81,6%	81,2%
154,00	1,62	0,08	11,34	71,5%	20,19	8,91	151,2	24,4	99,6%	81,5%	81,2%
155,00	1,62	0,09	10,87	79,2%	20,22	9,30	149,5	24,5	99,5%	81,4%	81,0%
156,00	1,58	0,09	10,55	84,7%	20,24	9,65	147,8	24,6	99,6%	81,3%	80,9%
157,00	1,58	0,08	10,33	88,6%	20,25	9,88	146,2	24,7	99,6%	81,3%	81,0%
158,00	1,53	0,08	10,09	93,2%	20,27	10,14	144,4	24,7	99,6%	81,2%	80,9%
159,00	1,53	0,08	9,81	98,6%	20,29	10,43	142,6	24,8	99,6%	81,2%	80,9%
160,00	1,53	0,07	9,68	101,4%	20,30	10,58	140,6	24,7	99,7%	81,2%	81,0%
161,00	1,49	0,07	9,63	102,5%	20,30	10,63	139,0	24,6	99,7%	81,3%	81,0%
162,00	1,49	0,08	9,56	103,7%	20,30	10,70	137,4	24,4	99,6%	81,3%	81,0%
163,00	1,49	0,08	9,52	104,7%	20,31	10,75	136,2	24,8	99,6%	81,4%	81,1%
164,00	1,44	0,08	9,47	105,8%	20,31	10,80	134,9	24,8	99,6%	81,5%	81,2%
165,00	1,44	0,08	9,42	106,9%	20,31	10,86	133,6	24,7	99,6%	81,5%	81,2%
166,00	1,44	0,08	9,40	107,2%	20,31	10,87	132,4	24,6	99,6%	81,6%	81,3%
167,00	1,44	0,08	9,37	107,8%	20,32	10,90	131,4	24,7	99,6%	81,7%	81,4%
168,00	1,39	0,08	9,32	109,0%	20,32	10,96	130,3	24,7	99,6%	81,7%	81,4%
169,00	1,39	0,08	9,30	109,5%	20,32	10,98	129,4	24,7	99,6%	81,8%	81,5%
170,00	1,39	0,09	9,20	111,5%	20,33	11,08	128,4	24,7	99,6%	81,8%	81,4%
171,00	1,35	0,09	9,17	112,1%	20,33	11,11	127,9	24,7	99,5%	81,8%	81,4%
172,00	1,35	0,09	9,15	112,4%	20,33	11,13	127,1	24,7	99,5%	81,8%	81,4%
173,00	1,35	0,09	9,07	114,4%	20,33	11,22	126,1	24,7	99,5%	81,8%	81,4%
174,00	1,35	0,10	9,05	114,7%	20,34	11,23	125,7	24,7	99,5%	81,9%	81,4%
175,00	1,31	0,09	9,02	115,5%	20,34	11,27	125,2	24,7	99,5%	81,9%	81,4%
176,00	1,30	0,09	9,07	114,4%	20,33	11,22	124,9	24,7	99,5%	81,9%	81,5%
177,00	1,30	0,09	9,04	115,1%	20,34	11,25	124,6	24,7	99,5%	81,9%	81,5%
178,00	1,30	0,10	9,05	114,7%	20,34	11,23	124,2	24,7	99,5%	82,0%	81,5%
179,00	1,26	0,09	9,11	113,5%	20,33	11,18	123,7	24,8	99,5%	82,1%	81,6%
180,00	1,26	0,10	9,04	115,0%	20,34	11,25	123,3	24,8	99,5%	82,0%	81,6%
181,00	1,26	0,10	9,07	114,2%	20,33	11,21	122,9	24,7	99,4%	82,1%	81,6%
182,00	1,26	0,10	8,37	131,8%	20,38	11,96	122,4	24,7	99,4%	81,6%	81,1%
183,00	1,26	0,12	8,11	138,8%	20,40	12,23	121,5	24,7	99,2%	81,4%	80,8%
184,00	1,26	0,13	7,94	143,4%	20,41	12,40	120,9	24,7	99,1%	81,3%	80,6%
185,00	1,21	0,13	7,90	144,8%	20,41	12,45	120,3	24,7	99,1%	81,3%	80,6%
186,00	1,24	0,13	7,86	145,8%	20,41	12,49	119,9	24,8	99,1%	81,3%	80,6%
187,00	1,21	0,13	7,86	145,8%	20,41	12,49	119,4	24,8	99,1%	81,4%	80,6%
188,00	1,21	0,13	7,83	146,8%	20,41	12,52	118,8	24,7	99,1%	81,4%	80,6%
189,00	1,21	0,13	7,81	147,2%	20,42	12,53	118,3	24,8	99,0%	81,4%	80,7%
190,00	1,21	0,14	7,78	148,2%	20,42	12,57	117,7	24,8	99,0%	81,5%	80,6%
191,00	1,21	0,14	7,60	153,9%	20,43	12,76	117,2	24,6	99,0%	81,3%	80,5%
192,00	1,17	0,14	7,53	156,0%	20,43	12,83	116,9	24,8	98,9%	81,3%	80,4%
193,00	1,17	0,14	7,55	155,5%	20,43	12,81	116,7	24,6	98,9%	81,3%	80,4%
194,00	1,17	0,14	7,55	155,4%	20,43	12,81	116,1	24,8	98,9%	81,4%	80,5%
195,00	1,17	0,15	7,53	155,7%	20,43	12,83	115,7	24,8	98,9%	81,4%	80,5%
196,00	1,17	0,15	7,53	155,7%	20,43	12,82	115,5	24,8	98,8%	81,4%	80,5%
197,00	1,17	0,15	7,53	155,7%	20,43	12,83	115,5	24,8	98,8%	81,4%	80,5%
198,00	1,17	0,16	7,50	156,5%	20,43	12,85	115,3	24,8	98,8%	81,4%	80,4%
199,00	1,12	0,16	7,49	157,0%	20,44	12,87	115,3	24,8	98,7%	81,4%	80,4%
200,00	1,12	0,18	7,39	159,7%	20,44	12,97	115,1	24,8	98,5%	81,3%	80,1%
201,00	1,12	0,18	7,34	161,4%	20,44	13,02	114,9	24,8	98,5%	81,3%	80,1%
202,00	1,12	0,19	7,30	162,3%	20,45	13,05	114,8	24,8	98,4%	81,2%	79,9%
203,00	1,12	0,19	7,34	161,1%	20,44	13,01	114,7	24,8	98,4%	81,3%	80,0%
204,00	1,12	0,19	7,34	161,1%	20,44	13,01	114,5	24,8	98,4%	81,3%	80,0%
205,00	1,12	0,19	7,35	160,5%	20,44	13,00	114,1	24,8	98,4%	81,3%	80,1%
206,00	1,11	0,19	7,35	160,4%	20,44	13,00	113,8	24,8	98,3%	81,4%	80,0%

207,00	1,08	0,19	7,39	159,4%	20,44	12,96	113,4	24,8	98,4%	81,4%	80,1%
208,00	1,08	0,21	7,44	156,6%	20,43	12,88	113,3	24,8	98,2%	81,5%	80,0%
209,00	1,08	0,19	7,48	156,1%	20,43	12,86	113,2	24,8	98,4%	81,5%	80,2%
210,00	1,08	0,18	7,50	155,6%	20,43	12,84	112,8	24,8	98,5%	81,6%	80,3%
211,00	1,08	0,19	7,43	157,7%	20,44	12,91	112,8	24,8	98,4%	81,5%	80,2%
212,00	1,05	0,21	7,46	156,1%	20,43	12,87	112,5	24,8	98,1%	81,6%	80,1%
213,00	1,03	0,21	7,44	156,8%	20,43	12,89	112,6	24,8	98,2%	81,6%	80,1%
214,00	1,03	0,21	7,46	156,2%	20,43	12,87	112,6	24,7	98,2%	81,6%	80,1%
215,00	1,03	0,24	7,44	155,9%	20,43	12,87	112,6	24,6	97,9%	81,5%	79,8%
216,00	1,03	0,24	7,41	156,9%	20,44	12,91	112,2	24,8	97,9%	81,5%	79,8%
217,00	1,03	0,25	7,44	155,4%	20,43	12,87	112,1	24,8	97,8%	81,6%	79,8%
218,00	1,03	0,25	7,31	159,6%	20,44	13,00	112,0	24,8	97,7%	81,5%	79,5%
219,00	1,03	0,26	7,25	161,6%	20,44	13,07	112,1	24,8	97,5%	81,4%	79,4%
220,00	0,99	0,28	7,36	157,2%	20,44	12,94	112,0	24,8	97,4%	81,5%	79,4%
221,00	0,99	0,28	7,43	155,1%	20,43	12,87	112,0	24,7	97,5%	81,5%	79,5%
222,00	0,99	0,27	7,46	154,3%	20,43	12,84	112,1	24,9	97,6%	81,6%	79,6%
223,00	0,99	0,27	7,36	157,4%	20,44	12,94	112,1	24,9	97,5%	81,5%	79,4%
224,00	0,99	0,28	7,28	159,9%	20,44	13,02	112,4	24,9	97,4%	81,4%	79,2%
225,00	0,99	0,28	7,28	159,8%	20,44	13,02	112,4	24,7	97,3%	81,4%	79,2%
226,00	0,99	0,25	7,31	159,9%	20,44	13,01	112,4	24,8	97,7%	81,4%	79,6%
227,00	0,94	0,22	7,40	158,0%	20,44	12,93	112,3	24,8	98,1%	81,5%	80,0%
228,00	0,94	0,21	7,43	157,1%	20,44	12,90	112,2	24,9	98,1%	81,6%	80,1%
229,00	0,94	0,21	7,39	158,3%	20,44	12,94	112,1	24,9	98,2%	81,6%	80,0%
230,00	0,94	0,21	7,41	157,8%	20,44	12,92	112,0	24,8	98,2%	81,6%	80,1%
231,00	0,92	0,20	7,41	158,0%	20,44	12,92	111,7	24,6	98,2%	81,6%	80,2%
232,00	0,94	0,19	7,43	157,7%	20,44	12,91	111,5	24,9	98,4%	81,7%	80,3%
233,00	0,90	0,19	7,45	157,2%	20,44	12,89	111,3	24,8	98,4%	81,7%	80,4%
234,00	0,90	0,19	7,43	157,7%	20,44	12,91	111,2	24,7	98,4%	81,7%	80,4%
235,00	0,90	0,20	7,36	159,5%	20,44	12,97	110,9	24,8	98,2%	81,6%	80,2%
236,00	0,90	0,21	7,36	159,5%	20,44	12,97	110,9	24,8	98,2%	81,6%	80,2%
237,00	0,90	0,21	7,35	160,1%	20,44	12,99	110,7	24,9	98,2%	81,6%	80,2%
238,00	0,90	0,20	7,31	161,3%	20,44	13,03	110,7	24,9	98,2%	81,6%	80,2%
239,00	0,90	0,20	7,33	160,8%	20,44	13,01	110,8	24,9	98,2%	81,6%	80,2%
240,00	0,90	0,20	7,31	161,3%	20,44	13,03	110,4	24,7	98,2%	81,6%	80,2%
241,00	0,85	0,21	7,28	162,3%	20,45	13,06	110,1	24,9	98,2%	81,6%	80,2%
242,00	0,85	0,21	7,25	163,5%	20,45	13,10	109,9	24,7	98,2%	81,6%	80,1%
243,00	0,85	0,23	7,21	163,9%	20,45	13,12	110,2	24,9	97,9%	81,6%	79,8%
244,00	0,85	0,24	7,23	162,9%	20,45	13,10	110,6	25,0	97,8%	81,5%	79,7%
245,00	0,85	0,24	7,24	162,8%	20,45	13,09	110,8	25,0	97,8%	81,5%	79,7%
246,00	0,85	0,24	7,21	163,4%	20,45	13,11	111,1	25,0	97,7%	81,5%	79,6%
247,00	0,80	0,24	7,20	163,9%	20,45	13,13	111,2	25,0	97,7%	81,4%	79,6%
248,00	0,80	0,24	7,18	164,6%	20,45	13,15	111,4	24,8	97,8%	81,4%	79,6%
249,00	0,80	0,24	7,20	164,0%	20,45	13,13	111,2	24,9	97,7%	81,4%	79,6%
250,00	0,80	0,25	7,15	165,6%	20,45	13,18	111,2	24,9	97,7%	81,4%	79,5%
251,00	0,80	0,25	7,13	166,3%	20,45	13,20	111,2	24,9	97,7%	81,4%	79,5%
252,00	0,80	0,25	7,14	166,0%	20,45	13,19	111,2	24,9	97,7%	81,4%	79,5%
253,00	0,80	0,25	7,12	166,5%	20,45	13,21	111,2	24,9	97,7%	81,4%	79,5%
254,00	0,79	0,25	7,08	168,0%	20,46	13,25	111,5	24,9	97,7%	81,3%	79,4%
255,00	0,76	0,25	7,07	168,3%	20,46	13,26	111,6	24,9	97,6%	81,3%	79,4%
256,00	0,76	0,25	7,10	167,2%	20,45	13,23	111,5	24,9	97,6%	81,3%	79,3%
257,00	0,76	0,25	7,08	167,8%	20,46	13,25	111,4	24,8	97,6%	81,3%	79,3%
258,00	0,76	0,26	6,98	171,3%	20,46	13,35	111,2	24,9	97,5%	81,2%	79,2%
259,00	0,76	0,29	6,82	176,4%	20,47	13,51	111,0	24,9	97,1%	81,0%	78,7%
260,00	0,76	0,32	6,83	174,5%	20,47	13,47	111,1	24,9	96,7%	81,0%	78,4%
261,00	0,72	0,34	6,86	173,1%	20,47	13,44	111,0	24,9	96,6%	81,0%	78,3%
262,00	0,71	0,34	6,82	174,0%	20,47	13,47	111,3	24,8	96,5%	81,0%	78,1%
263,00	0,71	0,36	6,85	172,7%	20,46	13,44	111,4	24,9	96,4%	81,0%	78,0%
264,00	0,71	0,36	6,80	174,4%	20,47	13,49	111,7	24,9	96,3%	80,9%	77,9%
265,00	0,71	0,36	6,78	175,1%	20,47	13,51	111,7	24,9	96,3%	80,9%	77,9%
266,00	0,71	0,36	6,80	174,5%	20,47	13,49	112,0	25,0	96,3%	80,9%	77,9%
267,00	0,67	0,36	6,80	174,5%	20,47	13,49	112,1	24,9	96,3%	80,9%	77,9%
268,00	0,67	0,35	6,77	175,9%	20,47	13,53	112,0	24,9	96,4%	80,8%	77,9%
269,00	0,67	0,35	6,79	175,1%	20,47	13,50	112,3	25,0	96,4%	80,8%	77,9%
270,00	0,67	0,38	7,24	157,8%	20,44	13,00	112,5	25,0	96,3%	81,3%	78,3%
271,00	0,67	0,28	7,34	157,7%	20,44	12,95	112,5	25,0	97,4%	81,4%	79,3%
272,00	0,67	0,23	7,21	163,9%	20,45	13,12	111,5	25,0	97,9%	81,4%	79,7%
273,00	0,67	0,23	7,17	165,7%	20,45	13,17	111,2	25,0	97,9%	81,4%	79,7%
274,00	0,67	0,22	7,10	168,1%	20,46	13,24	110,6	24,8	98,0%	81,4%	79,7%
275,00	0,67	0,22	7,05	170,0%	20,46	13,30	109,9	24,9	98,0%	81,4%	79,8%
276,00	0,62	0,27	6,98	170,9%	20,46	13,34	110,0	25,0	97,4%	81,3%	79,2%
277,00	0,62	0,28	6,95	171,8%	20,46	13,38	109,7	25,0	97,3%	81,3%	79,1%
278,00	0,62	0,28	6,95	171,5%	20,46	13,37	109,5	24,8	97,2%	81,3%	79,1%
279,00	0,62	0,29	6,98	170,1%	20,46	13,33	109,5	24,8	97,2%	81,3%	79,0%
280,00	0,62	0,30	7,05	167,5%	20,46	13,26	109,4	24,8	97,1%	81,4%	79,1%
281,00	0,62	0,30	7,05	167,2%	20,45	13,25	109,3	25,0	97,1%	81,4%	79,1%
282,00	0,60	0,29	6,97	170,6%	20,46	13,35	109,5	25,0	97,2%	81,3%	79,0%
283,00	0,58	0,29	6,97	170,5%	20,46	13,34	109,4	25,1	97,2%	81,4%	79,1%
284,00	0,58	0,29	6,93	172,0%	20,46	13,39	109,2	25,0	97,2%	81,3%	79,0%
285,00	0,58	0,29	6,93	172,0%	20,46	13,39	109,0	24,9	97,2%	81,3%	79,0%
286,00	0,58	0,29	6,95	171,2%	20,46	13,36	108,8	25,0	97,1%	81,4%	79,1%
287,00	0,58	0,29	6,98	170,1%	20,46	13,33	109,0	25,0	97,2%	81,4%	79,1%
288,00	0,53	0,29	7,00	169,5%	20,46	13,31	108,9	25,1	97,2%	81,4%	79,1%
289,00	0,53	0,29	7,00	169,4%	20,46	13,31	108,9	25,0	97,2%	81,4%	79,1%
290,00	0,53	0,29	6,97	170,7%	20,46	13,35	109,0	24,8	97,2%	81,4%	79,1%
291,00	0,53	0,29	6,97	170,6%	20,46	13,35	108,7	25,0	97,2%	81,4%	79,1%
292,00	0,53	0,29	6,97	170,8%	20,46	13,35	108,7	25,1	97,2%	81,4%	79,1%
293,00	0,53	0,28	6,94	172,2%	20,46	13,39	108,7	25,1	97,2%	81,4%	79,1%
294,00	0,53	0,28	6,95	171,6%	20,46	13,37	109,2	25,0	97,3%	81,4%	79,1%
295,00	0,52	0,18	8,07	138,0%	20,40	12,23	108,5	25,0	98,6%	82,5%	81,3%
296,00	0,49	0,16	7,91	143,4%	20,41	12,42	107,5	25,0	98,7%	82,5%	81,4%
297,00	0,49	0,17	7,71	149,3%	20,42	12,63	106,7	25,0	98,7%	82,4%	81,3%
298,00	0,49	0,17	7,57	153,7%	20,43	12,77	106,0	25,0	98,6%	82,3%	81,2%
299,00	0,49	0,17	7,48	156,8%	20,43	12,87	105,5	25,0	98,6%	82,3%	81,1%
300,00	0,47	0,18	7,44	157,9%	20,44	12,91	105,1	25,0	98,5%	82,3%	81,1%
301,00	0,46	0,18	7,41	158,8%	20,44	12,94	104,7	25,0	98,5%	82,3%	81,0%
302,00	0,44	0,18	7,36	160,3%	20,44	12,99	104,2	25,1	98,5%	82,3%	81,0%
303,00	0,44	0,18	7,32	161,6%	20,44	13,03	104,1	25,1	98,4%	82,3%	81,0%
304,00	0,44	0,18	7,34	161,2%	20,44	13,01	103,8	25,1	98,5%	82,3%	81,1%
305,00	0,44	0,19	7,13	168,5%	20,46	13,24	103,9	25,1	98,3%	82,1%	80,7%
306,00	0,44	0,19	7,00	173,1%	20,47	13,37	103,6	25,0	98,3%	82,0%	80,6%
307,00	0,44	0,19	7,03	172,3%	20,46	13,34	103,4	25,0	98,3%	82,1%	80,7%
308,00	0,44	0,19	6,93	176,1%	20,47	13,45	103,5	24,9	98,3%	81,9%	80,6%
309,00	0,44	0,19	6,91	176,6%	20,47	13,46	103,3	24,9	98,3%	81,9%	80,6%
310,00	0,40	0,19	6,87	178,3%	20,47	13,51	103,2	24,9	98,3%	81,9%	80,5%
311,00	0,40	0,19	6,84	179,2%	20,48	13,53	103,2	25,0	98,3%	81,9%	80,5%
312,00	0,40	0,19	6,86	178,5%	20,47	13,52	103,2	25,1	98,3%	81,9%	80,5%
313,00	0,40	0,19	6,95	175,0%	20,47	13,42	103,0	24,9	98,2%	82,0%	80,6%
314,00	0,40	0,20	6,99	173,3%	20,47	13,37	103,2	25,1	98,2%	82,0%	80,6%
315,00	0,40	0,20	7,07	170,4%	20,46	13,30	102,8	25,1	98,2%	82,1%	80,7%
316,00	0,40	0,20	7,04	171,3%	20,46	13,32	102,4	25,0	98,2%	82,1%	80,7%
317,00	0,40	0,21	6,98	173,2%	20,47	13,38	102,3	25,0	98,1%	82,1%	80,5%
318,00	0,35	0,21	6,93	174,8%	20,47	13,43	102,4	25,2	98,0%	82,1%	80,4%
319,00	0,35	0,21	6,97	173,5%	20,47	13,39	102,3	25,1	98,0%	82,1%	80,5%
320,00	0,35	0,22	7,02	171,3%	20,46	13,33	102,4	25,1	98,0%	82,1%	80,5%

321,00	0,35	0,22	7,84	170,8%	20,46	13,32	102,2	25,2	98,0%	82,2%	80,5%
322,00	0,35	0,22	7,85	170,3%	20,46	13,30	102,3	25,2	98,0%	82,2%	80,5%
323,00	0,36	0,22	7,84	170,6%	20,46	13,31	102,3	25,1	98,0%	82,2%	80,5%
324,00	0,36	0,22	7,13	167,3%	20,45	13,22	102,2	25,1	98,0%	82,2%	80,6%
325,00	0,36	0,21	7,14	167,3%	20,45	13,21	101,9	25,2	98,1%	82,3%	80,7%
326,00	0,36	0,22	7,16	166,1%	20,45	13,18	102,0	25,2	98,0%	82,3%	80,7%
327,00	0,36	0,22	7,23	163,7%	20,45	13,11	102,1	25,2	98,0%	82,4%	80,7%
328,00	0,36	0,21	7,25	163,5%	20,45	13,10	102,2	25,1	98,2%	82,4%	80,9%
329,00	0,36	0,17	7,16	168,2%	20,46	13,22	102,0	25,1	98,6%	82,3%	81,2%
330,00	0,36	0,16	7,06	171,9%	20,46	13,32	101,4	25,1	98,6%	82,3%	81,2%
331,00	0,36	0,16	7,02	173,3%	20,47	13,36	100,9	25,1	98,6%	82,3%	81,2%
332,00	0,38	0,16	6,97	175,3%	20,47	13,41	100,6	25,1	98,6%	82,3%	81,1%
333,00	0,36	0,17	6,99	174,5%	20,47	13,40	100,4	25,1	98,6%	82,3%	81,1%
334,00	0,36	0,17	7,01	173,6%	20,47	13,37	100,2	25,1	98,5%	82,3%	81,1%
335,00	0,36	0,17	7,06	171,5%	20,46	13,31	100,1	25,1	98,5%	82,4%	81,2%
336,00	0,36	0,18	7,08	170,7%	20,46	13,29	100,1	25,1	98,5%	82,4%	81,2%
337,00	0,36	0,18	7,11	169,5%	20,46	13,26	99,7	25,1	98,5%	82,5%	81,2%
338,00	0,36	0,17	7,14	168,6%	20,46	13,23	99,7	25,1	98,5%	82,5%	81,3%
339,00	0,21	0,17	7,14	168,4%	20,46	13,23	99,6	25,1	98,5%	82,5%	81,3%
340,00	0,21	0,18	7,14	168,2%	20,46	13,22	99,5	25,1	98,5%	82,5%	81,3%
341,00	0,21	0,18	7,17	167,1%	20,45	13,19	99,6	25,1	98,4%	82,5%	81,2%
342,00	0,21	0,19	7,16	167,4%	20,45	13,20	99,5	25,1	98,4%	82,5%	81,2%
343,00	0,21	0,19	7,17	166,9%	20,45	13,19	99,6	25,1	98,4%	82,5%	81,2%
344,00	0,21	0,19	7,16	167,4%	20,45	13,20	99,6	25,1	98,4%	82,5%	81,2%
345,00	0,21	0,19	7,16	167,6%	20,46	13,21	99,7	25,1	98,4%	82,5%	81,2%
346,00	0,17	0,19	7,16	167,4%	20,45	13,20	99,6	25,1	98,3%	82,5%	81,2%
347,00	0,17	0,19	7,16	167,1%	20,45	13,20	99,6	25,0	98,3%	82,5%	81,1%
348,00	0,17	0,19	7,14	168,0%	20,46	13,22	99,6	25,1	98,3%	82,5%	81,1%
349,00	0,17	0,19	7,11	169,2%	20,46	13,26	99,6	25,1	98,3%	82,5%	81,1%
350,00	0,17	0,19	7,14	167,9%	20,46	13,22	99,7	25,1	98,3%	82,5%	81,1%
351,00	0,17	0,20	7,17	166,5%	20,45	13,18	99,6	25,1	98,2%	82,5%	81,1%
352,00	0,13	0,20	7,13	167,8%	20,46	13,22	99,7	25,1	98,2%	82,5%	81,0%
353,00	0,16	0,21	7,06	169,9%	20,46	13,29	99,8	25,1	98,1%	82,4%	80,8%
354,00	0,12	0,21	7,10	168,6%	20,46	13,25	99,7	25,0	98,1%	82,4%	80,9%
355,00	0,12	0,21	7,10	168,8%	20,46	13,26	99,8	25,0	98,1%	82,4%	80,9%
356,00	0,12	0,21	7,12	168,1%	20,46	13,23	99,9	25,1	98,1%	82,5%	80,9%
357,00	0,12	0,21	7,13	167,7%	20,46	13,22	99,8	25,1	98,2%	82,5%	81,0%
358,00	0,12	0,21	7,16	166,5%	20,45	13,19	99,8	25,1	98,1%	82,5%	81,0%
359,00	0,08	0,21	7,19	165,6%	20,45	13,16	99,8	25,1	98,1%	82,5%	81,0%
360,00	0,08	0,21	7,19	165,7%	20,45	13,16	99,9	25,0	98,1%	82,5%	81,0%
361,00	0,08	0,21	7,21	164,9%	20,45	13,13	100,0	25,1	98,1%	82,5%	80,9%
362,00	0,08	0,21	7,20	165,1%	20,45	13,15	100,2	25,1	98,1%	82,5%	80,9%
363,00	0,08	0,22	7,21	164,5%	20,45	13,13	100,2	25,1	98,1%	82,5%	80,9%
364,00	0,08	0,22	7,20	164,7%	20,45	13,14	100,3	25,1	98,0%	82,5%	80,8%
365,00	0,08	0,22	6,99	172,5%	20,46	13,37	100,5	25,1	98,0%	82,3%	80,6%
366,00	0,03	0,22	6,87	176,8%	20,47	13,49	100,5	25,1	97,9%	82,2%	80,4%
367,00	0,06	0,23	6,80	179,4%	20,48	13,56	100,7	25,1	97,8%	82,1%	80,3%
368,00	0,03	0,23	6,72	182,5%	20,48	13,65	100,7	25,1	97,7%	82,0%	80,1%
369,00	0,03	0,24	6,69	183,5%	20,48	13,67	101,1	25,1	97,7%	81,9%	80,0%
370,00	0,03	0,24	6,66	184,8%	20,48	13,71	101,3	25,1	97,7%	81,9%	79,9%
371,00	0,03	0,23	6,62	186,5%	20,49	13,75	101,5	25,1	97,7%	81,8%	79,9%
372,00	0,03	0,24	6,44	193,9%	20,50	13,94	101,7	25,1	97,5%	81,6%	79,6%
373,00	0,03	0,25	6,36	197,3%	20,50	14,02	101,9	25,1	97,4%	81,5%	79,4%
374,00	0,03	0,25	6,26	201,6%	20,51	14,12	102,1	25,1	97,3%	81,3%	79,2%
375,00	0,00	0,26	6,20	204,3%	20,51	14,19	102,0	25,1	97,3%	81,3%	79,0%

Temps acquisition minutes	Flue temp °F	Room temp °F	Tunnel dry bulb °F	Catalyst °F	scale lbs	Right °F	Back °F	bottom °F	Top °F	Left °F
1	68,54	69,56	71,33	94,27	2,97	74,72	75,13	74,76	74,68	74,73
2	134,34	69,58	78,33	193,21	2,87	74,73	75,20	74,72	74,68	74,71
3	208,60	69,61	90,07	349,26	2,67	74,94	75,62	74,80	74,75	74,83
4	284,79	69,51	101,61	491,36	2,47	75,82	76,87	75,20	74,97	75,23
5	343,29	69,57	110,37	572,66	2,27	77,76	79,24	76,05	75,56	76,20
6	394,39	69,43	120,43	594,63	2,07	80,94	82,70	77,29	76,60	77,96
7	433,94	69,40	127,60	564,31	1,87	85,31	87,25	78,87	78,21	80,80
8	466,86	69,33	136,34	583,57	1,57	90,75	92,91	80,79	80,53	85,05
9	516,91	69,42	144,26	602,64	1,37	97,06	99,77	82,99	83,64	90,72
10	512,23	69,53	146,03	544,23	1,17	104,29	107,25	85,52	87,66	97,91
11	495,19	69,87	147,26	537,65	4,99	112,21	115,54	88,49	92,77	106,80
12	382,71	69,91	122,82	354,70	12,98	120,71	124,00	91,96	98,30	116,90
13	344,69	69,78	113,23	332,42	12,88	129,01	131,16	95,68	103,90	127,52
14	319,46	69,93	113,94	351,86	12,78	136,63	137,02	99,47	109,20	137,80
15	329,55	69,80	116,31	467,09	12,68	143,00	142,11	102,98	114,11	147,07
16	313,36	69,75	111,69	477,02	12,57	148,33	146,43	106,22	118,48	155,24
17	320,43	69,82	113,94	562,82	12,44	152,57	150,23	109,31	122,55	162,45
18	323,18	69,96	104,71	527,45	12,28	156,01	153,66	112,17	126,15	168,63
19	309,19	69,78	95,96	455,66	12,18	159,04	156,83	114,91	129,37	174,06
20	296,57	69,78	93,89	416,14	12,18	161,51	159,27	117,63	132,46	178,86
21	275,74	69,74	95,70	353,71	12,08	163,91	161,30	120,53	135,18	183,13
22	235,41	69,65	93,70	242,31	12,08	165,94	163,12	123,48	137,65	186,80
23	216,61	69,32	92,56	201,95	12,08	167,76	164,66	126,35	139,80	189,44
24	236,36	69,51	99,05	217,65	11,97	169,97	166,15	129,28	141,75	191,76
25	302,52	69,60	112,22	273,53	11,78	169,92	167,64	132,29	143,33	193,36
26	373,17	69,56	122,96	466,85	11,48	170,69	169,55	135,46	144,83	194,62
27	349,88	69,57	117,66	462,30	11,30	171,59	172,42	138,92	146,11	195,84
28	361,24	69,61	117,11	372,62	11,13	172,80	175,83	142,66	147,58	197,49
29	379,56	69,58	97,56	379,53	10,88	174,57	179,61	146,49	148,89	199,63
30	377,92	69,63	90,70	539,10	10,78	176,34	182,73	150,06	150,47	202,29
31	393,36	69,62	89,77	622,21	10,57	178,57	185,61	155,43	152,67	205,39
32	406,78	69,66	90,06	664,22	10,47	181,57	187,93	160,19	155,33	208,51
33	420,31	69,66	90,89	692,73	10,28	183,76	190,04	165,32	158,78	211,90
34	436,20	69,57	92,09	719,06	10,07	186,61	192,08	170,19	162,97	215,29
35	459,96	69,54	94,11	746,63	9,91	189,91	194,06	174,87	168,09	218,54
36	490,20	69,69	96,10	791,88	9,68	192,93	196,10	179,69	173,89	221,74
37	503,14	69,77	96,97	817,46	9,58	195,46	197,97	184,89	180,58	224,76
38	510,70	69,84	97,64	815,12	9,27	199,61	200,22	189,40	188,46	227,75
39	520,24	69,86	98,12	818,79	9,07	203,29	202,52	194,36	197,07	230,75
40	529,81	69,95	99,42	823,60	8,91	207,43	204,90	199,44	206,32	233,94
41	539,72	69,82	100,52	829,23	8,69	211,95	207,72	204,26	216,24	237,22
42	550,15	70,15	101,84	844,48	8,47	217,23	210,64	209,16	226,42	240,61
43	561,61	70,19	102,96	866,65	8,28	223,06	213,60	214,10	237,13	244,17
44	574,26	70,21	103,99	901,59	8,07	228,85	217,11	219,09	247,94	247,80
45	580,14	70,06	104,24	923,84	7,87	235,09	220,97	224,31	259,11	251,50
46	583,14	70,23	104,76	925,95	7,67	241,50	224,97	229,16	270,98	255,79
47	590,53	70,13	105,51	930,91	7,37	247,49	229,34	233,89	282,63	260,60
48	600,33	69,94	106,69	936,17	7,21	253,63	233,62	238,66	294,28	265,62
49	610,41	70,36	107,51	950,24	6,97	260,66	238,38	243,66	306,22	270,81
50	617,23	70,37	108,26	962,06	6,77	267,31	243,05	249,04	318,03	276,20
51	620,11	70,69	108,45	962,62	6,57	274,28	248,24	253,80	329,94	281,44
52	622,43	70,16	108,06	973,06	6,37	281,42	253,39	258,99	341,79	287,02
53	622,36	70,47	107,93	983,59	6,18	288,94	258,67	263,89	353,60	292,57
54	620,42	70,45	108,68	982,46	5,97	296,21	263,68	269,46	365,63	298,53
55	618,04	70,56	108,39	974,71	5,77	303,71	269,37	274,57	377,74	304,60
56	617,49	70,42	107,75	969,79	5,57	310,35	274,71	279,94	388,78	311,14
57	618,49	70,34	107,09	970,17	5,37	318,20	280,39	285,08	399,61	318,02
58	619,69	70,49	107,13	970,26	5,17	325,49	285,98	290,73	410,06	325,14
59	613,18	70,50	106,57	962,57	5,07	333,94	291,66	296,34	420,60	332,31
60	604,67	70,39	107,21	945,91	4,87	342,21	297,29	302,22	429,22	339,95
61	596,82	70,69	106,00	928,49	4,77	350,99	302,81	308,21	438,30	347,69
62	591,33	70,47	105,87	919,02	4,57	358,34	308,57	314,49	446,04	355,97
63	589,79	70,54	106,15	916,04	4,37	366,63	314,38	320,44	453,91	364,17
64	587,50	70,69	104,81	916,42	4,17	373,65	320,09	326,90	461,29	372,70
65	586,13	70,76	106,27	920,70	4,07	381,82	325,86	333,40	467,48	380,75
66	585,29	70,65	105,36	924,45	3,89	389,16	331,75	340,19	473,66	388,75
67	583,62	70,81	104,06	924,50	3,77	395,82	337,70	346,49	479,59	397,02
68	579,47	70,70	104,53	919,20	3,57	403,13	343,31	353,09	484,86	404,85
69	574,94	70,80	104,15	914,35	3,47	410,36	349,20	359,88	490,69	411,53
70	569,21	70,81	103,52	912,30	3,37	417,43	355,36	366,38	495,73	419,01
71	563,19	70,43	103,27	906,05	3,27	424,05	361,42	372,50	499,79	426,20
72	557,34	70,64	102,26	898,69	3,17	429,85	367,15	379,71	502,50	434,40
73	596,35	71,11	159,75	803,92	3,07	436,73	373,52	387,97	505,37	441,59
74	524,19	71,44	155,79	526,51	15,08	443,34	381,20	396,92	508,48	448,70
75	530,95	70,86	112,89	628,22	14,88	449,16	388,39	401,65	511,78	454,72
76	564,71	71,19	110,33	850,79	14,68	454,06	393,30	406,47	512,49	460,40
77	562,56	71,03	109,36	929,31	14,38	457,67	396,41	410,93	512,39	464,26
78	566,89	71,15	109,62	950,49	14,28	460,55	398,33	413,90	512,92	466,86
79	569,10	71,17	109,20	953,56	13,98	462,04	399,45	415,60	514,13	468,40
80	566,76	71,06	108,11	947,57	13,78	464,23	399,77	416,96	516,20	469,76
81	563,92	70,80	106,03	937,52	13,68	463,53	399,32	418,25	516,96	469,13
82	560,72	71,26	103,37	928,82	13,48	464,46	398,95	418,64	518,72	468,37
83	577,09	71,42	105,58	920,76	13,28	466,11	398,05	418,65	521,10	466,55
84	574,49	71,13	106,44	914,87	13,08	465,91	397,13	417,84	522,53	465,64
85	574,11	71,46	105,66	912,87	12,98	466,45	396,10	416,61	525,28	464,11
86	573,60	71,07	105,07	912,87	12,78	465,55	394,71	416,03	526,97	463,16
87	572,85	71,46	105,53	913,82	12,58	466,52	393,43	415,06	529,52	461,33
88	570,77	71,42	105,93	910,62	12,38	467,38	392,50	414,36	532,06	459,71
89	571,35	71,47	104,92	909,99	12,28	466,67	391,39	412,69	533,47	458,61
90	576,49	71,44	106,19	915,56	12,08	466,77	390,09	411,83	535,46	457,74

91	599,47	71,41	106,18	926,13	11,67	466,85	389,02	410,15	537,75	456,65
92	601,46	71,51	108,46	939,53	11,58	467,42	387,98	409,23	539,20	455,76
93	611,81	71,40	108,21	955,59	11,47	466,66	386,98	407,65	541,96	454,96
94	617,92	71,34	108,28	963,43	11,18	467,94	385,96	406,84	544,55	454,59
95	625,81	71,55	109,26	970,73	10,98	467,69	385,42	405,33	547,55	454,16
96	633,54	71,59	110,96	986,85	10,78	467,83	384,79	404,87	550,66	454,49
97	639,07	71,85	111,17	996,47	10,47	469,26	384,69	403,52	554,95	454,20
98	640,04	72,10	112,13	999,56	10,28	470,85	384,42	403,27	559,05	454,51
99	643,47	72,08	113,02	1010,90	10,08	471,69	384,56	402,63	562,16	455,33
100	645,31	71,97	113,13	1023,93	9,77	473,59	384,61	402,82	564,65	455,84
101	649,87	72,21	112,63	1029,52	9,58	475,23	385,43	402,18	570,13	457,17
102	653,85	72,03	112,45	1035,52	9,38	476,29	385,94	402,14	574,09	458,96
103	656,04	72,17	112,51	1040,50	9,14	477,62	386,81	401,86	579,40	460,47
104	657,40	71,92	113,84	1045,98	8,88	479,93	387,76	401,70	583,43	462,26
105	658,49	72,39	112,88	1050,27	8,68	482,92	389,19	401,35	588,92	463,99
106	658,85	72,98	113,52	1053,39	8,47	486,35	390,67	401,53	593,72	466,23
107	658,14	72,99	114,70	1051,13	8,22	489,83	392,31	402,12	598,19	468,71
108	659,31	73,10	115,52	1052,62	7,98	493,10	394,31	402,22	601,94	471,50
109	658,21	72,83	114,85	1052,72	7,77	497,61	396,47	402,75	607,07	474,39
110	657,63	72,58	114,32	1051,68	7,58	501,02	398,77	403,44	611,31	477,76
111	660,54	72,65	114,93	1053,28	7,38	505,07	401,48	404,07	615,59	481,59
112	658,57	72,48	113,95	1053,20	7,17	510,13	404,35	405,02	620,77	484,28
113	659,24	72,20	113,70	1055,90	6,97	513,40	407,22	405,74	623,81	489,48
114	661,43	72,61	113,86	1058,30	6,78	518,41	410,82	406,24	627,88	493,84
115	662,75	72,63	113,46	1060,04	6,57	522,59	414,10	407,36	630,94	499,10
116	660,96	72,30	111,40	1059,80	6,37	526,85	417,79	408,06	634,99	504,04
117	661,91	72,61	111,58	1058,45	6,18	530,63	421,21	409,35	637,77	509,30
118	663,06	72,76	112,34	1056,83	5,98	536,34	425,14	410,47	642,12	514,63
119	664,89	73,07	113,41	1051,86	5,79	540,89	428,80	411,30	645,22	520,32
120	664,71	72,79	112,65	1047,54	5,67	545,31	432,80	412,83	648,81	525,67
121	660,35	72,93	112,66	1043,59	5,48	550,47	436,57	414,35	651,34	530,75
122	656,11	72,37	111,51	1038,98	5,38	554,26	440,57	415,63	654,45	536,06
123	654,05	72,55	110,20	1038,06	5,17	557,27	444,40	417,14	657,40	541,59
124	652,66	72,37	110,19	1040,87	5,07	561,87	448,82	418,58	660,11	546,49
125	647,31	72,95	110,29	1034,69	4,87	567,19	453,36	419,67	662,64	550,81
126	639,46	72,01	109,19	1026,81	4,78	569,83	457,45	421,28	664,60	555,90
127	631,93	72,30	106,23	1018,70	4,68	574,00	462,27	423,22	667,24	560,28
128	624,68	72,54	107,11	1006,05	4,57	577,26	466,91	424,78	668,89	564,95
129	584,96	72,67	101,41	1019,46	4,47	581,94	473,40	426,72	669,52	568,60
130	507,93	72,82	93,23	1061,95	4,37	585,30	479,76	429,26	664,60	572,32
131	469,37	72,37	90,88	1037,65	4,37	587,24	484,70	431,47	663,00	576,36
132	443,73	71,88	89,36	1004,84	4,27	589,70	488,66	433,43	661,54	579,80
133	424,06	72,10	89,06	978,00	4,27	592,25	491,80	435,30	659,87	582,61
134	408,04	72,91	87,16	957,91	4,17	594,11	493,93	436,89	657,37	584,54
135	394,06	72,80	87,27	946,15	4,17	594,59	495,62	438,28	654,62	586,06
136	382,51	72,41	85,99	940,22	4,17	594,36	496,78	439,57	650,18	586,91
137	372,20	72,33	83,68	932,81	4,08	592,85	497,94	440,74	645,84	587,44
138	363,04	72,03	82,44	922,25	4,08	590,68	498,76	441,61	641,35	587,32
139	354,77	72,01	82,32	910,71	4,08	588,90	499,13	442,36	636,37	586,83
140	346,76	72,56	83,96	899,36	4,08	588,74	498,69	443,29	630,87	585,24
141	339,84	72,63	83,60	888,79	3,98	586,81	499,13	444,18	625,45	583,93
142	334,14	72,20	82,23	878,48	3,98	583,69	498,93	444,93	619,24	582,34
143	328,99	72,14	81,58	869,35	3,98	580,62	498,66	445,61	613,20	580,73
144	323,44	72,26	81,35	860,55	3,98	578,39	498,19	446,30	607,35	578,85
145	318,67	72,58	82,40	851,47	3,87	576,76	497,52	446,79	600,79	576,37
146	313,55	72,47	83,27	843,11	3,95	574,14	497,10	447,37	594,61	574,24
147	309,36	72,54	83,06	835,32	3,87	571,76	496,29	448,00	588,20	571,69
148	304,66	72,32	82,66	825,15	3,87	569,66	495,16	448,32	582,60	569,66
149	300,65	72,27	81,90	816,44	3,87	566,71	494,94	448,91	576,20	567,21
150	296,77	72,50	81,95	809,16	3,77	563,96	494,07	449,41	569,81	564,67
151	293,74	72,46	81,13	803,49	3,82	561,17	493,24	449,83	563,39	562,13
152	290,60	72,21	80,20	798,52	3,77	557,92	492,43	450,24	556,48	559,57
153	287,54	72,05	78,84	793,85	3,77	553,67	491,83	450,51	551,21	557,41
154	284,24	72,44	79,47	791,42	3,77	552,24	490,95	450,97	545,14	554,74
155	281,70	72,48	80,26	790,03	3,77	550,06	489,98	451,28	539,04	552,06
156	279,59	71,90	79,66	787,66	3,77	547,70	488,73	451,76	533,36	549,20
157	276,33	72,33	80,60	784,76	3,67	546,30	487,21	452,14	530,07	546,30
158	273,54	71,94	80,48	781,41	3,67	543,52	486,41	452,41	523,20	544,01
159	271,22	71,60	80,46	777,76	3,67	541,79	484,65	452,69	518,78	541,43
160	269,12	71,78	80,46	774,81	3,67	539,26	483,70	453,03	511,40	538,91
161	267,64	71,73	78,39	772,29	3,58	535,12	482,83	453,42	506,07	536,65
162	265,76	71,72	78,50	769,18	3,67	532,79	481,72	453,73	501,16	534,34
163	263,39	71,72	79,62	766,49	3,57	531,24	480,34	453,90	495,52	531,72
164	262,01	71,66	78,02	764,37	3,59	528,84	479,21	454,39	490,84	528,96
165	260,25	71,51	78,66	761,77	3,57	527,50	477,74	454,74	485,60	526,72
166	258,77	71,01	78,48	760,06	3,57	524,53	476,91	454,92	481,16	524,45
167	257,62	71,63	76,43	759,12	3,57	521,84	475,71	455,36	476,67	521,77
168	256,20	71,90	76,34	757,42	3,57	519,63	474,43	455,76	472,29	519,58
169	255,00	72,29	77,35	756,57	3,47	517,85	473,13	456,15	467,85	517,11
170	253,55	72,07	77,18	755,87	3,47	515,44	471,91	456,27	463,33	515,26
171	252,46	71,69	77,85	755,96	3,47	512,89	471,14	456,60	459,17	513,05
172	251,59	72,21	77,29	756,14	3,47	511,87	469,58	456,83	454,85	510,40
173	250,36	71,50	77,28	755,21	3,47	509,53	468,65	456,92	451,11	508,19
174	249,77	71,55	76,98	754,32	3,47	507,31	467,41	457,05	447,26	505,91
175	248,60	71,57	77,93	753,27	3,38	506,05	466,25	457,06	443,21	503,67
176	247,91	71,52	76,49	752,27	3,38	502,49	464,99	457,01	439,27	501,83
177	246,91	71,54	76,61	750,70	3,38	501,02	463,60	457,02	435,64	499,75
178	246,01	72,27	77,09	749,01	3,38	500,14	462,71	457,28	432,09	497,16
179	244,69	72,05	77,71	746,67	3,38	499,11	461,13	457,13	428,64	495,43
180	243,82	71,66	77,61	744,25	3,37	497,22	460,16	457,06	425,10	493,24
181	242,91	71,53	76,68	742,82	3,27	494,93	458,64	457,14	421,49	491,31
182	241,51	71,79	77,67	733,83	3,27	494,15	457,19	457,07	418,71	489,36
183	240,16	71,67	77,29	724,51	3,27	492,55	455,77	456,69	415,14	487,40

184	239,06	71,24	77,19	721,82	3,27	490,00	454,77	456,36	412,14	485,66
185	238,52	71,42	76,54	721,80	3,27	488,21	453,24	456,02	408,97	483,53
186	237,56	71,48	77,46	723,49	3,18	486,60	451,09	455,11	405,72	481,89
187	236,16	71,21	76,96	728,17	3,21	484,44	449,58	454,30	403,00	480,26
188	235,65	71,35	76,86	730,83	3,17	482,74	447,61	453,37	400,09	478,44
189	234,96	71,28	77,01	732,85	3,17	480,75	445,87	452,38	397,27	476,94
190	234,86	71,51	76,30	735,06	3,17	479,59	443,65	451,58	394,66	474,83
191	234,32	71,48	76,31	734,56	3,17	477,80	442,02	450,79	392,03	473,31
192	233,45	71,68	76,05	721,90	3,17	475,85	439,97	449,99	389,12	471,77
193	232,79	71,48	76,42	714,24	3,17	474,14	437,92	449,16	386,87	469,89
194	232,00	71,47	76,79	712,36	3,17	472,13	435,83	448,07	384,24	468,52
195	231,26	71,71	76,87	711,40	3,17	470,22	433,55	447,00	381,77	467,00
196	230,70	71,47	76,52	710,96	3,08	468,54	431,51	446,03	379,26	465,44
197	230,52	71,71	75,97	711,66	3,07	466,49	429,34	445,00	377,06	463,86
198	230,13	71,75	76,52	712,23	3,07	465,24	426,92	443,93	374,83	462,31
199	229,59	71,69	76,49	712,36	3,07	463,81	424,63	442,85	372,23	460,90
200	228,94	72,00	76,58	711,56	3,07	461,59	422,74	441,73	369,67	459,57
201	228,41	71,71	76,64	710,92	3,07	459,72	420,54	440,83	367,49	458,37
202	227,82	71,58	77,22	709,22	3,07	458,34	418,32	439,71	364,83	456,78
203	227,08	71,14	77,00	709,18	3,07	457,16	416,31	438,64	364,25	454,70
204	226,85	71,41	75,95	709,66	3,07	453,97	414,42	437,57	361,28	453,66
205	226,02	71,25	76,48	709,71	2,97	453,19	411,98	436,61	360,63	451,85
206	225,66	70,95	76,17	710,74	2,97	451,62	409,96	435,59	358,37	450,66
207	224,97	71,19	76,82	709,99	2,97	449,55	407,96	434,58	355,04	449,35
208	224,58	71,01	76,59	707,07	2,97	447,85	406,23	433,61	352,84	447,93
209	259,60	71,09	82,74	575,67	2,97	445,64	404,29	433,23	350,85	446,60

POLYTESTS
TESTING THROUGH YOUR REALITY

Date: 2022-06-09 Manufacturer: Hearthstone Model: 8031

Project #: PI 20270 Run: M-8 4 Tech: M M Reviewer: DP

- kindling 3.00 LBS start Fire
- by pass open
- Fan off
- At 1,2 LBS insert 1st preload
- At 1.2 LBS close Door
- At 2.9 LBS insert second preload
- close Door immedially
- At 4.8 LBS close air inlet (spacer) set Fan Low
and close by pass
- At 2.8 LBS rack coal Bed
~~At 2.8 L~~ min After 2 min insert load
At close Door and by pass immedially
At 5 min close air inlet (spacer 3/4)

TEST LOAD CONFIGURATION

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE / POST CHECKS

Date: 2022-06-09 Manufacturer: Hearthstone Model: 8031

Project #: QT 20270 Run: 4 Tech: MR Reviewer: DP

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
EM 334	7:00	OK	OK

Pre-Test Post-Test

Facility Conditions:

	Pre-Test	Post-Test
Air Velocity from less than 2 feet	0 (max50 Fpm)	0 (max50 Fpm)
Smoke Capture Check (tunnel velocity)	OK	NA
Picture (4 sides)	OK	OK

Wood Heater Conditions:

Date Wood Heater Stack Cleaned	2022-06-06
Date Dilution Tunnel Cleaned	2022-06-06
Induced Draft Check (max 0.005 H2O)	OK
Traverse before ignition	OK

Temperature System:

Ambient (65°-90°F)	OK °F

Proportional Checks:

Thermocouple check	OK
Pitot Clean	OK
Pitot verification	OK
Pictures for report: Side	OK
Coal bed	OK
Load	OK
Load in stove	OK
Fuel adjustment	OK
Load Length approximately 5/6 of firebox Lenght	OK

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 2022-06-09 Manufacturer: Hearthstone Model: 8031

Project #: PI 2270 Run: 4 Tech: MM Reviewer: DD

Leakage Checks Tunnel Samplers

	System 1st hour		System 1		System 2	
Unplugged Flow Rate = .25cfm	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)
Vacuum (inches Hg.)	-10	-10	-10	-10	-10	-10
Final 1minute DGM (Liter)	649019 65	650187 96	649019 77	650188 08	397032 10	398169 94
Initial 1minute DGM (Liter)	649019 55	650187 94	649019 73	650188 06	397032 08	398169 92
Change (Liter)	0,10	0,02	0,04	0,02	0,02	0,02
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)	**0.20**	**0.20**	**0.20**	**0.20**	**0.20**	**0.20**
Check OK	ok	ok	ok	ok	ok	ok

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 2022-06-09 Manufacturer: Hearth stove Model: 8031

Project #: PT 20270 Run: 4 Tech: MM Reviewer: DP

Leakage Checks Flue Gas Sampler

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

Leakage Checks Pitot

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

Scales checks

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Platform	~~EM-33~~ EM-205 MM	10.01 ~~lbs~~ KG MM, Class F	10.00 ~~lbs~~ KG MM
Wood	EM-090	440 lbs, Class F	440 lbs
Analytical	EM-335	100 mg, Class S	100 mg
Analytical	EM-119	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: 2022-06-09 Manufacturer: Hearthstone Model: 8031

Project #: pI to 230 Run: 4 Tech: JM Reviewer: DP

FOR TUNNELS < 12 in

Barometric pressure (P_{bar}) 100.7 (KPa.) Static pressure (P_s) 0.18 (inches w.c.)
Inside diameter: Port A _____ Port B ____
Tunnel cross sectional area: .1963Ft^2
Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_1 (inches H_2O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.069	66.82
B - Centroid	3.00	3.50	4	0.070	66.77
A-1	0.40	0.50	0.50	0.055	66.82
A-2	1.50	1.75	2	0.070	66.70
A-3	4.50	5.25	6	0.064	66.70
A-4	5.60	6.5	7.5	0.055	66.66
B-1	0.40	0.50	0.50	~~0.065~~ 0.057	66.77
B-2	1.50	1.75	2	0.065	66.78
B-3	4.50	5.25	6	0.073	66.78
B-4	5.60	6.5	7.5	0.057	66.65
				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 H_2O)
T_s = average absolute dilution tunnel temperature (°F + 460)
P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qs}$
P_q = static pressure $\frac{\text{in. } H_2O}{\{\ 13.6\ \}}$
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.

Date: 2022-06-09 Manufacturer: Hearthstone Model: 8321

Project #: QI 20270 Run: 4 Tech: MM Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
CO	0	0	3.018	3.00	1.030	1.00
Tolerance CO	0	+/- 0.02	0.018	+/- 0.15	0.030	+/- 0.05
CO_2	0	0	18.01	18.00	9.85	10.00
Tolerance CO2	0	+/- 0.02	0.01	+/- 0.5	0.15	+/- 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	3.010	1.010	0	0.02	0.008	0.15	0.020	0.05	✓	
CO_2	0	18.01	9.90	0	0.02	0	0.5	0.05	0.5	✓	

POLYTESTS
TESTING THROUGH YOUR REALITY

TEST DATA LOG

Date: 2022-06-09 Manufacturer: Beanthstone Model: 8031

Project #: PI 20270 Run: 4 Tech: JM Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blanck
Final (Liter)	650187,25	398168,36	385652,21
Initial (Liter)	649020,75	397037,20	384703,18

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	100,7	100,1
Dry Bulb (F):	72,50	78,1
Humidity (%):	55,1	45,3

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

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

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2022-06-09 Manufacturer: Hearthstone Model: 8031

Project #: PT 20230 Run: 4 Tech: MA Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight		Meter Moisture Content (% dry)*				
1 ½ x 3 ½ x 14 in.	1068	lbs.	19	19	19	20	20
1 ½ x 3 ½ x 14 in.	1398	lbs.	20	20	20	20	20
1 ½ x 3 ½ x 14 in.	1598	lbs.	23	23	22	22	22
1 ½ x 3 ½ x 14 in.	1368	lbs.	20	20	20	20	20
1 ½ x 3 ½ x 14 in.	1300	lbs.	21	21	21	21	21
1 ½ x 3 ½ x 14 in.	1442	lbs.	20	20	20	20	20
1 ½ x 3 ½ x 14 in.	1702	lbs.	19	19	19	19	19
1 ½ x 3 ½ x 14 in.	1376	lbs.	20	20	20	20	20
1 ½ x 3 ½ x 14 in.	1408	lbs.	23	23	22	22	23
x x in.		lbs.					
1 ½ x 3 ½ x 14 in.	1456	lbs.	20	20	20	20	20
1 ½ x 3 ½ x 14 in.	1386	lbs.	21	21	21	21	21
1 ½ x 3 ½ x 14 in.	1506	lbs.	22	21	21	21	21
1 ½ x 3 ½ x 14 in.	1064	lbs.	20	20	20	20	20
1 ½ x 3 ½ x 14 in.	1368	lbs.	21	21	21	21	21
1 ½ x 3 ½ x 14 in.	1600	lbs.	22	22	22	22	22
1 ½ x 3 ½ x 14 in.	1446	lbs.	21	21	21	21	21
1 ½ x 3 ½ x 14 in.	1404	lbs.	19	19	19	19	19
1 ½ x 3 ½ x 14 in.	1460	lbs.	20	20	19	19	19
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					

TEST LOAD WEIGHT: 1269 + 12,56 lbs

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2026-06-09 Manufacturer: Hearthstone Model: 8031

Project #: PT 20270 Run: 4 Tech: MP Reviewer: DO

FUEL DESCRIPTION:
Type of wood :

TEST LOAD

Piece Size	Weight		Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 15 in.	1684	lbs.	196	199	205	201	203
1 1/2 x 3 1/2 x 15 in.	1476	lbs.	201	202	203	202	202
1 1/2 x 3 1/2 x 15 in.	1494	lbs.	211	216	213	214	213
3 1/2 x 3 1/2 x 15 in.	3346	lbs.	224	223	226	219	215
3 1/2 x 3 1/2 x 15 in.	3182	lbs.	227	223	229	226	224
x x in.		lbs.					
1 1/2 x 3/4 x 5 in.	0144	lbs.			201		
1 1/2 x 3/4 x 5 in.	0148	lbs.			196		
1 1/2 x 3/4 x 5 in.	0136	lbs.			193		
1 1/2 x 3/4 x 5 in.	0134	lbs.			192		
1 1/2 x 3/4 x 5 in.	0156	lbs.			194		
1 1/2 x 3/4 x 5 in.	0138	lbs.			208		
1 1/2 x 3/4 x 5 in.	0120	lbs.			209		
1 1/2 x 3/4 x 5 in.	0126	lbs.			210		
1 1/2 x 3/4 x 5 in.	0136	lbs.			208		
1 1/2 x 3/4 x 5 in.	0124	lbs.			204		
1 1/2 x 3/4 x 5 in.	0114	lbs.			203		
1 1/2 x 3/4 x 5 in.	0136	lbs.			198		
1 1/2 x 3/4 x 5 in.	0156	lbs.			199		
1 1/2 x 3/4 x 5 in.	0138	lbs.			200		
1 1/2 x 3/4 x 5 in.	0140	lbs.			198		
1 1/2 x 3/4 x 5 in.	0128	lbs.			196		
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					

TEST LOAD WEIGHT: 1337 lbs Min 20%: ~~50~~ 267 Max 25%: 334

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2022-06-08 Manufacturer: Heatilator Model: 8031

Project #: PT 20270 Run: 4 Tech: MR Reviewer: AP

		SYSTEM 1 – 1st 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	Blanck
Date	Time	005	307	308	21	13	309	310	42	313
2022-06-08	17:00	61,5010	0,1262	0,1266	33,6777	95,1467	0,1275	0,1268	35,4755	0,1269
2022-06-09	9:00	61,5011	0,1263	0,1266	33,6778	95,1466	0,1274	0,1267	35,4756	0,1268

		SYSTEM 1 – 1st 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	Blanck
Date	Time	005	307	308	21	13	309	310	42	313
2022-06-09	16:30	61,5015	0,1277	0,1265	~~33,68~~ 33,6817 MR	95,1474	0,1273	0,1265	35,4778	0,1271
2022-06-13	9:00	61,5013	0,1276	0,1262	33,6790	95,1467	0,1269	0,1261	35,4769	0,1269
2022-06-14	9:00	61,5012	0,1276	0,1262	33,6790	95,1467	0,1269	0,1261	35,4769	0,1269

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2022-06-08 Manufacturer: Hearthstone Model: 8031

Project #: PT 20170 Run: 4 Tech: MM Reviewer: DP

Pre-test Weight Record		SYSTEM 2 Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	33	311	312	44
2022-06-08	17:30	109 3637	01276	01276	34 5289
2022-06-09	9:30	109 3628	01275	01275	34 5290

Post-test Weight Record		SYSTEM 2 Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	33	311	312	44
2022-06-09	16:30	109 3642	01289	01273	34 5319
2022-06-13	9:00	109 3640	01286	01270	34 5304
2022-06-14	9:30	109 3640	01286	01271	34 5304

Paramètres

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

Code verrouillage:	HEA	

Description du test

Test standard	EPA	
Run #	4	
Date	09-06-2022	
Technicien	m.m	
Project #	pi 20270	

Description de l'unité

Manufacturier	hearthstone	
Modèle	8031	
Combustion system	Cat	
Appliance type	wood stove	
Firebox volume	1,9	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

Paramètres du test

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

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	1,007	Dimensionless
Equipment number (DGM #1):	em 178	
Calibration Factor (DGM #2):	1,005	Dimensionless
Equipment number (DGM #2):	em 318	
Calibration Factor (DGM #3):	0,988	
Equipment number (DGM #3):	em 179	Dimensionless

Tunnel

Targeted tunnel flow rate	350	scfm
Tunnel diameter	8	in.
Molecular weight	29	29 as per ASTM E2515
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 20270
Date	09-06-2022
Technicien	m.m

Fuel data

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

Default Fuel Values

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

	Start	End
Barometer (kPa):	100,7	100,1
Barometer (in.Hg):	29,736699	29,55951887
Dry Bulb (F):	72,5	78,1
Humidity (%):	55,1	45,3
Air velocity (ft/min)	0	0

DGM #1	Final:	22961,147	cuft	Final:	650187,250	Liter
	Initial:	22919,934	cuft	Initial:	649020,250	Liter
DGM #2	Final:	14061,183	cuft	Final:	398168,360	Liter
	Initial:	14021,060	cuft	Initial:	397032,200	Liter
DGM room	Final:	13619,180	cuft	Final:	385652,210	Liter
	Initial:	13585,665	cuft	Initial:	384703,180	Liter

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent: 258

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

Project nu.	pi 20270
Date	09-06-2022
Technicien	m.m

Preload data sheet

Test Load Weight:

Lower	Ideal	Upper
11,97	13,30	14,63

Load Volume: 0,7656 cu. ft

Loading Density: 13,289 lbs./ft3

Number of Spaces:

Spacer weight (lbs):

Load Density (wet): 32,980 lbs./ft3

Dry Wood Density: 27,275559

Piece Size (in): Thick	Wide	x Length	Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x Weight	Volume Cubic Inches
1,5	3,5	14	1,068	19,6	19,6	19,4	20	20,1	21,08232	73,50
1,5	3,5	14	1,398	20,4	20,8	20,3	20,2	20,2	28,49124	73,50
1,5	3,5	14	1,598	23,1	23	22,9	22,9	22,8	36,65812	73,50
1,5	3,5	14	1,268	20,6	20,4	20,3	20,4	20,8	25,994	73,50
1,5	3,5	14	1,3	21,1	21,6	21,8	21,2	21,4	27,846	73,50
1,5	3,5	14	1,442	20,3	20,3	20,6	20,3	20,2	29,33028	73,50
1,5	3,5	14	1,702	19,6	19,3	19,2	19,6	19,8	33,189	73,50
1,5	3,5	14	1,376	20	20	20,4	20,3	20,4	27,82272	73,50
1,5	3,5	14	1,408	23,1	23,1	22,9	22,9	23	32,384	73,50
										0,00
1,5	3,5	14	1,456	20,3	20,4	20,6	20,3	20,4	29,7024	73,50
1,5	3,5	14	1,386	21	21,1	21,3	21,2	21	29,27232	73,50
1,5	3,5	14	1,506	22	21,9	21,8	21,7	21,6	32,8308	73,50
1,5	3,5	14	1,064	20	20,3	20,2	20,6	20,8	21,68432	73,50
1,5	3,5	14	1,368	21,3	21,6	21,4	21,3	21,4	29,2752	73,50
1,5	3,5	14	1,6	22	22,3	22,6	22,4	22,3	35,712	73,50
1,5	3,5	14	1,446	21,1	21	21,1	21	21,2	30,48168	73,50
1,5	3,5	14	1,404	19,6	19,3	19,4	19,8	19,3	27,34992	73,50
1,5	3,5	14	1,46	20	20,1	19,8	19,8	19,4	28,9372	73,50
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00

SUM MC: 528,04352

PreTest Load Weight: 25,25 lbs.

Dry Weight: 9,47 kg.

Average Moisture Content: %

Dry: 20,91

20,91

Must be 18-28

Wet: 17,30

must be 15,2-22

Project nu.	pi 20270
Date	09-06-2022
Technicien	m.m

FUEL LOAD DATA SHEET, CSA B415

Test Load Weight:

Lower	Ideal	Upper
12,0	13,3	14,6

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

Load Volume: 0,35 cu. ft | Loading Density: 7,0 lbs./ft3

Number of Spaces: 16 | Load Density (wet): 32,0 lbs./ft3

Spacer weight: lbs | Dry Wood Density: 26,4 lbs./ft3

Piece Size (in): Thick	Wide	Length	Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x Weight	Volume Cubic Inches	Ave. MC %
1,5	3,5	15	1,68	19,60	19,90	20,00	20,10	20,20	33,61264	78,75	20,0
1,5	3,5	15	1,48	20,10	20,20	20,30	20,20	20,20	29,8152	78,75	20,2
1,5	3,5	15	1,49	21,10	21,60	21,30	21,40	21,30	31,88196	78,75	21,3
3,5	3,5	15	3,35	22,40	22,30	22,60	21,90	21,80	74,2812	183,75	22,2
3,5	3,5	15	3,18	22,80	22,30	22,90	22,60	22,40	71,9132	183,75	22,6
										0,00	
										0,00	
										0,00	

1,5	0,75	5	0,14			20,10			2,8944	5,63	20,1
1,5	0,75	5	0,15			19,60			2,9008	5,63	19,6
1,5	0,75	5	0,14			19,30			2,6248	5,63	19,3
1,5	0,75	5	0,13			19,20			2,5728	5,63	19,2
1,5	0,75	5	0,16			19,60			3,0576	5,63	19,6
1,5	0,75	5	0,14			20,80			2,8704	5,63	20,8
1,5	0,75	5	0,12			20,90			2,508	5,63	20,9
1,5	0,75	5	0,13			21,00			2,646	5,63	21,0
1,5	0,75	5	0,14			20,80			2,8288	5,63	20,8
1,5	0,75	5	0,12			20,40			2,5296	5,63	20,4
1,5	0,75	5	0,11			20,30			2,3142	5,63	20,3
1,5	0,75	5	0,14			19,80			2,6928	5,63	19,8
1,5	0,75	5	0,16			19,90			3,1044	5,63	19,9
1,5	0,75	5	0,14			20,00			2,76	5,63	20,0
1,5	0,75	5	0,14			19,80			2,772	5,63	19,8
1,5	0,75	5	0,13			19,60			2,5088	5,63	19,6
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
								SUM MCx	285,0896		20,4 %

Test Load Weight: 13,36 lbs. | Dry Weight: 4,99 kg.

Average Moisture Content: %

Dry: 21,35 | Dry(EPA) 21,35 | Dry(B415 21,35 | 21,35 Must be 19-25 | Wet: 17,59 must be 15,2-22

Coal Bed Range: 2,7 lbs. to 3,3 lbs.

TEST CHARGE:

Coal bed weight: 2,8 lbs.

Project nu.	pi 20270
Date	09-06-2022
Technicien	m.m

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	5	307	308	21	13	309	310	42	33	31	312	44	313		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,5010	0,1262	0,1266	33,6777	95,1467	0,1275	0,1268	35,4755	109,3637	0,1276	0,1276	34,5289	0,1269	2022-06-08	17:00
Before (6)	61,5011	0,1263	0,1266	33,6778	95,1466	0,1274	0,1267	35,4756	109,3638	0,1275	0,1275	34,5290	0,1268	2022-06-09	09:00
After (1)	61,5015	0,1277	0,1265	33,6817	95,1474	0,1273	0,1265	35,4778	109,3642	0,1289	0,1273	34,5319	0,1271	2022-06-09	16:00
After (2)	61,5013	0,1276	0,1262	33,6790	95,1467	0,1269	0,1261	35,4769	109,3640	0,1286	0,1270	34,5304	0,1269	2022-06-13	09:00
After (3)	61,5012	0,1276	0,1262	33,6790	95,1467	0,1269	0,1261	35,4769	109,3640	0,1286	0,1271	34,5304	0,1269	2022-06-14	09:00
After (4)															
After (5)															
After (6)	61,5012	0,1276	0,1262	33,6790	95,1467	0,1269	0,1261	35,4769	109,3640	0,1286	0,1271	34,5304	0,1269	2022-06-14	09:00
Difference	0,0001	0,0013	-0,0004	0,0012	0,0001	-0,0005	-0,0006	0,0013	0,0002	0,0011	-0,0004	0,0014	0,0001		
Total (mg)		2,2				2,5				2,3			0,1		
Total ajusté (mg)		**2,10**				**2,40**				**2,20**					

Project nu.	pi 20270
Date	09-06-2022
Technicien	m.m

Demonstration Purpose only not real Numbers negative mass adjusted to Zero

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	5	307	308	21	13	309	310	42	33	31	312	44	313		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,5010	0,1262	0,1266	33,6777	95,1467	0,1275	0,1268	35,4755	109,3637	0,1276	0,1276	34,5289	0,1269	2022-06-08	17:00
Before (6)	61,5011	0,1263	0,1266	33,6778	95,1466	0,1274	0,1267	35,4756	109,3638	0,1275	0,1275	34,5290	0,1268	2022-06-09	09:00
After (1)	61,5015	0,1277	0,1265	33,6817	95,1474	0,1273	0,1265	35,4778	109,3642	0,1289	0,1273	34,5319	0,1271	2022-06-09	16:00
After (2)	61,5013	0,1276	0,1262	33,6790	95,1467	0,1269	0,1261	35,4769	109,3640	0,1286	0,1270	34,5304	0,1269	2022-06-13	09:00
After (3)	61,5012	0,1276	0,1262	33,6790	95,1467	0,1269	0,1261	35,4769	109,3640	0,1286	0,1271	34,5304	0,1269	2022-06-14	09:00
After (4)															
After (5)															
After (6)	61,5012	0,1276	0,1266	33,6790	95,1467	0,1274	0,1267	35,4769	109,3640	0,1286	0,1275	34,5304	0,1269	2022-06-14	09:00
Difference	0,0001	0,0013	0,0000	0,0012	0,0001	0,0000	0,0000	0,0013	0,0002	0,0011	0,0000	0,0014	0,0001		
Total (mg)		2,6				4				2,7			0,1		
Total ajusté (mg)		**2,50**				**3,90**				**2,60**					

Project nu.	pi 20270
Date	09-06-2022
Technicien	m.m

SFBA EPA EMISSION RESULTS

Test Duration: **211** min

PRESSURE FACTOR:	DGM 1	0,96328	
	DGM 2	0,96672	
	DGM 3	0,99091	
TEMPERATURE FACTORS	DGM 1	0,98312	
	DGM 2	0,97370	
	DGM 3	0,98353	
VOLUMES SAMPLED	DGM 1	39,285	SCft
	DGM 2	37,973	Scft
	DGM 3	32,277	SCft

TOTAL TUNNEL VOLUME : 73144

SAMPLE RATIOS

Sample Train 1:	1861,879
Sample Train 2:	1926,182

Paticulate concentration

Sample Train 1	**0,000064**	g/dscf
Sample Train 2	**0,000061**	g/dscf
Room	**0,000003**	g/dscf

TOTAL EMISSIONS

Sample Train 1	**4,43**	g
Sample Train 2	**4,20**	g

EMISSION RATES

Sample Train 1	**1,26**	g/hr
Sample Train 2	**1,20**	g/hr
1st hour emission rate	**4,10**	g/hr

	Train 1	Train 2
Cs	6,364E-05	6,05686E-05

RESULTS

Average emission rate: 1,23 g/hr

Burn Rate : 1,420 Dry kg/hr

BAROMETRIC PRESSURE

Average:	29,648109	In Hg
Start:	29,736699	In Hg
End:	29,559519	In Hg

DGM CONTROLLER VALUES

DGM 1	Final:	22961,147	Cuft
	Initial:	22919,934	Cuft
DGM 2	Final:	14061,183	Cuft
	Initial:	14021,060	Cuft
DGM #3	Final:	13619,180	Cuft
	Initial:	13585,665	Cuft

TEMPERATURES

DGM 1	537,063	°R
DGM 2	542,259	°R

CALIBRATION FACTORS

DGM 1	1,0066
DGM 2	1,0054
DGM #3	0,9882

TUNNEL FLOW RATE: 346,653 Dscfm

PARTICULATE CATCH

Total Sample Train 1:	2,50	mg
Total Sample Train 2:	2,30	mg
Total Sample Train 1 1st hour:	2,20	mg

DEVIATION: 2,60%

# Elapsed Time		# Weight Remaining	#	#	#	#1 Flue Gas	#2 Room Temp	#3 Tunnel Dry Bulb	#4 Limit Switch Top	#5 Limit Switch Back	#6 Limit Switch Middle	#7 Limit Switch Bottom	#8 Limit Switch Bottom	# Cetal yet	Oven Zone 1 Heating	#OVEN 2 Chiller T	#OVEN 3 Chiller T	#Oven 4 Chiller T Temp	Oven Zone 2 Heating	#OVEN 2 Chiller T	#OVEN 3 Chiller T	#Oven 4 Chiller T Temp	Cetal Unit of Pressure	Flue Gas Pressure	Thermo in Surface Temp.
mm:ss	New data row	lbs	CO	CO_2	O_2	°F	°F	°F	°F	°F	°F	°F	°F	°F	Indicator	°F	°F	°F	Indicator	°F	°F	°F	in wc	in wc	°F
0,00	208,00	13,4	0,2	3,0	811,0	348,3	76,8	115,4	435,8	498,1	534,1	551,8	540,8	520,1	0,18	76,81	76,83	80,82	0,18	76,82	77,36	81,13	0,08	0,08	0
1,0	199,0	13,1	0,6	2,8	809,2	342,6	77,0	98,7	431,7	496,0	534,6	553,8	539,8	481,3	0,18	76,82	76,83	80,38	0,18	76,88	77,62	80,81	0,07	0,07	-1,782802
2,0	202,0	13,0	0,7	6,1	807,3	341,2	76,8	94,8	430,1	493,1	531,8	552,3	539,3	588,7	0,18	76,88	76,89	80,28	0,18	76,88	78,08	80,79	0,07	0,07	-3,727807
3,0	201,0	12,9	0,3	9,3	804,6	366,8	76,8	93,3	426,3	489,2	529,0	549,8	538,8	765,8	0,18	76,91	76,87	80,20	0,18	77,08	78,19	80,78	0,08	0,07	-6,366818
4,0	202,0	12,8	0,1	7,7	801,4	370,8	76,8	93,6	413,3	484,1	525,7	547,8	537,7	817,1	0,18	76,91	76,87	80,20	0,18	77,19	78,31	80,76	0,08	0,07	-8,389303
5,0	197,0	12,8	0,1	7,8	798,4	374,6	76,8	91,7	410,0	479,8	521,1	544,3	537,0	826,8	0,18	76,91	76,88	80,17	0,18	77,36	78,44	80,74	0,08	0,07	-11,07908
6,0	194,0	12,7	0,1	6,1	795,0	380,6	76,8	91,4	407,4	474,8	516,8	540,8	535,7	838,8	0,18	76,91	76,88	80,17	0,18	77,62	78,57	80,74	0,07	0,07	-15,04018
7,0	199,0	12,6	0,1	5,6	791,8	380,0	76,8	91,0	404,8	469,8	512,3	536,8	534,1	848,4	0,18	76,14	76,88	80,21	0,18	77,82	78,66	80,81	0,07	0,07	-19,17699
8,0	196,0	12,5	0,1	7,4	788,2	381,2	77,0	92,0	405,0	465,6	508,8	533,1	532,7	849,8	0,18	76,14	76,87	80,26	0,18	78,00	78,80	80,88	0,08	0,07	-22,76858
9,0	197,0	12,4	0,1	6,6	784,4	380,2	76,8	91,6	402,4	458,3	501,1	529,1	530,6	836,1	0,18	76,27	76,87	80,28	0,18	78,27	78,87	80,87	0,08	0,07	-26,61416
10,0	198,0	12,3	0,1	6,8	781,1	388,8	76,8	91,8	401,1	453,3	494,3	526,0	529,1	828,4	0,18	76,31	76,87	80,29	0,18	78,48	78,94	80,83	0,08	0,07	-30,88187
11,0	199,0	12,3	0,1	6,1	777,4	387,4	76,8	91,6	399,8	447,8	490,7	521,8	527,2	833,4	0,10	76,29	76,84	80,36	0,18	78,61	79,09	80,96	0,08	0,07	-35,88033
12,0	170,0	12,2	0,1	5,0	673,8	387,2	76,8	91,7	397,4	442,2	488,8	517,8	526,4	834,8	0,10	76,28	76,87	80,40	0,18	78,80	79,20	81,06	0,08	0,07	-37,23368
13,0	171,0	12,1	0,1	5,0	670,1	386,8	76,8	91,4	395,7	437,7	486,3	513,7	525,3	834,8	0,10	76,31	76,85	80,44	0,18	78,98	79,31	81,11	0,08	0,07	-40,84131
14,0	172,0	12,0	0,1	6,1	666,0	386,2	76,8	91,7	394,3	432,8	479,8	510,1	521,4	831,1	0,10	76,38	76,84	80,49	0,18	79,17	79,40	81,17	0,08	0,07	-44,13083
15,0	173,0	11,9	0,1	6,2	663,3	386,0	76,7	91,8	393,7	428,8	476,8	508,8	519,3	838,2	0,10	76,38	76,85	80,56	0,18	79,34	79,51	81,21	0,08	0,07	-47,71463
16,0	174,0	11,8	0,1	5,8	659,8	387,0	76,8	92,0	392,8	423,4	468,8	503,8	517,2	840,2	0,10	76,40	76,85	80,60	0,18	79,48	79,77	81,30	0,08	0,07	-51,12774
17,0	175,0	11,8	0,1	6,8	656,1	388,4	76,1	91,8	387,4	419,2	460,8	498,4	514,6	842,8	0,10	76,48	76,85	80,64	0,18	79,63	79,68	81,33	0,07	0,07	-54,88783
18,0	176,0	11,7	0,1	6,8	652,8	389,8	76,4	91,7	388,2	414,8	456,3	494,7	512,8	852,4	0,10	76,47	76,86	80,73	0,18	79,77	79,74	81,37	0,08	0,07	-58,2261
19,0	177,0	11,6	0,1	7,0	649,7	391,4	76,8	91,9	384,1	410,2	452,8	491,3	510,8	859,1	0,10	76,50	76,87	80,81	0,18	79,98	79,83	81,46	0,08	0,07	-61,23827
20,0	178,0	11,5	0,1	8,6	646,7	393,8	76,4	92,1	382,7	406,1	448,8	487,4	508,0	868,4	0,10	76,57	76,90	80,83	0,18	80,13	79,90	81,54	0,08	0,07	-64,24584
21,0	179,0	11,4	0,1	9,8	643,8	396,8	76,4	92,3	382,0	402,0	444,4	483,7	506,0	881,7	0,10	76,59	76,89	80,88	0,18	80,27	79,97	81,58	0,08	0,07	-67,18884
22,0	180,0	11,3	0,1	10,1	641,0	399,0	76,4	92,1	380,8	398,2	441,1	480,2	504,0	891,8	0,10	76,61	76,90	80,90	0,18	80,38	80,04	81,60	0,08	0,07	-69,65817
23,0	181,0	11,1	0,1	10,7	638,8	374,8	76,3	92,4	380,1	394,2	437,2	477,3	503,1	909,8	0,10	76,63	76,92	80,98	0,18	80,48	80,10	81,66	0,08	0,07	-72,80148
24,0	182,0	11,0	0,2	11,4	635,8	376,2	76,3	92,8	378,3	390,8	433,8	474,3	501,3	918,2	0,10	76,64	76,91	81,06	0,18	80,51	80,21	81,74	0,08	0,07	-76,14063
25,0	183,0	10,9	0,2	11,3	633,8	381,7	76,3	92,8	378,3	388,1	430,4	471,4	499,4	924,4	0,10	76,68	76,94	81,18	0,18	80,68	80,39	81,83	0,08	0,07	-77,46188
26,0	184,0	10,7	0,2	11,5	631,4	384,6	76,4	93,1	378,1	388,1	428,8	468,8	497,4	931,2	0,10	76,63	76,96	81,21	0,18	80,76	80,56	81,92	0,08	0,07	-79,34255
27,0	185,0	10,6	0,2	11,6	629,8	387,8	76,3	93,4	380,1	388,2	428,3	468,8	496,8	932,8	0,10	76,72	76,97	81,28	0,18	80,86	80,64	81,98	0,07	0,07	-81,17792
28,0	186,0	10,5	0,2	12,0	628,8	390,0	76,3	93,6	382,8	378,8	422,8	463,7	493,9	940,8	0,10	76,77	76,01	81,32	0,18	80,99	80,83	82,08	0,08	0,07	-82,46778
29,0	187,0	10,4	0,2	12,0	627,4	392,4	76,4	93,8	385,1	377,3	420,2	461,8	492,4	949,3	0,10	76,84	76,03	81,38	0,18	81,10	80,82	82,10	0,08	0,07	-83,63486
30,0	188,0	10,3	0,2	12,0	626,2	393,0	76,4	93,4	386,3	378,1	418,8	460,8	490,4	953,8	0,10	76,82	76,05	81,39	0,18	81,18	80,84	82,14	0,08	0,07	-84,77018
31,0	189,0	10,1	0,3	13,0	625,3	394,0	76,4	93,8	388,0	379,0	417,8	459,2	488,8	958,1	0,10	76,80	76,05	81,41	0,18	81,23	80,87	82,18	0,08	0,07	-85,72714
32,0	190,0	10,0	0,3	13,1	624,4	397,8	76,3	93,7	390,1	371,2	415,7	458,1	486,7	964,8	0,10	76,77	76,07	81,44	0,18	81,28	80,74	82,20	0,07	0,07	-86,62376
33,0	191,0	9,8	0,3	13,2	624,2	400,0	76,3	93,8	394,0	368,8	414,4	457,2	484,7	970,3	0,10	76,79	76,08	81,51	0,18	81,34	80,80	82,28	0,08	0,07	-88,81223
34,0	192,0	9,7	0,3	13,8	623,8	402,1	76,3	93,8	396,1	368,8	413,8	456,8	482,8	977,8	0,10	76,80	76,09	81,55	0,18	81,37	80,83	82,32	0,08	0,07	-87,48661
35,0	193,0	9,6	0,3	13,8	623,3	403,7	76,3	94,0	399,3	366,8	413,3	456,0	481,1	979,4	0,10	76,81	76,09	81,60	0,18	81,44	80,90	82,36	0,08	0,07	-85,7019
36,0	194,0	9,5	0,3	13,7	623,0	405,7	76,4	94,6	401,8	365,7	412,8	456,0	479,3	982,8	0,10	76,78	76,11	81,68	0,18	81,47	80,94	82,42	0,07	0,07	-87,83667
37,0	195,0	9,3	0,3	13,8	622,8	407,8	76,4	94,8	404,7	364,8	412,3	455,8	477,8	983,1	0,10	76,79	76,13	81,74	0,18	81,50	80,98	82,46	0,08	0,07	-90,45763
38,0	196,0	9,2	0,3	13,3	623,0	408,7	76,4	94,7	406,3	363,8	411,7	455,8	476,8	1007,3	0,10	76,78	76,14	81,83	0,18	81,55	81,05	82,57	0,08	0,07	-87,83724
39,0	197,0	9,1	0,2	13,8	623,3	412,1	76,4	94,7	411,8	362,8	411,8	455,8	475,8	1014,7	0,10	76,81	76,14	81,84	0,18	81,58	81,08	82,61	0,07	0,07	-87,69144
40,0	198,0	8,9	0,3	13,8	623,7	415,8	76,4	95,2	415,4	362,3	411,4	457,3	475,2	1022,3	0,10	76,78	76,15	81,90	0,18	81,60	81,10	82,71	0,07	0,08	-87,30441
41,0	199,0	8,8	0,3	14,0	624,1	418,0	76,4	95,1	418,0	361,8	411,3	458,4	476,8	1028,2	0,18	76,80	76,13	81,97	0,18	81,62	81,14	82,78	0,08	0,08	-86,84318
42,0	200,0	8,6	0,3	14,2	624,6	420,6	76,4	95,4	422,0	361,4	411,3	459,4	499,0	1039,8	0,10	76,82	76,16	82,00	0,18	81,68	81,17	82,80	0,08	0,08	-86,38418
43,0	201,0	8,5	0,4	14,2	625,2	422,3	76,5	95,4	425,4	361,2	411,8	460,7	497,2	1044,8	0,10	76,89	76,17	82,06	0,18	81,76	81,22	82,88	0,07	0,07	-85,77377
44,0	202,0	8,3	0,5	14,2	626,2	423,0	76,4	95,7	426,8	361,8	411,1	462,4	495,7	1050,3	0,10	76,92	76,10	82,10	0,18	81,79	81,25	82,92	0,08	0,07	-84,73834
45,0	203,0	8,2	0,5	14,2	627,0	425,2	76,5	95,7	433,1	361,2	411,4	464,4	494,2	1048,3	0,18	76,94	76,22	82,18	0,18	81,84	81,31	82,97	0,08	0,08	-83,66488
46,0	204,0	8,1	0,6	14,1	626,1	426,0	76,5	95,8	434,8	361,8	412,0	466,8	492,8	1052,2	0,10	76,93	76,23	82,16	0,18	81,87	81,34	83,00	0,08	0,07	-82,80723
47,0	205,0	7,9	0,4	14,3	626,2	426,8	76,5	95,8	440,4	362,8	413,8	468,7	491,2	1064,3	0,10	76,94	76,23	82,20	0,18	81,86	81,37	83,04	0,08	0,08	-81,8085
48,0	206,0	7,8	0,4	14,2	626,4	427,5	76,5	95,8	444,3	363,2	414,8	471,2	490,8	1061,3	0,10	76,90	76,24	82,23	0,18	81,89	81,40	83,08	0,08	0,08	-80,85832
49,0	207,0	7,7	0,3	14,1	631,8	428,2	76,5	95,7	447,8	362,8	415,7	471,4	488,3	1064,2	0,10	76,94	76,24	82,28	0,18	81,89	81,48	83,10	0,08	0,08	-79,4328
50,0	208,0	7,6	0,3	14,3	632,8	428,2	76,8	96,3	451,0	363,1	416,8	470,8	486,8	1078,8	0,10	76,94	76,25	82,36	0,18	81,94	81,49	83,20	0,07	0,08	-78,11181
51,0	209,0	7,4	0,4	14,6	634,0	431,1	76,8	96,4	454,3	363,8	417,8	470,4	485,7	1081,3	0,18	76,98	76,24	82,41	0,18	81,98	81,51	83,28	0,07	0,08	-76,88833
52,0	210,0	7,3	0,4	14,6	635,2	432,8	76,8	96,4	457,3	364,4	418,8	480,8	484,3	1086,4	0,10	76,98	76,28	82,48	0,18	81,98	81,55	83,30	0,07	0,08	-75,81378
53,0	211,0	7,2	0,5	14,7	636,6	433,7	76,8	96,4	460,8	365,4	420,0	483,4	483,2	1104,3	0,10	76,98	76,28	82,48	0,18	81,98	81,57	83,32	0,08	0,08	-74,42692
54,0	212,0	7,0	0,4	14,7	637,8	435,8	76,7	96,1	463,8	366,4	421,0	486,1	482,1	1113,8	0,10	77,00	76,31	82,53	0,18	82,04	81,66	83,33	0,08	0,08	-73,14202
55,0	213,0	6,8	0,5	14,8	639,1	435,4	76,8	96,3	467,3	367,3	422,1	488,3	480,8	1118,7	0,10	76,98	76,32	82,53	0,18	82,08	81,72	83,38	0,08	0,08	-71,83675
56,0	214,0	6,7	0,4	14,9	640,4	436,8	76,8	96,3	469,8	368,3	423,3	490,8	479,8	1124,8	0,10	76,98	76,33	82,58	0,18	82,10	81,77	83,39	0,08	0,08	-70,89298
57,0	215,0	6,6	0,4	14,9	642,2	437,8	76,7	96,3	473,7	369,4	424,8	493,1	479,0	1131,4	0,10	76,98	76,34	82,60	0,18	82,11	81,81	83,43	0,08	0,08	-69,87683
58,0	216,0	6,5	0,4	15,0	643,8	438,4	76,7	96,8	477,1	370,4	426,3	496,8	478,8	1123,8	0,10	77,03	76,36	82,64	0,18	82,18	81,85	83,50	0,07	0,08	-67,43641
59,0	217,0	6,3	0,4	14,9	643,8	438,0	76,8	96,7	479,8	371,7	428,2	498,8	477,1	1118,3	0,10	77,07	76,40	82,72	0,18	82,21	81,90	83,56	0,07	0,08	-64,10578
60,0	218,0	6,2	0,4	14,8	644,4	438,0	76,8	96,6	482,3	373,1	429,8	500,2	476,2	1114,7	0,10	77,09	76,41	82,76	0,18	82,20	81,90	83,58	0,08	0,08	-64,61368
61,0	219,0	6,1	0,3	14,8	647,8	438,0	76,8	96,8	484,8	374,4	431,4	502,8	475,8	1118,7	0,10	77,11	76,42	82,79	0,18	82,20	81,96	83,60	0,08	0,08	-63,23481
62,0	220,0	6,0	0,3	14,8	649,3	438,0	76,8	96,8	487,8	376,7	433,4	505,2	474,8	1114,1	0,10	77,11	76,43	82,86	0,18	82,21	81,99	83,62	0,07	0,08	-61,84078
63,0	221,0	5,8	0,4	14,7	650,7	437,8	76,4	96,2	490,8	377,2	434,8	507,4	473,3	1108,8	0,10	77,08	76,44	78,87	0,18	82,18	82,04	83,64	0,07	0,08	-60,25864
64,0	222,0	5,7	0,3	13,3	652,1	437,3	76,8	96,0	492,8	378,8	436,8	509,2	442,7	1077,8	0,10	77,28	76,47	78,13	0,18	82,38	82,10	83,63	0,07	0,08	-58,63462
65,0	223,0	5,6	0,3	13,3	654,1	433,0	76,7	96,3	497,3	379,8	438,0	512,8	442,2	1065,3	0,10	77,34	76,50	78,44	0,18	82,43	82,14	83,68	0,08	0,08	-56,83647
66,0	224,0	5,5	0,3	12,6	655,8	430,0	76,8	96,3	499,8	381,3	442,1	516,2	441,1	1054,8	0,10	77,33	76,52	78,62	0,18	82,48	82,17	83,69	0,08	0,08	-55,1363
67,0	225,0	5,4	0,3	11,8	657,4	426,7	76,8	96,0	501,8	382,8	444,8	517,8	440,3	1027,8	0,10	77,25	76,54	78,78	0,18	82,40	82,20	83,68	0,08	0,07	-53,55148
68,0	226,0	5,3	0,3	11,8	658,8	425,4	76,8	96,2	503,3	384,3	446,7	519,3	439,8	1009,8	0,10	77,20	76,54	78,90	0,18	82,34	82,23	83,64	0,08	0,07	-51,71577
69,0	227,0	5,2	0,3	10,8	661,1	416,8	77,0	96,4	504,8	385,3	448,4	524,3	438,7	992,3	0,10	77,19	76,55	80,08	0,18	82,37	82,25	83,62	0,08	0,07	-49,88158
70,0	228,0	5,1	0,3	10,7	662,8	412,8	77,0	96,4	506,0	386,3	449,4	527,4	437,8	977,8	0,10	77,21	76,55	80,18	0,18	82,38	82,28	83,61	0,07	0,07	-48,21232
71,0	229,0	5,1	0,3	10,8	664,8	408,8	77,0	94,8	507,8	387,3	450,3	530,3	436,7	967,8	0,10	77,21	76,57	80,28	0,18	82,37	82,30	83,56	0,08	0,07	-46,46212
72,0	230,0	5,0	0,3	10,8	665,8	408,8	77,0	94,8	508,0	388,2	451,4	533,1	435,8	960,8	0,10	77,20	76,59	80,38	0,18	82,38	82,31	83,64	0,08	0,07	-45,07618
73,0	231,0	4,9	0,3	10,7	667,1	403,1	77,0	94,4	508,3	389,1	452,3	534,0	434,8	958,0	0,10	77,21	76,61	80,47	0,18	82,34	82,32	83,62	0,07	0,07	-43,84238
74,0	232,0	4,8	0,3	10,7	668,4	400,8	77,0	94,2	508,1	389,7	453,8	537,8	433,8	957,8	0,10	77,24	76,59	80,59	0,18	82,43	82,35	83,60	0,08	0,07	-42,58883
75,0	233,0	4,7	0,3	11,1	669,4	399,4	76,4	94,3	508,3	390,4	454,7	539,8	432,8	972,7	0,10	77,20	76,59	80,67	0,18	82,41	82,39	83,68	0,08	0,07	-41,58418
76,0	234,0	4,7	0,3	11,2	669,6	398,8	76,8	93,7	507,8	390,8	456,3	541,2	431,8	970,1	0,10	77,20	76,61	80,74	0,18	82,40	82,43	83,64	0,07	0,07	-40,3803
77,0	235,0	4,6	0,3	11,7	670,3	397,0	76,8	94,2	507,8	391,2	457,2	542,3	431,2	983,4	0,10	77,30	76,61	80,82	0,18	82,42	82,44	83,64	0,07	0,07	-40,72048
78,0	236,0	4,6	0,3	12,0	671,4	397,0	77,0	94,4	511,0	391,2	457,7	543,3	430,1	999,8	0,10	77,44	76,67	80,84	0,18	82,52	82,53	83,68	0,08	0,07	-39,28504
79,0	237,0	4,6	0,3	12,1	671,7	397,0	76,8	94,2	508,1	390,3	456,8	542,3	429,8	999,8	0,10	77,44	76,67	80,84	0,18	82,54	82,54	83,68	0,08	0,07	-39,29838
80,0	238,0	4,5	0,3	12,3	672,7	397,4	77,0	94,2	510,4	392,7	458,8	545,1	428,8	1000,2	0,10	77,43	76,70	81,07	0,18	82,62	82,63	83,44	0,08	0,08	-38,38888
81,0	239,0	4,2	0,3	12,4	673,0	398,4	76,8	94,8	509,6	393,3	459,2	545,4	427,8	1000,2	0,10	77,40	76,71	81,16	0,18	82,61	82,64	83,43	0,07	0,07	-37,67662
82,0	240,0	4,2	0,3	12,4	673,3	398,2	76,7	94,4	508,7	393,8	461,8	545,8	426,8	998,2	0,10	77,44	76,73	81,26	0,18	82,63	82,62	83,42	0,08	0,07	-37,7041
83,0	241,0	4,0	0,3	12,3	673,8	398,8	77,2	94,2	508,3	394,2	464,1	546,4	425,8	998,2	0,10	77,48	76,76	81,30	0,18	82,64	82,62	83,40	0,08	0,07	-37,23267
84,0	242,0	4,0	0,3	12,0	674,3	397,0	77,0	93,8	508,1	394,7	465,8	546,8	425,1	998,8	0,10	77,33	76,78	81,34	0,18	82,67	82,68	83,38	0,08	0,07	-36,70442
85,0	243,0	3,9	0,3	11,8	675,3	396,0	76,8	93,1	507,8	395,3	464,8	547,4	424,3	976,3	0,10	77,33	76,78	81,38	0,18	82,60	82,69	83,38	0,08	0,07	-37,11743
86,0	244,0	3,8	0,3	11,7	676,0	394,4	77,1	93,3	508,0	395,8	466,3	547,8	424,1	976,1	0,10	77,48	76,79	81,39	0,18	82,67	82,70	83,38	0,08	0,07	-38,0761
87,0	245,0	3,7	0,3	11,6	676,4	393,2	77,3	94,1	507,8	396,4	466,1	548,6	423,8	973,4	0,10	77,48	76,80	81,41	0,18	82,67	82,72	83,38	0,08	0,07	-38,88818
88,0	246,0	3,6	0,3	11,4	676,1	391,8	76,8	94,0	508,0	397,1	466,1	548,3	423,1	968,8	0,10	77,47	76,81	81,38	0,18	82,63	82,73	83,34	0,08	0,07	-34,84038
89,0	247,0	3,6	0,3	11,2	676,1	390,8	77,0	93,7	507,8	397,8	467,3	548,8	422,7	965,3	0,10	77,52	76,84	81,43	0,18	82,70	82,75	83,38	0,08	0,07	-34,62484
90,0	248,0	3,5	0,3	11,0	676,8	388,4	77,2	93,4	507,7	398,8	468,1	548,8	422,2	962,8	0,10	77,54	76,84	81,45	0,18	82,71	82,74	83,38	0,08	0,07	-34,1639
91,0	249,0	3,4	0,3	10,9	677,1	387,2	77,3	93,7	506,8	399,3	467,8	550,3	421,8	958,2	0,10	77,52	76,84	81,70	0,18	82,70	82,74	83,38	0,08	0,07	-33,87411
92,0	250,0	3,3	0,3	10,9	677,4	385,2	77,3	93,8	505,7	399,8	469,2	550,8	421,2	954,2	0,10	77,50	76,86	81,78	0,18	82,64	82,76	83,36	0,07	0,07	-33,62464
93,0	251,0	3,3	0,3	10,8	677,4	382,7	77,1	93,6	504,1	400,1	511,0	551,0	420,6	954,1	0,10	77,54	76,87	81,81	0,18	82,70	82,80	83,34	0,07	0,07	-33,61208
94,0	252,0	3,2	0,3	10,7	678,0	380,2	77,3	93,3	503,1	400,8	511,4	551,7	420,3	950,3	0,10	77,44	76,87	81,88	0,18	82,67	82,83	83,33	0,08	0,07	-32,98786
95,0	253,0	3,2	0,3	10,0	677,8	378,0	77,2	93,0	502,3	401,0	513,3	551,8	419,7	924,7	0,10	77,34	76,88	81,81	0,18	82,62	82,84	83,18	0,07	0,07	-33,48508
96,0	254,0	3,1	0,3	9,9	677,7	376,4	77,3	93,3	501,1	401,8	514,4	552,3	419,3	921,1	0,10	77,38	76,84	81,88	0,18	82,58	82,84	83,18	0,07	0,07	-33,39622
97,0	255,0	3,0	0,3	9,7	677,8	372,0	77,

102,0	360,0	2,8	0,1	8,0	474,8	362,8	76,7	90,2	462,6	403,8	520,6	881,3	434,6	886,3	0,10	77,35	74,86	81,00	0,18	82,63	83,88	82,86	0,07	0,06	-34,06391
103,0	361,0	2,8	0,1	8,0	474,2	362,7	76,9	90,1	466,0	403,0	521,7	882,7	434,7	888,2	0,10	77,32	74,90	81,01	0,18	82,66	83,84	82,86	0,08	0,06	-34,80046
104,0	362,0	2,7	0,1	8,0	474,2	388,8	77,0	91,8	460,8	403,0	521,3	849,8	434,8	888,2	0,10	77,42	74,83	81,00	0,18	82,77	83,96	82,83	0,08	0,06	-34,7946
105,0	363,0	2,8	0,1	8,0	474,7	387,6	77,1	90,2	467,0	402,8	521,1	846,4	434,0	884,7	0,10	77,62	74,84	81,00	0,18	82,80	83,83	82,82	0,08	0,06	-36,2884
106,0	364,0	2,8	0,1	9,1	474,4	386,4	76,9	91,0	465,3	403,0	524,2	849,0	434,1	881,1	0,10	77,60	74,84	81,01	0,18	82,80	83,81	82,80	0,08	0,07	-38,63828
107,0	365,0	2,8	0,1	9,2	474,3	385,2	76,9	91,7	461,3	403,0	524,7	848,1	434,8	883,2	0,10	77,59	74,87	81,01	0,18	82,81	83,84	82,88	0,08	0,07	-36,65891
108,0	366,0	2,8	0,1	9,3	473,7	384,4	77,3	91,8	478,8	403,8	525,3	847,8	433,8	881,3	0,10	77,61	74,87	81,04	0,18	82,80	83,84	82,84	0,08	0,07	-37,31803
109,0	367,0	2,8	0,1	9,3	473,6	383,8	77,3	91,7	474,3	403,8	525,7	848,8	433,0	878,8	0,10	77,61	74,88	81,01	0,18	82,80	83,86	82,81	0,08	0,07	-37,98764
110,0	368,0	2,4	0,1	9,2	472,4	382,9	77,2	91,6	474,7	402,7	524,3	848,0	432,2	880,2	0,10	77,61	74,88	81,02	0,18	82,78	83,87	82,78	0,08	0,07	-38,58746
111,0	369,0	2,4	0,1	9,2	471,7	382,0	77,2	91,7	471,3	402,8	524,8	848,8	431,7	877,8	0,10	77,60	74,88	81,03	0,18	82,76	83,88	82,77	0,07	0,07	-39,29872
112,0	370,0	2,4	0,1	9,1	471,1	381,4	77,1	91,4	469,8	402,8	527,2	844,8	431,1	878,1	0,10	77,59	74,88	81,04	0,18	82,78	83,90	82,78	0,07	0,06	-39,80777
113,0	371,0	2,3	0,1	9,0	470,4	381,2	77,2	91,1	467,6	402,4	527,7	843,8	430,8	880,3	0,10	77,61	74,89	81,05	0,18	82,78	83,89	82,71	0,08	0,06	-40,85376
114,0	372,0	2,3	0,1	8,8	469,8	380,8	77,3	90,4	465,4	402,2	528,0	843,2	430,2	883,8	0,10	77,62	74,89	81,06	0,18	82,79	83,89	82,71	0,08	0,07	-41,17686
115,0	373,0	2,2	0,1	8,7	469,2	380,7	77,1	91,1	463,3	401,8	528,2	842,8	429,8	883,3	0,10	77,64	77,00	81,03	0,18	82,79	83,90	82,68	0,08	0,07	-41,80734
116,0	374,0	2,2	0,1	8,6	468,3	380,6	76,8	90,8	460,3	402,0	527,8	841,7	429,7	880,8	0,10	77,66	77,00	81,01	0,18	82,86	83,91	82,62	0,08	0,06	-42,60777
117,0	375,0	2,2	0,1	8,5	467,8	380,1	77,3	90,8	458,0	401,8	528,3	840,7	429,3	878,4	0,10	77,76	77,04	81,00	0,18	82,94	83,94	82,58	0,08	0,06	-43,38109
118,0	376,0	2,1	0,1	8,4	466,9	380,0	77,4	90,8	455,3	401,8	528,8	839,8	429,1	878,4	0,10	77,78	77,05	80,99	0,18	82,97	83,94	82,56	0,08	0,06	-44,11177
119,0	377,0	2,1	0,1	8,3	466,3	367,8	77,5	91,0	454,7	401,8	529,3	838,6	428,7	880,4	0,10	77,79	77,06	80,98	0,18	82,96	83,98	82,55	0,08	0,06	-44,61103
120,0	378,0	2,1	0,1	8,1	465,8	346,8	77,5	90,8	452,4	400,8	529,8	837,7	428,7	880,8	0,10	77,72	77,07	80,97	0,18	82,93	83,98	82,53	0,08	0,06	-45,38213
121,0	379,0	2,1	0,2	7,7	464,6	345,8	77,2	90,2	449,3	400,6	528,4	836,8	428,3	878,3	0,10	77,78	77,10	80,94	0,18	82,94	83,91	82,45	0,08	0,06	-46,3902
122,0	380,0	2,0	0,2	7,7	463,8	344,6	77,5	90,4	447,0	399,8	528,8	836,2	428,2	878,3	0,10	77,79	77,09	80,91	0,18	82,98	83,91	82,36	0,07	0,06	-47,09062
123,0	381,0	2,0	0,2	7,6	462,8	343,6	77,4	90,7	443,8	399,8	528,6	834,3	428,1	868,0	0,10	77,73	77,10	80,88	0,18	82,96	83,92	82,43	0,08	0,06	-48,11186
124,0	382,0	2,0	0,2	7,6	462,0	342,8	77,4	90,6	441,4	398,8	528,4	833,1	428,1	869,6	0,10	77,70	77,11	80,88	0,18	82,98	83,92	82,42	0,08	0,06	-48,99819
125,0	383,0	2,0	0,2	7,6	461,2	341,8	77,3	90,8	438,8	398,8	527,8	832,3	428,1	862,3	0,10	77,68	77,10	80,83	0,18	82,90	83,91	82,40	0,08	0,06	-49,84156
126,0	384,0	2,0	0,2	7,5	460,3	340,3	77,3	90,2	437,2	397,8	527,8	830,8	428,0	868,4	0,10	77,66	77,09	80,82	0,18	82,91	83,94	82,36	0,08	0,06	-50,75875
127,0	385,0	1,9	0,2	7,5	459,3	339,1	77,3	90,2	434,7	397,2	526,4	829,4	428,1	843,2	0,10	77,66	77,10	80,84	0,18	82,88	83,91	82,33	0,08	0,06	-51,71808
128,0	386,0	1,9	0,2	7,5	458,3	338,0	77,0	90,2	432,1	397,0	526,4	828,2	428,1	840,8	0,10	77,64	77,11	80,83	0,18	82,89	83,91	82,29	0,08	0,06	-52,62035
129,0	387,0	1,8	0,2	7,6	456,9	336,7	77,3	90,4	429,0	396,8	523,8	826,8	428,4	836,7	0,10	77,66	77,11	80,81	0,18	82,92	83,93	82,30	0,07	0,06	-54,12842
130,0	388,0	1,8	0,2	7,6	455,6	336,3	76,9	90,1	426,0	396,4	522,1	825,1	428,4	834,3	0,10	77,64	77,11	80,82	0,18	82,93	83,93	82,31	0,07	0,06	-55,34852
131,0	389,0	1,8	0,2	7,7	454,8	334,9	77,0	90,2	424,0	396,2	520,7	823,8	428,2	830,7	0,10	77,67	77,13	80,78	0,18	82,89	83,97	82,28	0,06	0,06	-56,14358
132,0	390,0	1,8	0,2	7,8	453,8	333,8	77,1	90,1	421,8	395,8	520,1	822,6	428,8	827,3	0,10	77,68	77,20	80,79	0,18	83,18	83,36	82,26	0,06	0,06	-57,12233
133,0	391,0	1,7	0,2	7,8	452,8	333,1	77,3	90,2	419,7	395,8	518,6	821,3	428,7	825,2	0,10	78,08	77,22	80,73	0,18	83,22	83,30	82,24	0,07	0,06	-58,23481
134,0	392,0	1,7	0,3	7,8	451,7	331,8	76,9	89,9	417,1	395,1	517,0	820,4	428,8	823,4	0,10	78,00	77,24	80,69	0,18	83,21	83,36	82,20	0,08	0,06	-59,28797
135,0	393,0	1,7	0,3	7,9	450,7	330,8	77,3	89,8	414,7	394,7	515,8	819,3	429,1	817,7	0,10	77,91	77,25	80,68	0,18	83,16	83,39	82,16	0,08	0,06	-60,32966
136,0	394,0	1,7	0,3	7,9	449,8	330,0	77,4	89,6	412,1	394,6	514,8	818,1	429,4	814,2	0,10	77,88	77,24	80,66	0,18	83,12	83,37	82,11	0,08	0,06	-61,17043
137,0	395,0	1,6	0,3	8,0	449,4	328,9	77,0	89,7	410,8	394,8	514,3	817,3	429,8	812,3	0,10	77,81	77,23	80,68	0,18	83,10	83,39	82,12	0,08	0,06	-61,80864
138,0	396,0	1,6	0,3	8,0	448,6	327,6	76,8	89,6	409,0	394,6	512,7	816,2	430,1	808,3	0,10	77,70	77,21	80,60	0,18	83,08	83,38	82,09	0,08	0,06	-62,37989
139,0	397,0	1,6	0,2	8,1	447,4	327,0	76,8	89,8	406,8	394,7	510,8	815,0	430,7	806,8	0,10	77,79	77,21	80,59	0,18	83,08	83,39	82,01	0,08	0,06	-63,60788
140,0	398,0	1,5	0,2	8,1	447,1	326,8	77,2	89,1	404,8	394,8	510,8	814,1	431,3	803,8	0,10	77,80	77,24	80,64	0,18	83,14	83,48	81,98	0,08	0,06	-63,84864
141,0	399,0	1,5	0,2	7,9	446,3	326,3	77,2	88,9	402,2	394,8	509,0	813,2	431,8	804,8	0,10	77,80	77,25	80,64	0,18	83,17	83,45	82,02	0,07	0,06	-64,37811
142,0	400,0	1,5	0,2	7,8	445,7	325,4	77,3	89,7	400,4	398,2	509,0	812,2	431,8	811,1	0,10	77,87	77,27	80,61	0,18	83,16	83,44	82,02	0,07	0,06	-64,91864
143,0	401,0	1,5	0,2	7,8	445,3	325,0	77,3	89,6	398,6	398,8	508,4	811,4	432,1	811,8	0,10	77,86	77,26	80,60	0,18	83,16	83,41	81,99	0,07	0,06	-65,72643
144,0	402,0	1,4	0,3	7,4	444,8	324,6	77,3	89,4	396,7	398,8	507,6	810,8	432,4	812,1	0,10	77,84	77,27	80,49	0,18	83,18	83,43	81,97	0,06	0,06	-66,39619
145,0	403,0	1,4	0,3	7,4	444,0	324,3	77,2	89,3	394,7	398,8	507,1	810,1	432,8	811,4	0,10	77,82	77,24	80,49	0,18	83,18	83,42	81,98	0,08	0,06	-66,84822
146,0	404,0	1,4	0,3	7,4	443,3	323,8	77,2	89,3	392,3	398,8	506,4	809,4	432,8	810,3	0,10	77,79	77,28	80,48	0,18	83,11	83,41	81,94	0,08	0,06	-67,63677
147,0	405,0	1,4	0,3	7,5	442,6	323,2	77,2	89,1	390,3	398,7	505,4	808,8	433,1	809,4	0,10	77,79	77,24	80,48	0,18	83,10	83,40	81,89	0,08	0,06	-68,36128
148,0	406,0	1,4	0,3	7,5	442,1	324,6	76,9	88,8	388,8	398,7	504,8	808,0	433,3	808,8	0,10	77,75	77,24	80,49	0,18	83,08	83,41	81,86	0,08	0,06	-68,88687
149,0	407,0	1,4	0,3	7,5	441,1	324,8	77,0	88,7	386,3	398,5	503,1	807,1	433,8	806,0	0,10	77,78	77,24	80,38	0,18	83,13	83,43	81,81	0,08	0,06	-69,65376
150,0	408,0	1,3	0,3	7,6	440,4	324,0	77,1	88,2	383,9	398,4	502,3	806,5	434,3	803,3	0,10	77,81	77,29	80,38	0,18	83,16	83,48	81,83	0,07	0,06	-70,84283
151,0	409,0	1,3	0,3	7,7	440,0	323,2	77,2	88,2	381,5	398,3	501,8	805,8	434,8	801,6	0,10	77,83	77,27	80,40	0,18	83,18	83,48	81,84	0,08	0,06	-71,20503
152,0	410,0	1,3	0,3	7,7	439,3	322,6	76,9	88,0	381,7	398,3	499,8	804,8	434,8	800,3	0,10	77,84	77,28	80,37	0,18	83,19	83,47	81,82	0,08	0,06	-71,4803
153,0	411,0	1,2	0,3	7,8	438,8	322,0	77,2	88,1	380,0	398,2	498,7	803,7	435,3	799,8	0,10	77,90	77,30	80,32	0,18	83,28	83,83	81,72	0,08	0,06	-72,40288
154,0	412,0	1,2	0,3	7,8	438,2	322,3	77,2	88,0	378,8	398,2	498,8	803,2	435,8	801,2	0,10	77,98	77,34	80,32	0,18	83,30	83,87	81,78	0,08	0,06	-72,78814
155,0	413,0	1,2	0,3	7,8	437,7	322,1	77,3	88,1	377,1	398,7	498,3	802,6	436,3	798,3	0,10	77,93	77,34	80,31	0,18	83,30	83,86	81,77	0,08	0,06	-73,31949
156,0	414,0	1,2	0,3	7,7	437,2	321,8	77,1	88,1	375,4	398,4	497,7	801,8	436,7	796,8	0,10	77,93	77,34	80,31	0,18	83,32	83,84	81,78	0,08	0,06	-73,82272
157,0	415,0	1,1	0,3	7,7	436,8	320,0	76,9	88,4	374,3	398,3	496,3	800,8	437,8	795,3	0,10	77,89	77,37	80,28	0,18	83,31	83,88	81,69	0,08	0,06	-74,38362
158,0	416,0	1,1	0,3	7,8	436,0	319,1	77,1	88,8	373,8	398,3	495,9	800,1	437,8	779,6	0,10	77,81	77,35	80,28	0,18	83,29	83,88	81,68	0,07	0,06	-74,83964
159,0	417,0	1,1	0,3	7,8	435,6	318,8	77,2	88,0	370,8	398,4	495,4	799,5	437,8	778,3	0,10	77,80	77,37	80,28	0,18	83,28	83,88	81,68	0,08	0,06	-75,36841
160,0	418,0	1,0	0,1	7,8	435,3	318,2	77,2	88,0	369,0	398,4	494,8	799,3	438,3	777,8	0,10	77,80	77,37	80,26	0,18	83,26	83,86	81,66	0,07	0,06	-75,72413
161,0	419,0	1,0	0,1	7,8	434,8	317,8	77,1	88,1	368,2	398,4	493,7	798,7	438,8	776,1	0,10	77,87	77,37	80,28	0,18	83,24	83,84	81,68	0,08	0,06	-76,2283
162,0	420,0	1,0	0,1	7,8	434,3	317,3	77,1	88,0	366,4	398,3	492,8	798,2	439,3	774,8	0,10	77,89	77,38	80,28	0,18	83,28	83,84	81,68	0,08	0,06	-76,82587
163,0	421,0	1,0	0,1	7,9	434,1	317,0	77,1	88,0	365,0	398,3	493,0	797,8	439,8	773,8	0,10	77,91	77,38	80,27	0,18	83,23	83,82	81,63	0,08	0,06	-76,80888
164,0	422,0	1,0	0,1	7,9	433,3	316,1	77,0	88,7	364,6	398,4	490,7	796,8	439,8	768,0	0,10	77,73	77,37	80,28	0,18	83,16	83,84	81,63	0,08	0,06	-77,70386
165,0	423,0	0,9	0,1	7,8	432,8	315,8	77,1	88,3	362,0	398,7	490,6	796,7	439,3	770,2	0,10	77,74	77,35	80,19	0,18	83,18	83,86	81,68	0,07	0,06	-78,15447
166,0	424,0	1,0	0,1	7,8	432,4	315,4	76,7	88,3	361,2	398,2	489,8	795,8	439,0	772,0	0,10	77,75	77,33	80,17	0,18	83,16	83,84	81,64	0,07	0,06	-78,6127
167,0	425,0	0,9	0,1	7,9	432,0	315,0	77,1	88,8	359,2	398,2	489,1	795,8	439,6	771,2	0,10	77,82	77,33	80,18	0,18	83,10	83,84	81,69	0,07	0,06	-78,84067
168,0	426,0	0,9	0,1	7,8	431,8	315,0	77,1	88,3	358,1	397,1	488,4	794,5	439,6	767,8	0,10	77,84	77,32	80,18	0,18	83,07	83,88	81,68	0,07	0,06	-79,39249
169,0	427,0	0,8	0,1	7,8	431,3	314,3	77,1	88,5	356,0	397,5	488,3	794,5	439,8	766,4	0,10	77,88	77,34	80,18	0,18	83,11	83,82	81,68	0,07	0,06	-79,83044
170,0	428,0	0,8	0,1	7,8	431,2	314,1	77,0	88,6	355,0	398,1	488,1	793,6	439,3	765,8	0,10	77,78	77,35	80,14	0,18	83,14	83,80	81,66	0,07	0,06	-79,82828
171,0	429,0	0,8	0,1	7,7	431,2	314,0	77,1	88,6	354,0	398,2	487,8	793,2	439,3	764,4	0,10	77,77	77,35	80,15	0,18	83,15	83,81	81,65	0,07	0,06	-79,87418
172,0	430,0	0,8	0,1	7,7	430,7	313,6	77,2	88,3	353,0	398,4	486,7	792,8	439,8	762,4	0,10	77,88	77,35	80,08	0,18	83,17	83,48	81,62	0,07	0,06	-80,29233
173,0	431,0	0,8	0,1	7,7	430,3	313,8	77,2	88,4	352,2	400,3	486,8	792,5	439,1	762,8	0,10	77,89	77,37	80,09	0,18	83,22	83,48	81,62	0,07	0,06	-80,4548
174,0	432,0	0,7	0,1	7,6	430,2	313,8	77,2	88,3	351,0	401,2	485,6	791,7	439,1	763,8	0,10	77,88	77,39	80,03	0,18	83,23	83,48	81,67	0,06	0,06	-80,77408
175,0	433,0	0,7	0,1	7,6	430,2	314,0	77,2	88,4	350,0	401,8	485,7	791,2	439,1	767,1	0,10	77,90	77,38	80,03	0,18	83,26	83,47	81,68	0,06	0,06	-80,85168
176,0	434,0	0,7	0,1	7,5	429,8	314,4	76,7	88,2	349,3	402,8	484,8	790,8	439,1	769,8	0,10	77,88	77,37	80,03	0,18	83,28	83,48	81,68	0,06	0,06	-81,14694
177,0	435,0	0,6	0,1	7,5	429,4	313,9	77,0	88,3	347,9	403,8	483,4	790,0	439,2	770,7	0,10	77,92	77,38	80,03	0,18	83,30	83,47	81,64	0,06	0,06	-81,88334
178,0	436,0	0,6	0,1	7,5	429,3	314,1	77,1	88,8	347,0	404,8	483,0	789,2	439,4	770,1	0,10	77,88	77,39	80,02	0,18	83,36	83,47	81,64	0,07	0,06	-81,68416
179,0	437,0	0,6	0,2	7,5	429,0	313,6	77,2	88,4	346,3	405,1	482,8	788,8	439,1	771,1	0,10	77,99	77,45	80,07	0,18	83,40	83,47	81,68	0,06	0,06	-81,84083
180,0	438,0	0,6	0,2	7,5	428,9	313,6	77,1	88,5	345,3	406,1	482,8	788,4	439,3	769,8	0,10	78,01	77,43	80,03	0,18	83,40	83,48	81,68	0,06	0,06	-82,07987
181,0	439,0	0,6	0,2	7,5	428,5	314,0	77,2	88,3	343,8	406,8	481,4	787,5	439,4	768,1	0,10	78,03	77,43	80,02	0,18	83,38	83,48	81,64	0,06	0,06	-82,80382
182,0	440,0	0,6	0,2	7,5	428,3	313,8	77,2	88,3	343,0	407,8	481,2	787,1	439,4	767,1	0,10	78,03	77,44	80,01	0,18	83,37	83,48	81,62	0,06	0,06	-82,71368
183,0	441,0	0,6	0,2	7,3	428,0	313,6	77,2	88,3	342,1	408,8	480,8	786,4	439,3	766,4	0,10	78,03	77,46	80,03	0,18	83,39	83,51	81,62	0,06	0,06	-83,0082
184,0	442,0	0,8	0,2	7,1	427,8	313,7	77,2	88,2	341,1	409,1	479,8	785,7	439,3	771,2	0,10	78,04	77,44	80,06	0,18	83,43	83,51	81,60	0,06	0,06	-83,3767
185,0	443,0	0,8	0,2	6,9	427,4	313,7	77,1	88,3	340,3	409,8	479,3	785,2	439,8	774,3	0,10	78,03	77,47	80,08	0,18	83,48	83,50	81,62	0,06	0,06	-83,80834
186,0	444,0	0,8	0,2	6,9	427,2	313,2	77,1	88,2	339,8	409,8	479,2	784,8	439,8	774,3	0,10	78,00	77,48	80,09	0,18	83,48	83,51	81,61	0,06	0,06	-83,80248
187,0	445,0	0,4	0,2	6,8	426,8	312,9	76,9	87,9	338,3	410,8	477,8	783,8	439,3	774,2	0,10	77,97	77,48	80,08	0,18	83,44	83,53	81,62	0,06	0,06	-84,33738
188,0	446,0	0,4	0,2	6,7	426,3	311,9	76,9	88,0	337,3	409,8	477,8	783,3	439,8	774,8	0,10	78,00	77,50	80,08	0,18	83,44	83,53	81,58	0,06	0,06	-84,68021
189,0	447,0	0,4	0,2	6,6	425,8	312,2	76,7	88,0	336,0	409,4	477,8	782,1	424,1	776,7	0,10	78,11	77,49	80,07	0,18	83,48	83,52	81,58	0,06	0,06	-85,11827
190,0	448,0	0,4	0,2	6,6	425,8	311,4	77,2	88,3	334,3	409,7	477,8	781,8	425,0	777,3	0,10	78,09	77,52	80,08	0,18	83,44	83,52	81,62	0,07	0,06	-85,09494
191,0	449,0	0,4	0,2	6,6	425,8	311,7	76,9	87,7	334,4	407,8	477,8	780,8	424,8	778,3	0,10	77,88	77,46	80,03	0,18	83,11	83,53	81,61	0,06	0,06	-85,18135
192,0	450,0	0,3	0,2	6,6	425,2	311,8	76,9	87,8	334,0	407,8	478,8	780,2	424,8	778,8	0,10	77,73	77,40	80,04	0,18	83,08	83,51	81,58	0,06	0,06	-85,37256
193,0	451,0	0,3	0,2	6,6	425,0	311,8	76,9	87,8	333,8	408,8	478,8	779,8	424,8	780,3	0,10	77,60	77,38	80,04	0,18	83,04	83,51	81,61	0,06	0,06	-85,63677
194,0	452,0	0,3	0,2	6,6	425,0	311,6	76,8	88,0	334,4	408,1	477,2	778,3	424,0	779,2	0,10	77,56	77,31	80,78	0,18	83,68	83,43	81,17	0,06	0,06	-85,87358
195,0	453,0	0,3	0,2	6,6	424,7	311,7	76,8	87,6	333,2	408,2	476,7	778,2	424,6	778,8	0,10	78,68	77,24	80,66	0,18	83,40	83,38	81,26	0,06	0,06	-86,38783
196,0	454,0	0,2	0,3	6,6	423,7	312,0	76,8	87,1	330,8	404,8	476,3	777,4	430,3	778,8	0,10	78,78	77,24	80,67	0,18	83,43	83,33	81,26	0,06	0,06	-87,24127
197,0	455,0	0,2	0,3	6,6	423,6	311,4	76,9	87,6	330,8	404,2	474,6	776,8	431,3	778,8	0,10	78,84	77,23	80,64	0,18	83,50	83,33	81,26	0,07	0,06	-87,43184
198,0	456,0	0,2	0,3	6,6	423,2	311,5	76,2	88,0	329,8	403,4	474,6	776,8	431,8	778,8	0,10	77,98	77,24	80,67	0,18	83,56	83,38	81,26	0,06	0,06	-87,80519
199,0	457,0	0,2	0,3	6,6	423,0	311,5	76,3	87,8	329,7	402,4	474,8	776,2	432,6	774,8	0,10	77,17	77,24	80,64	0,18	83,60	83,38	81,26	0,06	0,06	-88,04838
200,0	458,0	0,2	0,3	6,6	422,8	311,8	76,4	87,8	328,6	401,7	474,3	774,7	433,3	774,8	0,10	77,28	77,24	80,62	0,18	83,67	83,33	81,26	0,06	0,06	-88,47649
201,0	459,0	0,2	0,3	6,6	422,1	311,4	76,8	88,1	327,0	401,3	474,0	773,8	433,7	774,8	0,10	77,40	77,18	80,64	0,18

308,0	466,0	0,1	0,2	6,6	418,7	310,4	76,8	87,0	321,6	397,7	470,2	468,0	435,8	772,8	0,19	77,64	77,36	80,62	0,18	82,66	83,27	81,08	0,07	0,06	-61,24578
309,0	467,0	0,1	0,3	6,5	418,3	311,0	76,8	87,9	321,1	397,1	469,6	467,3	435,7	770,1	0,19	77,64	77,34	80,68	0,18	82,66	83,29	81,08	0,07	0,06	-60,7938
310,0	468,0	0,1	0,3	6,2	417,7	311,4	76,8	88,1	320,4	396,8	469,4	466,8	435,6	774,0	0,19	77,60	77,35	80,66	0,18	82,65	83,30	81,08	0,07	0,06	-60,2871
311,0	469,0	0,0	0,3	6,3	417,3	311,8	76,7	88,1	319,8	396,3	468,8	466,9	435,4	770,8	0,19	77,61	77,34	80,67	0,18	82,64	83,29	81,08	0,07	0,06	-61,71849

Manufacturer: hearthstone
Model: 8031

Run: 4
Project #: pi 20270
Test Duration: 211 min

	HHV	LHV
Eff	76,30%	82,47%
Comb Eff	98,46%	98,46%
HT Eff	77,50%	83,76%
Output	21 465	Btu/h
Burn Rate	1,42	kg/h
Grams CO	125	g
Input	28 132	Btu/h
MC wet	17,59	
Average	0,18	9,80

Note: In the "Input data", "Calc. % O_2", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [e], [b], [c], [h], [d], [e], [j], and [k] refer to their respective variables in Clauses

Ultimate CO_2
$CO_{2\,ult}$ 19,64
F_d
1,062

Overall Heating Efficiency:	76,30%
Combustion Efficiency:	98,46%
Heat Transfer Efficiency:	77,50%

Heat Output:	20 362	Btu/h
Heat Input:	26 686	Btu/h
Burn Duration:	3,52	h
Burn Rate:	3,13	lb/h
Stack Temp:	359,7	Deg. F

			1,24	20,31	10,93	182,00	24,91	0,99	0,77	#DIV/0!
INPUT DATA			Oxygen Calculation			Input Data		Combust	Heat	Net
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO_2 [d]	Excess Air EA	Meas O_2	Calc. % O_2 [g]	Flue Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %
0,00	6,06	0,24	2,95	334,1%	20,73	17,85	174,0	24,8	96,2%	58,2%	55,4%
1,00	5,94	0,59	2,82	475,8%	20,71	17,60	172,6	25,0	87,0%	57,5%	50,0%
2,00	5,89	0,65	6,09	191,3%	20,49	14,08	182,9	24,7	92,5%	72,3%	66,8%
3,00	5,84	0,26	8,27	130,3%	20,38	11,98	185,8	24,7	97,8%	76,2%	74,5%
4,00	5,80	0,11	7,72	150,7%	20,42	12,64	189,2	25,0	99,3%	75,2%	74,7%
5,00	5,79	0,11	7,51	158,0%	20,44	12,88	184,1	24,9	99,3%	75,3%	74,8%
6,00	5,75	0,12	6,88	216,9%	20,53	14,39	182,0	24,6	99,1%	72,5%	71,9%
7,00	5,71	0,12	7,43	160,2%	20,44	12,95	182,2	24,9	99,2%	75,3%	74,7%
8,00	5,66	0,12	7,38	161,8%	20,44	13,00	182,9	25,0	99,1%	75,2%	74,5%
9,00	5,62	0,11	6,56	194,7%	20,50	13,89	182,3	24,7	99,2%	73,6%	73,1%
10,00	5,57	0,11	6,47	198,5%	20,51	13,98	181,4	24,9	99,2%	73,6%	73,0%
11,00	5,56	0,11	6,11	215,6%	20,53	14,36	180,8	24,9	99,2%	72,8%	72,2%
12,00	5,53	0,11	5,85	229,1%	20,55	14,63	180,7	24,9	99,1%	72,1%	71,4%
13,00	5,48	0,11	5,90	226,6%	20,54	14,58	180,5	24,9	99,1%	72,3%	71,6%
14,00	5,43	0,11	6,12	215,4%	20,53	14,36	180,1	24,8	99,2%	72,8%	72,2%
15,00	5,39	0,12	6,25	208,7%	20,52	14,21	180,5	24,8	99,1%	73,1%	72,5%
16,00	5,39	0,12	6,46	198,5%	20,51	13,98	181,1	24,7	99,1%	73,5%	72,9%
17,00	5,34	0,12	6,77	185,2%	20,49	13,66	181,3	24,5	99,1%	74,1%	73,5%
18,00	5,30	0,12	6,77	184,9%	20,48	13,65	182,0	24,7	99,1%	74,1%	73,4%
19,00	5,25	0,13	6,97	176,8%	20,47	13,44	183,0	24,7	99,0%	74,4%	73,6%
20,00	5,21	0,13	8,64	124,1%	20,36	11,66	184,3	24,7	99,2%	76,9%	76,3%
21,00	5,16	0,11	9,46	105,3%	20,31	10,80	185,8	24,7	99,3%	77,8%	77,2%
22,00	5,07	0,12	10,06	93,0%	20,27	10,15	187,7	24,7	99,3%	78,2%	77,7%
23,00	5,03	0,14	10,68	81,5%	20,23	9,47	190,3	24,6	99,1%	78,6%	77,9%
24,00	4,98	0,18	11,45	68,8%	20,17	8,63	192,3	24,6	98,9%	79,1%	78,2%
25,00	4,94	0,17	11,33	70,7%	20,18	8,76	194,3	24,6	98,9%	78,9%	78,0%
26,00	4,85	0,17	11,43	69,3%	20,17	8,65	195,9	24,6	99,0%	78,9%	78,0%
27,00	4,80	0,17	11,53	67,9%	20,17	8,55	197,5	24,5	99,0%	78,8%	78,0%
28,00	4,75	0,17	11,96	61,9%	20,14	8,09	198,9	24,6	99,0%	79,1%	78,3%
29,00	4,71	0,17	12,04	60,9%	20,13	8,01	200,2	24,7	99,0%	79,0%	78,3%
30,00	4,66	0,15	12,04	61,0%	20,13	8,01	201,1	24,7	99,1%	79,0%	78,3%
31,00	4,57	0,15	12,02	61,3%	20,14	8,03	202,2	24,7	99,1%	78,9%	78,2%
32,00	4,53	0,16	12,13	59,9%	20,13	7,92	203,2	24,6	99,1%	78,9%	78,2%
33,00	4,44	0,17	12,21	58,7%	20,12	7,83	204,4	24,6	99,0%	78,9%	78,1%
34,00	4,39	0,17	12,47	55,4%	20,11	7,55	205,6	24,6	99,0%	79,0%	78,2%
35,00	4,35	0,18	12,63	53,3%	20,09	7,37	206,5	24,6	99,0%	79,1%	78,3%
36,00	4,30	0,18	12,69	52,6%	20,09	7,31	207,6	24,7	99,0%	79,0%	78,2%
37,00	4,21	0,19	12,93	49,7%	20,07	7,05	208,7	24,7	98,9%	79,2%	78,3%
38,00	4,16	0,18	13,26	46,1%	20,05	6,70	209,8	24,7	99,0%	79,3%	78,5%
39,00	4,12	0,19	13,53	43,2%	20,03	6,41	211,2	24,7	99,0%	79,4%	78,6%
40,00	4,03	0,26	13,79	39,8%	20,01	6,09	213,1	24,7	98,6%	79,4%	78,3%
41,00	3,98	0,31	14,00	37,2%	19,99	5,83	214,5	24,7	98,3%	79,4%	78,1%
42,00	3,90	0,34	14,15	35,5%	19,98	5,66	215,8	24,7	98,1%	79,5%	77,9%
43,00	3,85	0,43	14,20	34,2%	19,97	5,56	216,9	24,7	97,6%	79,4%	77,5%
44,00	3,76	0,49	14,22	33,5%	19,97	5,50	217,7	24,7	97,3%	79,3%	77,2%
45,00	3,71	0,49	14,20	33,7%	19,97	5,52	218,4	24,7	97,3%	79,3%	77,1%
46,00	3,66	0,55	14,07	34,3%	19,97	5,63	218,8	24,7	96,9%	79,2%	76,7%
47,00	3,57	0,38	14,25	36,3%	19,97	5,53	219,3	24,8	97,9%	79,3%	77,7%
48,00	3,53	0,34	14,30	35,0%	19,98	5,61	219,7	24,7	98,1%	79,3%	77,8%
49,00	3,48	0,28	14,12	36,4%	19,99	5,73	220,1	24,7	98,5%	79,2%	78,0%
50,00	3,44	0,33	14,34	34,0%	19,97	5,47	220,7	24,8	98,2%	79,3%	77,9%
51,00	3,35	0,38	14,60	31,1%	19,95	5,16	221,7	24,8	98,0%	79,4%	77,8%
52,00	3,30	0,43	14,63	30,4%	19,95	5,10	222,6	24,8	97,7%	79,3%	77,5%
53,00	3,26	0,46	14,68	29,7%	19,94	5,02	223,2	24,8	97,5%	79,3%	77,4%
54,00	3,16	0,45	14,73	29,4%	19,94	4,98	224,1	24,8	97,6%	79,3%	77,4%
55,00	3,10	0,45	14,81	28,7%	19,93	4,89	224,1	24,8	97,6%	79,4%	77,4%
56,00	3,04	0,43	14,95	27,8%	19,92	4,76	224,9	24,8	97,7%	79,4%	77,6%
57,00	2,98	0,44	14,95	27,6%	19,92	4,76	225,3	24,8	97,7%	79,4%	77,5%
58,00	2,94	0,43	14,96	27,6%	19,92	4,75	225,8	24,8	97,7%	79,4%	77,6%
59,00	2,85	0,43	14,89	28,2%	19,93	4,82	226,1	24,9	97,7%	79,3%	77,5%
60,00	2,80	0,38	14,78	29,6%	19,94	4,97	226,0	24,9	98,0%	79,3%	77,7%
61,00	2,76	0,33	14,80	29,8%	19,94	4,97	226,0	24,9	98,2%	79,3%	77,9%
62,00	2,71	0,31	14,77	30,3%	19,94	5,03	225,7	24,8	98,4%	79,3%	78,0%
63,00	2,62	0,37	14,68	30,5%	19,95	5,08	225,3	24,7	98,0%	79,2%	77,7%
64,00	2,57	0,27	13,30	44,8%	20,04	6,61	225,2	24,8	98,5%	78,4%	77,2%
65,00	2,53	0,20	13,28	45,7%	20,05	6,67	223,3	24,8	98,9%	78,5%	77,7%
66,00	2,48	0,15	12,57	54,4%	20,10	7,45	221,6	24,9	99,1%	78,2%	77,5%
67,00	2,44	0,12	11,85	64,1%	20,15	8,24	219,3	25,0	99,3%	77,7%	77,2%
68,00	2,39	0,10	11,19	74,0%	20,19	8,96	216,3	25,0	99,5%	77,4%	77,0%
69,00	2,35	0,09	10,87	79,2%	20,22	9,30	213,8	25,0	99,6%	77,2%	76,9%
70,00	2,30	0,09	10,73	81,6%	20,23	9,45	211,4	25,0	99,6%	77,3%	76,9%
71,00	2,30	0,08	10,65	83,1%	20,23	9,55	209,7	25,0	99,6%	77,3%	77,0%
72,00	2,26	0,08	10,53	85,3%	20,24	9,67	207,5	25,0	99,7%	77,3%	77,1%
73,00	2,21	0,07	10,68	82,7%	20,23	9,52	206,2	25,0	99,7%	77,6%	77,4%
74,00	2,17	0,08	10,71	82,1%	20,23	9,48	204,9	25,0	99,7%	77,7%	77,4%
75,00	2,12	0,07	11,12	75,5%	20,20	9,04	204,1	24,7	99,7%	78,1%	77,9%
76,00	2,12	0,07	11,19	74,4%	20,20	8,97	203,6	24,7	99,7%	78,2%	77,9%
77,00	2,08	0,07	11,65	67,6%	20,17	8,48	203,3	24,9	99,7%	78,6%	78,4%
78,00	2,03	0,08	11,96	63,0%	20,14	8,14	202,8	25,0	99,6%	78,9%	78,6%
79,00	1,98	0,09	12,13	60,8%	20,13	7,96	203,3	24,8	99,6%	79,0%	78,6%
80,00	1,94	0,09	12,26	59,1%	20,12	7,82	203,0	25,0	99,6%	79,1%	78,8%
81,00	1,89	0,09	12,41	57,1%	20,11	7,66	203,6	24,9	99,6%	79,1%	78,8%
82,00	1,89	0,09	12,37	57,6%	20,12	7,70	203,5	24,8	99,6%	79,1%	78,8%
83,00	1,80	0,10	12,28	58,8%	20,12	7,80	203,6	25,1	99,5%	79,1%	78,7%
84,00	1,80	0,09	12,05	61,9%	20,14	8,05	202,8	25,0	99,6%	78,9%	78,6%
85,00	1,76	0,08	11,85	64,6%	20,15	8,26	202,2	24,9	99,6%	78,8%	78,5%
86,00	1,71	0,08	11,70	66,7%	20,16	8,42	201,4	25,1	99,6%	78,8%	78,5%
87,00	1,67	0,08	11,57	68,6%	20,17	8,56	200,7	25,1	99,6%	78,7%	78,4%
88,00	1,62	0,08	11,39	71,4%	20,18	8,76	199,9	25,0	99,7%	78,6%	78,4%
89,00	1,62	0,07	11,17	74,7%	20,20	8,99	198,8	25,0	99,7%	78,5%	78,3%
90,00	1,58	0,07	11,03	77,1%	20,21	9,15	198,0	25,1	99,7%	78,5%	78,3%
91,00	1,53	0,07	10,89	79,1%	20,22	9,29	197,3	25,1	99,7%	78,4%	78,1%
92,00	1,49	0,08	10,91	78,7%	20,21	9,26	196,2	25,2	99,6%	78,5%	78,2%

93,00	1,49	0,09	10,84	79,8%	20,22	9,34	194,9	25,1	99,6%	78,5%	78,2%
94,00	1,44	0,07	10,68	82,7%	20,23	9,51	193,5	25,1	99,7%	78,4%	78,2%
95,00	1,44	0,05	10,00	95,4%	20,28	10,25	192,2	25,1	99,9%	77,9%	77,8%
96,00	1,39	0,05	9,87	98,1%	20,29	10,39	190,8	25,1	99,9%	77,9%	77,8%
97,00	1,35	0,05	9,72	101,1%	20,29	10,55	189,4	25,1	99,9%	77,8%	77,8%
98,00	1,35	0,05	9,54	104,8%	20,31	10,74	188,0	25,1	99,9%	77,7%	77,6%
99,00	1,35	0,05	9,44	106,9%	20,31	10,85	187,0	25,1	99,9%	77,7%	77,6%
100,00	1,30	0,06	9,29	109,9%	20,32	11,00	185,7	25,0	99,8%	77,6%	77,5%
101,00	1,26	0,06	9,19	112,1%	20,33	11,10	184,9	25,0	99,8%	77,6%	77,4%
102,00	1,26	0,06	8,93	118,4%	20,35	11,38	183,6	24,8	99,8%	77,4%	77,2%
103,00	1,26	0,07	8,95	117,9%	20,34	11,36	182,6	24,9	99,7%	77,5%	77,3%
104,00	1,21	0,08	8,87	119,7%	20,35	11,45	181,4	25,0	99,7%	77,5%	77,2%
105,00	1,17	0,09	8,95	117,4%	20,34	11,35	180,9	25,1	99,6%	77,6%	77,3%
106,00	1,17	0,07	9,13	113,6%	20,33	11,17	180,2	24,9	99,7%	77,9%	77,7%
107,00	1,17	0,07	9,24	111,8%	20,33	11,05	179,6	24,9	99,7%	78,0%	77,8%
108,00	1,12	0,07	9,28	110,1%	20,32	11,01	179,2	25,1	99,7%	78,1%	77,9%
109,00	1,12	0,07	9,26	110,4%	20,32	11,02	178,8	25,2	99,7%	78,1%	77,9%
110,00	1,08	0,07	9,31	109,3%	20,32	10,97	178,3	25,2	99,7%	78,2%	78,0%
111,00	1,08	0,08	9,21	111,2%	20,33	11,07	177,8	25,2	99,6%	78,2%	77,8%
112,00	1,08	0,09	9,10	113,6%	20,33	11,18	177,5	25,1	99,5%	78,0%	77,7%
113,00	1,03	0,10	8,96	117,0%	20,34	11,34	177,3	25,1	99,5%	77,9%	77,5%
114,00	1,03	0,11	8,83	119,7%	20,35	11,47	177,2	25,2	99,3%	77,8%	77,2%
115,00	0,99	0,12	8,71	122,4%	20,36	11,58	177,1	25,1	99,2%	77,6%	77,0%
116,00	0,99	0,11	8,55	126,9%	20,37	11,76	176,4	24,9	99,4%	77,5%	77,0%
117,00	0,99	0,12	8,48	128,5%	20,37	11,84	175,6	25,2	99,2%	77,5%	76,9%
118,00	0,94	0,13	8,43	129,5%	20,37	11,88	175,6	25,2	99,1%	77,4%	76,7%
119,00	0,94	0,15	8,29	132,7%	20,38	12,02	175,5	25,2	98,9%	77,2%	76,4%
120,00	0,94	0,17	8,10	137,4%	20,39	12,20	174,9	25,2	98,7%	77,0%	76,0%
121,00	0,94	0,19	7,74	147,7%	20,42	12,58	174,4	25,1	98,5%	76,5%	75,4%
122,00	0,90	0,19	7,66	150,2%	20,42	12,67	173,7	25,2	98,4%	76,5%	75,2%
123,00	0,90	0,20	7,64	150,6%	20,42	12,68	173,1	25,2	98,4%	76,5%	75,2%
124,00	0,90	0,20	7,56	153,2%	20,43	12,77	172,5	25,2	98,3%	76,4%	75,1%
125,00	0,90	0,20	7,56	153,2%	20,43	12,77	171,9	25,2	98,3%	76,5%	75,2%
126,00	0,90	0,20	7,51	154,9%	20,43	12,82	171,3	25,2	98,3%	76,5%	75,2%
127,00	0,85	0,20	7,53	154,3%	20,43	12,80	170,6	25,2	98,3%	76,5%	75,3%
128,00	0,85	0,20	7,54	153,7%	20,43	12,79	170,0	25,0	98,3%	76,6%	75,3%
129,00	0,81	0,20	7,62	151,8%	20,42	12,70	169,3	25,2	98,3%	76,8%	75,5%
130,00	0,80	0,20	7,64	150,4%	20,42	12,68	169,0	24,9	98,3%	76,8%	75,5%
131,00	0,80	0,20	7,71	148,5%	20,42	12,61	168,3	25,0	98,3%	77,0%	75,7%
132,00	0,80	0,19	7,77	146,5%	20,41	12,54	167,7	25,1	98,4%	77,2%	75,9%
133,00	0,76	0,19	7,79	146,1%	20,41	12,53	167,3	25,2	98,4%	77,2%	76,0%
134,00	0,76	0,19	7,84	144,8%	20,41	12,48	166,6	24,9	98,5%	77,3%	76,2%
135,00	0,76	0,18	7,86	144,5%	20,41	12,46	166,0	25,2	98,6%	77,4%	76,3%
136,00	0,76	0,17	7,93	142,5%	20,41	12,39	165,6	25,2	98,6%	77,6%	76,5%
137,00	0,73	0,17	7,97	141,3%	20,40	12,35	165,0	25,0	98,7%	77,7%	76,6%
138,00	0,71	0,16	7,99	140,8%	20,40	12,33	164,2	24,8	98,7%	77,7%	76,8%
139,00	0,71	0,16	8,06	139,0%	20,40	12,26	163,9	24,9	98,8%	77,9%	76,9%
140,00	0,67	0,16	8,06	138,9%	20,40	12,26	163,2	25,1	98,8%	77,9%	77,0%
141,00	0,67	0,18	7,84	145,0%	20,41	12,48	163,0	25,2	98,6%	77,7%	76,6%
142,00	0,67	0,20	7,57	152,7%	20,43	12,75	163,0	25,2	98,3%	77,3%	76,0%
143,00	0,67	0,20	7,49	155,2%	20,43	12,84	163,1	25,2	98,2%	77,2%	75,8%
144,00	0,67	0,21	7,44	156,7%	20,43	12,89	163,1	25,1	98,2%	77,1%	75,7%
145,00	0,62	0,21	7,40	158,4%	20,44	12,94	163,0	25,1	98,2%	77,0%	75,7%
146,00	0,62	0,20	7,43	157,4%	20,44	12,91	162,8	25,1	98,2%	77,1%	75,7%
147,00	0,62	0,20	7,46	156,3%	20,43	12,87	162,9	25,1	98,3%	77,1%	75,8%
148,00	0,62	0,20	7,49	155,3%	20,43	12,84	162,6	25,0	98,3%	77,2%	75,9%
149,00	0,62	0,20	7,53	154,3%	20,43	12,80	162,5	25,0	98,3%	77,3%	76,0%
150,00	0,58	0,19	7,63	151,3%	20,42	12,70	162,2	25,1	98,4%	77,4%	76,2%
151,00	0,58	0,19	7,68	149,8%	20,42	12,65	161,7	25,1	98,4%	77,6%	76,3%
152,00	0,58	0,19	7,68	149,8%	20,42	12,65	161,4	24,9	98,5%	77,6%	76,4%
153,00	0,53	0,20	7,48	156,0%	20,43	12,86	161,1	25,1	98,3%	77,3%	76,0%
154,00	0,53	0,21	7,34	160,0%	20,44	12,99	161,3	25,1	98,2%	77,1%	75,7%
155,00	0,53	0,20	7,48	155,9%	20,43	12,86	161,2	25,2	98,3%	77,3%	76,0%
156,00	0,53	0,17	7,68	150,2%	20,42	12,66	160,8	25,1	98,6%	77,7%	76,6%
157,00	0,49	0,16	7,72	149,3%	20,42	12,62	160,0	24,9	98,7%	77,8%	76,8%
158,00	0,49	0,15	7,82	146,5%	20,41	12,52	159,5	25,0	98,8%	78,0%	77,0%
159,00	0,49	0,15	7,82	146,6%	20,41	12,52	159,4	25,1	98,9%	78,0%	77,1%
160,00	0,45	0,15	7,85	145,7%	20,41	12,49	159,0	25,1	98,9%	78,0%	77,2%
161,00	0,49	0,15	7,85	145,7%	20,41	12,49	158,8	25,1	98,9%	78,1%	77,2%
162,00	0,44	0,14	7,91	144,0%	20,41	12,43	158,5	25,1	99,0%	78,2%	77,4%
163,00	0,44	0,13	7,93	143,6%	20,41	12,41	158,3	25,1	99,0%	78,2%	77,5%
164,00	0,44	0,13	7,91	144,4%	20,41	12,44	157,8	25,0	99,1%	78,2%	77,5%
165,00	0,42	0,14	7,84	146,2%	20,41	12,50	157,6	25,0	99,0%	78,2%	77,4%
166,00	0,44	0,14	7,85	145,9%	20,41	12,50	157,4	24,8	99,0%	78,2%	77,3%
167,00	0,40	0,15	7,87	145,2%	20,41	12,47	157,2	25,0	98,9%	78,2%	77,4%
168,00	0,40	0,15	7,85	145,7%	20,41	12,49	157,2	25,1	98,9%	78,2%	77,4%
169,00	0,35	0,15	7,80	147,2%	20,42	12,54	156,8	25,1	98,9%	78,2%	77,3%
170,00	0,35	0,15	7,79	147,6%	20,42	12,56	156,7	25,0	98,9%	78,2%	77,3%
171,00	0,35	0,15	7,75	148,9%	20,42	12,60	156,4	25,0	98,9%	78,1%	77,3%
172,00	0,35	0,15	7,71	150,0%	20,42	12,64	156,3	25,1	98,9%	78,1%	77,2%
173,00	0,35	0,14	7,69	150,9%	20,42	12,66	156,4	25,1	99,0%	78,1%	77,3%
174,00	0,30	0,14	7,65	152,4%	20,43	12,71	156,4	25,1	99,0%	78,0%	77,2%
175,00	0,30	0,14	7,56	154,9%	20,43	12,80	156,7	25,1	98,9%	77,9%	77,0%
176,00	0,30	0,15	7,48	157,4%	20,44	12,88	156,9	24,9	98,8%	77,7%	76,8%
177,00	0,26	0,15	7,47	157,9%	20,44	12,89	156,6	25,0	98,8%	77,7%	76,8%
178,00	0,26	0,15	7,47	158,0%	20,44	12,90	156,7	25,1	98,8%	77,7%	76,8%
179,00	0,28	0,15	7,47	157,9%	20,44	12,90	157,2	25,1	98,8%	77,7%	76,8%
180,00	0,26	0,15	7,47	157,7%	20,44	12,89	157,2	25,1	98,8%	77,7%	76,8%
181,00	0,26	0,15	7,50	156,6%	20,43	12,86	157,1	25,1	98,8%	77,7%	76,8%
182,00	0,26	0,15	7,48	157,2%	20,44	12,88	157,3	25,1	98,8%	77,7%	76,8%
183,00	0,21	0,15	7,33	162,5%	20,45	13,04	156,4	25,1	98,8%	77,6%	76,6%
184,00	0,21	0,17	7,08	170,7%	20,46	13,29	156,0	25,1	98,5%	77,2%	76,1%
185,00	0,21	0,18	6,93	176,2%	20,47	13,45	155,9	25,1	98,4%	77,0%	75,7%
186,00	0,21	0,19	6,88	178,0%	20,47	13,50	155,7	25,0	98,3%	76,9%	75,6%
187,00	0,17	0,19	6,85	179,1%	20,48	13,53	155,5	25,0	98,3%	76,9%	75,5%
188,00	0,17	0,19	6,72	184,3%	20,48	13,67	155,5	25,0	98,2%	76,7%	75,3%
189,00	0,17	0,20	6,65	186,7%	20,49	13,74	155,7	24,8	98,1%	76,5%	75,0%
190,00	0,17	0,21	6,62	187,8%	20,49	13,77	155,2	25,1	98,0%	76,5%	75,0%
191,00	0,17	0,21	6,60	188,4%	20,49	13,78	155,4	24,6	98,0%	76,4%	74,9%
192,00	0,12	0,21	6,58	188,9%	20,49	13,80	155,5	24,5	97,9%	76,4%	74,8%
193,00	0,12	0,22	6,58	188,9%	20,49	13,80	155,5	24,6	97,9%	76,4%	74,7%
194,00	0,12	0,22	6,58	189,0%	20,49	13,80	155,3	24,2	97,9%	76,3%	74,7%
195,00	0,12	0,22	6,58	188,9%	20,49	13,80	155,4	24,2	97,9%	76,3%	74,7%
196,00	0,08	0,22	6,58	188,8%	20,49	13,80	155,6	24,2	97,9%	76,3%	74,7%
197,00	0,08	0,21	6,62	187,6%	20,49	13,76	155,2	24,4	98,0%	76,4%	74,9%
198,00	0,08	0,21	6,62	187,6%	20,49	13,76	155,3	24,5	97,9%	76,5%	74,9%
199,00	0,08	0,21	6,62	187,6%	20,49	13,76	155,3	24,6	98,0%	76,5%	74,9%
200,00	0,08	0,21	6,60	188,3%	20,49	13,78	155,4	24,7	98,0%	76,4%	74,9%
201,00	0,08	0,21	6,62	187,6%	20,49	13,77	155,2	24,7	98,0%	76,5%	74,9%
202,00	0,03	0,22	6,60	188,1%	20,49	13,78	155,0	24,7	97,9%	76,4%	74,8%
203,00	0,03	0,21	6,62	187,5%	20,49	13,76	155,2	24,6	97,9%	76,5%	74,9%
204,00	0,03	0,20	6,65	186,6%	20,49	13,73	155,0	24,9	98,1%	76,6%	75,1%
205,00	0,03	0,20	6,70	184,8%	20,48	13,69	154,9	24,9	98,1%	76,7%	75,3%
206,00	0,03	0,19	6,72	184,3%	20,48	13,67	154,7	24,9	98,2%	76,7%	75,4%

207,00	0,03	0,19	6,77	182,3%	20,48	13,62	154,3	24,9	98,2%	76,8%	#DIV/0!
208,00	0,03	0,23	6,58	188,6%	20,49	13,80	154,7	24,9	97,8%	76,5%	#DIV/0!
209,00	0,03	0,24	6,30	200,3%	20,51	14,09	155,0	24,9	97,5%	75,9%	#DIV/0!
210,00	0,03	0,24	6,17	206,3%	20,52	14,22	155,2	24,9	97,5%	75,6%	73,7%
211,00	0,00	0,24	6,17	206,3%	20,52	14,22	155,3	24,8	97,5%	75,6%	73,7%

Temps acquisition minutes	Flue temp °F	Room temp °F	Tunnel dry bulb °F	Catalyst °F	scale lbs	Right °F	Back °F	bottom °F	Top °F	Left °F
1	79,16	65,58	71,40	80,96	2,87	74,39	75,15	74,46	74,63	74,64
2	123,79	65,55	77,63	171,11	2,84	74,34	75,13	74,44	74,64	74,58
3	176,89	65,72	82,35	225,62	2,67	74,44	75,37	74,51	74,65	74,60
4	229,47	65,69	87,86	281,56	2,57	74,79	76,10	74,75	74,80	75,06
5	282,21	65,52	95,00	312,77	2,37	75,60	77,41	75,30	75,25	76,35
6	322,16	65,63	100,33	345,65	2,27	76,96	79,34	76,14	76,07	78,79
7	376,75	66,04	109,19	420,62	2,07	78,99	81,79	77,26	77,44	82,61
8	417,42	66,74	115,06	477,69	1,87	81,44	84,87	78,73	79,48	87,66
9	426,53	67,42	110,42	490,16	1,67	84,50	88,55	80,55	82,38	93,80
10	424,90	68,00	104,85	583,97	1,57	88,34	92,34	82,90	86,08	100,93
11	422,00	68,39	103,11	606,02	1,47	93,06	96,44	85,56	90,35	108,82
12	421,67	68,69	102,69	596,56	1,37	98,76	100,95	88,67	95,06	117,32
13	432,60	69,16	104,30	603,59	1,27	105,16	105,76	92,15	100,16	126,09
14	426,51	69,50	125,57	549,72	1,17	112,21	111,05	96,26	105,46	135,07
15	370,33	69,73	121,24	382,93	12,97	119,74	117,10	100,63	110,77	144,19
16	318,15	69,86	114,38	388,66	13,68	127,30	123,12	105,10	116,03	153,20
17	304,62	70,01	114,13	408,94	13,58	134,21	128,33	109,47	120,84	161,60
18	276,18	70,11	108,40	351,24	13,48	140,10	132,78	113,51	125,17	169,15
19	270,43	70,22	106,96	344,70	13,38	145,07	136,58	117,31	128,91	175,85
20	279,83	70,36	109,22	391,05	13,38	149,07	139,68	120,83	132,24	181,86
21	310,01	70,46	115,81	611,97	13,17	152,21	142,70	124,12	135,15	187,35
22	326,77	70,53	118,56	610,45	12,98	154,73	145,50	127,29	137,81	192,45
23	324,15	70,66	118,20	543,24	12,88	156,87	148,15	130,38	140,31	197,21
24	352,44	70,75	125,58	667,91	12,67	158,76	150,66	133,45	142,68	201,79
25	377,96	70,81	118,89	564,21	12,48	160,73	153,25	136,27	145,02	206,17
26	413,79	70,92	107,15	650,78	12,28	162,97	156,11	139,04	147,17	210,44
27	383,40	70,97	95,43	619,80	12,18	165,60	158,83	142,16	149,63	214,62
28	356,52	71,04	91,53	590,46	12,08	168,48	161,46	145,50	152,36	218,73
29	340,31	71,11	89,43	553,45	12,08	171,27	163,94	149,14	155,46	222,80
30	329,31	71,16	88,53	536,13	11,97	174,00	166,19	152,57	158,66	226,03
31	321,66	71,25	87,44	524,01	11,87	176,28	168,19	155,66	161,60	228,89
32	319,83	71,28	87,33	522,66	11,87	178,21	169,95	158,42	165,04	231,13
33	323,66	71,32	87,59	525,54	11,78	179,86	171,54	160,98	167,94	232,88
34	329,61	71,35	87,81	531,46	11,68	181,41	173,00	166,54	170,68	234,06
35	337,18	71,44	87,90	539,81	11,58	182,86	174,46	169,90	173,81	234,84
36	351,69	71,42	88,76	555,27	11,38	184,26	175,99	173,40	176,50	235,56
37	369,43	71,55	89,99	578,88	11,34	185,68	177,59	176,75	179,33	236,24
38	390,19	71,59	92,28	601,79	11,17	187,76	179,48	179,75	182,55	236,93
39	412,78	71,62	94,00	627,84	11,08	189,84	181,56	182,60	186,29	237,69
40	433,65	71,62	95,06	659,72	10,88	192,11	183,87	184,96	190,62	238,55
41	446,19	71,82	95,64	667,26	10,78	194,71	186,28	186,99	195,47	239,93
42	446,02	71,77	96,59	701,74	10,57	197,67	189,01	188,82	201,18	241,54
43	452,57	71,77	96,73	711,51	10,44	200,76	191,72	190,18	207,07	243,40
44	454,80	71,96	97,00	722,81	10,29	204,05	194,48	191,74	213,36	245,51
45	457,23	72,02	97,64	730,36	10,18	207,66	197,18	192,80	219,74	247,71
46	463,06	72,05	98,76	738,62	10,07	211,16	199,87	193,80	226,24	250,12
47	475,06	71,98	99,39	764,46	9,87	214,69	202,45	194,40	232,84	252,56
48	482,71	72,11	99,55	768,43	9,68	218,13	205,14	195,07	239,45	255,14
49	489,61	72,24	101,00	792,97	9,58	221,76	207,75	195,65	246,42	257,63
50	497,05	72,22	101,37	795,85	9,38	225,76	210,32	196,22	253,55	260,37
51	504,92	72,18	102,09	805,40	9,17	230,03	213,11	196,81	261,18	263,15
52	516,14	72,33	103,32	816,54	9,07	234,49	215,89	197,44	269,43	266,06
53	529,54	72,43	105,25	830,30	8,86	239,54	218,88	198,67	277,45	269,10
54	536,10	72,47	105,92	842,25	8,67	244,64	222,04	200,46	285,57	272,39
55	542,33	72,52	106,10	852,13	8,47	250,38	225,41	202,28	294,06	276,09
56	545,40	72,63	106,52	869,56	8,28	256,16	229,06	204,40	302,68	280,03
57	547,27	72,74	106,32	877,13	8,18	262,01	232,96	206,83	311,36	284,60
58	548,12	72,64	107,17	879,16	7,97	267,95	237,01	209,04	320,35	289,46
59	549,37	72,91	107,77	878,96	7,77	273,95	241,32	211,98	328,85	294,89
60	552,47	73,04	108,12	877,84	7,58	280,03	245,76	214,64	337,67	300,62
61	554,32	72,87	108,04	874,09	7,48	285,94	250,38	217,80	345,93	306,76
62	554,42	72,97	108,36	872,76	7,27	292,03	255,07	220,74	354,76	313,04
63	555,83	73,09	108,01	876,96	7,07	298,18	259,84	223,79	363,11	319,40
64	554,55	73,12	108,49	877,69	6,97	304,35	264,67	227,35	371,10	325,92
65	550,96	73,15	107,74	874,14	6,88	310,59	269,53	230,53	379,19	332,49
66	546,29	73,05	107,39	868,19	6,67	316,73	274,38	233,73	387,34	339,15
67	541,13	73,34	107,17	860,94	6,57	322,95	279,22	237,48	394,40	345,82
68	536,02	73,64	107,02	852,90	6,37	329,09	284,07	241,03	401,69	352,69
69	532,56	73,61	106,52	847,53	6,27	335,26	288,75	244,45	407,84	359,73
70	530,90	73,49	106,55	844,95	6,18	341,27	293,40	247,97	414,06	366,34
71	529,72	73,44	105,96	844,46	5,97	347,29	297,94	251,63	419,44	372,87
72	528,48	73,62	106,21	844,56	5,87	353,26	302,35	255,32	424,69	379,45
73	527,88	73,74	106,14	843,40	5,77	359,35	306,70	259,55	429,39	385,87
74	526,50	73,73	106,45	844,45	5,57	365,20	311,00	263,99	433,65	392,34
75	529,96	73,70	105,86	846,86	5,48	370,99	315,24	268,25	438,00	398,66
76	531,58	73,44	106,31	848,02	5,38	376,59	319,46	272,75	441,99	405,06
77	532,30	73,68	106,05	848,60	5,17	382,03	323,66	277,57	446,14	411,44
78	531,68	73,81	106,71	845,96	5,07	387,40	327,78	282,61	449,28	417,76
79	530,78	74,11	106,61	842,73	4,97	392,65	331,94	287,65	452,63	424,17
80	529,31	74,07	105,99	841,62	4,78	397,72	336,05	292,93	456,04	430,54
81	527,17	74,22	105,66	839,86	4,78	402,61	340,22	298,18	459,51	436,97
82	521,83	74,01	105,50	835,86	4,57	407,51	344,32	303,42	462,86	442,96
83	518,84	73,63	105,39	832,36	4,47	412,17	348,46	309,05	466,10	448,89
84	514,96	74,22	105,45	828,23	4,37	416,86	352,48	314,58	468,51	454,52
85	510,90	73,90	104,44	821,72	4,27	421,14	356,38	320,04	471,72	459,86
86	506,96	73,91	104,77	814,39	4,17	425,80	360,10	325,70	473,21	464,96
87	503,97	74,01	104,45	812,36	4,08	429,75	363,58	331,72	475,39	469,03
88	500,51	74,05	104,17	815,96	3,97	433,78	366,91	337,57	476,66	473,10
89	498,36	74,05	103,83	822,89	3,87	437,91	370,14	343,37	478,20	476,66
90	496,37	74,22	104,25	826,96	3,87	442,56	373,25	349,25	479,22	480,56

91	494,82	74,48	104,06	828,97	3,67	447,06	376,33	354,92	460,20	483,50
92	492,74	74,29	103,04	828,26	3,67	451,66	379,32	360,47	461,05	486,60
93	490,67	74,36	102,82	823,82	3,57	456,36	382,30	366,05	462,03	489,36
94	487,43	74,69	102,09	819,26	3,47	460,77	385,24	371,69	462,76	491,71
95	490,43	74,67	102,02	807,97	3,38	465,39	388,15	377,29	463,29	494,26
96	472,29	74,29	101,39	794,15	3,38	469,32	390,76	382,76	463,43	496,76
97	463,20	74,67	100,58	780,16	3,27	473,32	393,33	387,02	463,65	499,30
98	454,72	74,38	100,24	769,77	3,27	477,03	395,55	391,10	464,11	501,65
99	449,27	74,32	100,01	764,31	3,17	480,22	397,50	394,91	463,94	503,56
100	445,46	74,58	99,58	759,18	3,17	483,06	399,39	397,78	463,14	505,18
101	443,30	74,72	99,00	756,37	3,07	485,37	401,07	400,94	462,34	506,60
102	441,94	74,71	99,28	753,77	3,04	487,62	402,64	403,95	461,47	507,89
103	441,53	74,84	99,41	752,23	2,97	489,09	404,04	406,87	460,04	508,93
104	441,96	74,65	98,73	751,62	2,87	490,31	405,42	410,21	478,57	509,70
105	442,12	74,42	99,07	750,04	2,77	491,49	406,45	414,42	477,28	510,45
106	467,77	75,16	135,90	697,55	7,98	492,77	407,68	419,58	475,12	511,12
107	447,11	74,66	114,54	523,61	15,08	493,47	409,77	422,71	473,66	512,31
108	456,79	74,59	106,99	662,34	14,98	493,62	411,01	425,61	472,48	513,45
109	463,00	74,58	105,66	778,64	14,78	493,77	411,19	428,66	470,04	514,18
110	503,63	74,63	106,05	824,97	14,58	493,22	410,47	430,97	468,58	514,26
111	518,37	74,60	106,64	842,35	14,38	491,96	409,12	432,55	467,51	513,54
112	530,64	74,97	107,03	860,36	14,18	490,81	407,41	433,64	466,80	512,22
113	539,26	74,61	108,19	871,90	13,98	489,17	405,45	434,40	466,79	510,33
114	547,14	74,65	108,44	882,06	13,78	487,57	403,33	434,87	467,12	508,23
115	554,62	75,46	109,65	893,51	13,68	486,43	401,26	434,79	468,74	506,20
116	562,74	75,49	110,49	902,74	13,47	485,33	399,25	434,70	470,66	504,05
117	570,96	75,33	111,29	912,61	13,18	484,29	397,38	434,50	473,22	502,01
118	578,23	74,99	112,12	920,62	12,98	483,69	395,68	434,05	476,47	500,15
119	585,17	74,60	112,75	928,47	12,78	483,00	394,15	433,61	480,12	498,36
120	591,06	75,54	113,66	937,51	12,58	483,03	392,78	433,62	484,23	497,10
121	597,03	75,53	114,06	946,29	12,38	482,85	391,57	433,34	488,47	495,66
122	603,09	75,31	114,54	952,13	12,18	483,21	390,62	433,03	493,44	494,40
123	607,50	75,78	115,36	957,97	11,98	483,53	390,01	432,93	498,66	493,36
124	610,92	75,55	116,34	962,03	11,68	484,35	389,33	432,81	503,95	492,62
125	614,14	75,75	116,68	965,92	11,48	485,31	389,06	432,74	509,04	491,94
126	616,56	75,65	117,41	970,13	11,28	486,26	388,66	432,94	514,43	491,52
127	621,71	75,99	118,40	974,26	10,98	487,56	388,91	433,03	519,97	490,92
128	624,80	75,93	118,16	978,37	10,82	489,01	389,03	432,79	525,39	490,64
129	627,44	75,18	117,64	982,17	10,58	490,59	389,32	432,60	530,63	490,66
130	629,97	75,73	118,10	985,31	10,38	492,18	389,78	432,94	535,91	490,89
131	631,72	75,85	118,08	989,51	10,18	494,04	390,37	433,07	540,84	491,04
132	633,09	76,12	118,39	992,16	9,98	496,43	391,08	433,43	546,22	491,61
133	635,37	76,13	118,16	994,45	9,68	498,75	391,98	433,52	552,19	492,60
134	637,13	76,12	119,00	999,82	9,48	501,44	393,03	433,28	557,56	493,97
135	638,40	75,97	118,98	1005,71	9,28	503,87	394,06	433,41	561,99	494,85
136	639,72	75,68	119,53	1013,91	9,07	506,27	395,50	434,12	567,55	496,45
137	642,27	75,96	118,76	1023,48	8,88	508,95	396,75	434,32	572,55	497,83
138	644,40	75,98	119,62	1030,46	8,63	511,76	398,27	434,96	577,60	499,56
139	646,10	76,03	120,06	1034,78	8,37	514,81	400,03	435,48	582,72	501,62
140	646,32	76,16	121,10	1036,27	8,18	518,25	401,87	436,14	587,71	503,20
141	647,76	76,54	121,21	1039,81	7,98	521,45	403,68	436,87	592,13	505,36
142	646,61	76,29	120,61	1041,85	7,77	524,55	405,71	437,71	596,56	507,97
143	644,88	76,62	120,78	1042,68	7,54	528,06	407,90	438,85	601,34	510,45
144	643,03	76,61	120,22	1044,25	7,37	531,74	410,11	440,12	607,47	513,56
145	643,35	75,84	119,55	1046,91	7,07	535,19	412,44	440,88	611,26	516,40
146	646,34	76,21	120,70	1048,14	6,90	539,34	414,93	441,86	616,63	520,29
147	647,86	75,97	120,73	1047,69	6,78	543,19	417,46	442,93	620,90	523,49
148	648,57	76,53	120,39	1048,04	6,52	547,04	420,04	443,46	624,95	526,91
149	648,90	75,89	121,17	1044,57	6,37	551,06	422,92	444,87	628,93	530,41
150	648,64	76,25	120,61	1038,44	6,18	555,01	425,86	445,74	633,28	534,26
151	648,13	75,85	120,48	1034,89	6,08	558,87	428,88	447,36	637,59	537,87
152	648,00	76,64	120,05	1032,95	5,88	563,03	432,02	448,44	639,89	541,63
153	646,97	76,00	119,69	1032,99	5,67	567,14	435,32	450,05	643,20	545,07
154	646,56	76,02	118,84	1032,92	5,57	570,95	438,64	451,37	646,45	548,59
155	634,45	76,69	118,06	1029,56	5,38	574,66	441,95	453,23	649,69	552,30
156	628,75	76,18	117,41	1025,51	5,28	578,41	445,45	454,57	651,28	556,06
157	624,33	75,54	116,56	1021,23	5,17	582,07	448,82	456,08	653,34	559,53
158	620,50	76,47	116,58	1017,31	5,02	585,43	452,33	457,45	655,30	563,25
159	617,46	76,89	116,23	1014,59	4,87	589,16	455,98	459,72	657,36	566,35
160	612,94	76,22	116,24	1009,31	4,78	592,28	459,42	461,64	658,95	569,81
161	570,67	75,82	110,06	1069,52	4,68	595,07	465,17	463,91	659,12	573,05
162	535,70	76,82	106,53	1126,15	4,58	597,85	469,34	465,72	654,69	576,49
163	516,55	76,67	104,56	1111,12	4,47	601,03	473,10	467,81	653,25	579,71
164	501,43	76,01	102,69	1085,71	4,37	604,02	476,60	469,97	652,73	583,12
165	490,66	76,63	101,85	1053,25	4,28	606,75	479,96	471,70	650,58	585,85
166	477,49	76,62	101,12	1028,58	4,27	609,22	483,19	473,49	649,62	588,54
167	467,77	76,94	101,10	1011,18	4,18	611,20	485,71	475,38	648,66	590,59
168	458,59	77,04	100,22	993,67	4,17	612,05	487,99	477,15	646,01	592,54
169	450,06	76,83	99,25	978,66	4,08	612,40	490,10	478,96	643,72	594,09
170	442,41	76,82	98,34	965,32	4,08	612,82	492,19	480,75	641,04	595,10
171	435,36	77,05	98,14	955,15	3,98	612,27	494,11	482,34	636,99	596,03
172	428,82	77,12	97,73	946,30	3,98	611,74	495,77	484,05	632,84	596,82
173	422,85	76,94	96,76	937,40	3,98	610,83	497,23	485,74	628,81	597,35
174	416,83	76,83	96,53	928,64	3,88	609,72	498,28	487,46	625,03	597,61
175	411,81	76,88	95,99	921,36	3,88	608,28	499,78	489,12	619,94	597,76
176	407,07	77,02	96,00	914,65	3,88	606,55	500,63	490,92	615,61	597,70
177	401,95	77,01	95,40	907,56	3,83	604,69	501,60	492,61	610,59	597,37
178	397,41	76,97	95,37	902,12	3,77	603,05	502,29	494,57	606,24	597,10
179	393,43	76,99	95,08	896,84	3,77	601,15	503,15	496,25	600,76	596,26
180	390,24	76,23	94,63	891,99	3,67	599,05	503,53	497,96	595,26	595,78
181	387,64	76,52	94,21	888,66	3,67	597,75	504,57	499,73	589,21	595,15
182	385,99	76,71	94,30	885,69	3,67	595,66	504,77	501,32	584,11	594,07
183	383,56	77,16	94,23	880,72	3,63	593,66	505,46	502,88	578,55	593,00

184	380,92	76,91	93,91	875,18	3,67	592,21	505,41	504,68	573,11	591,70
185	379,27	76,69	93,65	869,83	3,57	590,25	505,51	506,43	567,84	590,66
186	378,54	76,55	93,34	865,21	3,57	588,59	505,51	508,16	564,07	589,57
187	373,15	76,67	93,18	860,11	3,47	586,55	506,22	509,83	557,96	588,36
188	370,61	76,75	92,80	855,36	3,47	584,71	506,23	511,49	553,02	587,29
189	367,63	76,59	92,47	851,16	3,47	583,65	506,26	513,37	549,71	586,17
190	365,59	76,65	92,19	847,44	3,41	581,35	506,53	515,04	542,79	585,05
191	363,67	76,40	91,89	844,07	3,38	580,04	506,65	516,41	537,62	583,71
192	361,56	76,25	92,33	840,30	3,38	578,67	506,60	518,33	532,52	582,59
193	359,75	76,73	91,96	836,71	3,28	577,31	506,65	519,78	527,46	581,43
194	357,72	76,94	92,11	833,67	3,28	575,80	506,83	521,37	523,28	580,31
195	356,76	77,14	91,70	830,86	3,28	573,95	507,05	522,99	517,95	579,28
196	354,22	76,71	91,38	832,44	3,28	572,62	506,80	524,73	515,41	578,63
197	352,92	76,72	91,27	834,40	3,23	570,79	506,98	526,87	509,07	577,51
198	351,58	76,72	91,00	833,72	3,17	569,76	506,96	527,15	505,37	576,83
199	350,36	76,24	91,46	833,00	3,17	568,17	507,35	528,23	500,41	575,57
200	349,51	77,01	90,88	831,19	3,09	567,06	507,54	529,00	495,93	574,39
201	349,06	76,93	90,65	829,51	3,17	565,74	507,82	529,62	491,93	573,16
202	347,43	76,95	90,56	828,48	3,07	564,24	508,34	530,51	488,12	571,96
203	346,85	76,95	90,10	827,64	2,97	563,06	508,47	531,03	483,91	570,93
204	346,36	76,24	90,15	827,36	3,00	561,70	508,42	531,83	480,04	569,57
205	345,03	76,77	90,07	827,18	2,97	560,84	508,96	532,61	477,18	568,75
206	344,59	77,18	90,24	825,29	2,97	559,40	509,61	533,20	472,89	567,28
207	343,47	77,18	90,15	820,72	2,97	558,16	510,15	533,82	469,14	566,19
208	342,63	76,72	90,24	819,01	2,97	556,43	510,59	534,45	465,53	564,76
209	341,93	76,84	89,93	815,96	2,87	555,65	510,65	535,22	462,25	563,97
210	342,13	76,71	89,85	811,73	2,87	554,72	510,78	535,95	458,89	563,11
211	340,93	76,27	89,52	802,74	2,87	551,97	511,26	536,12	454,93	561,46
212	339,63	76,42	89,74	798,36	2,87	550,66	510,92	536,77	451,89	560,47
213	338,53	76,69	89,79	795,82	2,87	549,92	509,92	537,33	449,09	559,54
214	336,95	76,90	89,47	794,97	2,87	548,10	509,31	537,68	447,82	558,54
215	336,17	76,48	89,35	795,10	2,84	546,67	508,39	537,85	443,46	558,39
216	335,39	76,60	89,11	792,85	2,77	544,64	506,73	538,36	440,19	558,10
217	333,59	76,59	89,26	790,39	2,87	543,46	505,36	538,79	437,46	557,43
218	332,24	76,46	88,92	788,76	2,77	542,65	503,78	539,43	435,22	556,73
219	331,37	76,46	88,54	789,46	2,77	540,32	502,94	539,61	432,12	556,56
220	357,86	76,32	102,33	688,41	2,77	539,66	500,98	540,17	429,70	556,12
221	333,91	76,66	91,36	696,74	2,77	538,36	499,79	540,46	426,91	555,29

POLYTESTS
TESTING THROUGH YOUR REALITY

Date: 2022-06-13 Manufacturer: Hearthstone Model: 8031

Project #: pI 20270 Run: 5 Tech: MT Reviewer: MP

- Loading 31LBS start fire
- by pass open
- fan off
- At 12LBS insert preload
- 10 2LBS close Door
- At 300LBS insert Second preload
- close Door immediately
- At 47LBS close air inlet and bypass
- At 28LBS Max coal Bed
- After 1 min insert load and open by pass and admit
- close Door immediately
- After 5min close air inlet and bypass

TEST LOAD CONFIGURATION

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE / POST CHECKS

Date: 2022-06-13 Manufacturer: Hearthstone Model: 8031

Project #: pI 2.270 Run: 5 Tech: MM Reviewer: DD

Moisture Meter Calibration Check:	Equipment #	Time	12%	22%
	EM 334	7:20	ok	ok

	Pre-Test	Post-Test
Facility Conditions:		
Air Velocity from less than 2 feet	0 (max50 Fpm)	0 (max50 Fpm)
Smoke Capture Check (tunnel velocity)	ok	NA
Picture 4 sides	ok	ok
Wood Heater Conditions:		
Date Wood Heater Stack Cleaned	2022-06-06	
Date Dilution Tunnel Cleaned	2022-06-06	
Induced Draft Check (max 0.005 H2O)	ok	
Traverse before ignition	ok	
Temperature System:		
Ambient (65°-90°F)	ok °F	
Proportional Checks:		
Thermocouple check	ok	
Pitot Clean	ok	
Pitot verification	ok	
Pictures for report		
Side		ok
Coal bed		ok
Load		ok
Load in stove		ok
Fuel adjustment		ok
Load Length approximately 5/6 of firebox Lenght		ok

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 2022-06-13 Manufacturer: Hearthstone Model: 8031
Project #: PI 20270 Run: 5 Tech: MH Reviewer: DP

Leakage Checks Tunnel Samplers

	System 1st hour		System 1		System 2	
Unplugged Flow Rate = .25cfm	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)
Vacuum (inches Hg.)	- 10	- 10	- 10	- 10	- 10	- 10
Final 1minute DGM (Liter)	650188 98	651897 90	650189 50	651898,16	398169 89	399840, 36
Initial 1minute DGM (Liter)	650188 88	651897 85	650189 45	651898,06	398169, 85	399840,32
Change (Liter)	0,10	0,05	0,05	0,10	0,04	0,04
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)	**0.20**	**0.20**	**0.20**	**0.20**	**0.20**	**0.20**
Check OK	~~0.10~~ ok MH	ok	~~0.05~~ ok MH	ok	~~0.04~~ ok MH	ok

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 2022-06-13 Manufacturer: Hearthstone Model: 8031

Project #: PI 20276 Run: 5 Tech: MM Reviewer: DP

Leakage Checks Flue Gas Sampler

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

Leakage Checks Pitot

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

Scales checks

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	Em. 090	44 lbs, Class F	44 lbs
Platform	Em- 205	~~lbs~~, Class F	~~lbs~~
Wood	Em. 090	440 lbs, Class F	440 lbs
Analytical	Em. 335 mm	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%

POLYTESTS
TESTING THROUGH YOUR REALITY

CONTINUOUS ANALYZERS

Date: 2024-06-13 Manufacturer: Hearthstone Model: 8031
Project #: JI 2027 Run: 5 Tech: MM Reviewer: DO

FOR TUNNELS < 12 in

Barometric pressure (P_{bar}) 100.5 (KPa.) Static pressure (P_q) 0.18 (inches w.c.)
Inside diameter: Port A ______ Port B ____.
Tunnel cross sectional area: .1963Ft^2
Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H_2O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.074	72.74
B - Centroid	3.00	3.50	4	0.073	72.78
A-1	0.40	0.50	0.50	0.061	74.74
A-2	1.50	1.75	2	0.064	72.67
A-3	4.50	5.25	6	0.065	72.67
A-4	5.60	6.5	7.5	0.060	72.66
B-1	0.40	0.50	0.50	0.060	72.78
B-2	1.50	1.75	2	0.061	72.23
B-3	4.50	5.25	6	0.078	72.23
B-4	5.60	6.5	7.5	0.060	72.16
				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 H_2O)
T_s = average absolute dilution tunnel temperature (°F + 460)
P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{sg}$
P_q = static pressure $\frac{\text{in. } H_2O}{13.6}$
M_s = 28.56, wet molecular weight of stack gas (alternatively, i: 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_t) measured at each traverse point.

Date: 2022-06-13 Manufacturer: Hearthstone Model: 8031

Project #: PI 20270 Run: 5 Tech: MR Reviewer: DO

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
CO	0	0	3019	3000	1025	1000
Tolerance CO	0	+/- 0.02	0019	+/- 0.15	0025	+/- 0.05
CO_2	0	0	17 97	18 00	985	10 00
Tolerance CO2	0	+/- 0.02	003	+/- 0.5	015	+/- 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	3014	1016	0	0.02	0005	0.15	0009	0.05	✓	
CO_2	0	1389	986	0	0.02	008	0.5	001	0.5	✓	

POLYTESTS
TESTING THROUGH YOUR REALITY

TEST DATA LOG

Date: 2022-06-13 Manufacturer: Hearthstone Model: 8031

Project #: PI 20220 Run: 5 Tech: MP Reviewer: DR

RAW DRY GAS METER READINGS

	System 1	System 2	Blanck
Final (Liter)	651897,31	399839,06	387061,65
Initial (Liter)	650190,00	398169,60	385652,21

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	100,5	100,4
Dry Bulb (F):	71,6	74,4
Humidity (%):	65,3	62,1

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

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

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2022-06-13 Manufacturer: Hearthstone Model: 8031

Project #: PT 20270 Run: 5 Tech: MM Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight		Meter Moisture Content (% dry)*				
1 ¼ x 3 ½ x 14 in.	1446	lbs.	21.1	21.0	20.4	21.3	21.4
1 ¼ x 3 ½ x 14 in.	1106	lbs.	20.0	20.2	20.7	20.4	20.8
1 ¼ x 3 ½ x 14 in.	1568	lbs.	20.7	20.5	20.8	20.7	20.7
1 ¼ x 3 ½ x 14 in.	1472	lbs.	19.9	20.0	19.4	19.6	19.3
1 ¼ x 3 ½ x 14 in.	1478	lbs.	19.0	19.1	19.2	19.6	19.4
1 ¼ x 3 ½ x 14 in.	1440	lbs.	22.1	22.0	22.1	22.3	21.9
1 ¼ x 3 ½ x 14 in.	1478	lbs.	21.6	21.4	21.3	21.4	21.6
1 ¼ x 3 ½ x 14 in.	1432	lbs.	20.8	21.4	21.3	21.2	21.0
1 ¼ x 3 ½ x 14 in.	1392	lbs.	21.4	21.3	21.8	21.7	21.4
x x in.		lbs.					
1 ¼ x 3 ½ x 14 in.	1182	lbs.	21.6	21.3	22.4	21.8	21.4
1 ¼ x 3 ½ x 14 in.	1404	lbs.	21.4	21.9	21	22.0	21.9
1 ¼ x 3 ½ x 14 in.	1182	lbs.	20.1	20.4	20	19.9	19.9
1 ¼ x 3 ½ x 14 in.	1444	lbs.	20.4	20.6	20.7	20.4	20.8
1 ¼ x 3 ½ x 14 in.	1462	lbs.	20.6	20.4	20.0	20.8	20.4
1 ¼ x 3 ½ x 14 in.	1512	lbs.	19.9	20.0	20.6	20.3	20.2
1 ¼ x 3 ½ x 14 in.	1524	lbs.	19.8	19.3	20.4	19.4	19.3
1 ¼ x 3 ½ x 14 in.	1670	lbs.	20.0	20.4	20.3	20.8	20.4
1 ¼ x 3 ½ x 14 in.	1410	lbs.	20.4	20.6	20.5	20.3	20.2
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					

TEST LOAD WEIGHT: 12 81 + 12.74 lbs

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2022-06-13 Manufacturer: Hearthstone Model: 8031

Project #: pI 20270 Run: 5 Tech: MM Reviewer:

FUEL DESCRIPTION:

Type of wood :

TEST LOAD

Piece Size	Weight		Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 15 in.	1218	lbs.	19.9	20.0	20.1	20.1	20.0
1 1/2 x 3 1/2 x 15 in.	1636	lbs.	21.5	21.4	21.6	21.3	21.4
1 1/2 x 3 1/2 x 15 in.	1446	lbs.	21.4	21.3	21.4	21.8	21.4
3 1/2 x 3 1/2 x 15 in.	330	lbs.	22.8	22.4	22.3	22.6	22.1
3 1/2 x 3 1/2 x 15 in.	3126	lbs.	21.6	22.1	22.1	22.2	22.0
x x in.		lbs.					
1 1/2 x 3/4 x 5 in.	0132	lbs.			19.6		
1 1/2 x 3/4 x 5 in.	0156	lbs.			19.8		
1 1/2 x 3/4 x 5 in.	0144	lbs.			19.7		
1 1/2 x 3/4 x 5 in.	0150	lbs.			20.0		
1 1/2 x 3/4 x 5 in.	0132	lbs.			20.0		
1 1/2 x 3/4 x 5 in.	0132	lbs.			19.8		
1 1/2 x 3/4 x 5 in.	0134	lbs.			19.7		
1 1/2 x 3/4 x 5 in.	0156	lbs.			19.3		
1 1/2 x 3/4 x 5 in.	0158	lbs.			19.8		
1 1/2 x 3/4 x 5 in.	0130	lbs.			19.9		
1 1/2 x 3/4 x 5 in.	0124	lbs.			19.9		
1 1/2 x 3/4 x 5 in.	0128	lbs.			20.1		
1 1/2 x 3/4 x 5 in.	0136	lbs.			21.0		
1 1/2 x 3/4 x 5 in.	0136	lbs.			21.1		
1 1/2 x 3/4 x 5 in.	0134	lbs.			20.9		
1 1/2 x 3/4 x 5 in.	0128	lbs.			20.8		
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					

TEST LOAD WEIGHT: 1344 lbs Min 20%: 269 Max 25%: 336

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2022-06-09 Manufacturer: Hearthstone Model: 8031

Project #: PT 20 270 Run: 5 Tech: MM Reviewer: AO

		SYSTEM 1 – ~~1st hour~~ 1 hr				SYSTEM 1 st hour hr				
Pre-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	16	314	315	15	30	316	317	29	348
2022-06-09	17:30	108 7516	0 1272	0 1284	35 4961	110 2130	0 1281	0 1274	34 3200	0 1271
2022-06-13	8:00	108 7517	0 1273	0 1283	35 4960	110 2131	0 1282	0 1273	34 3199	0 1270

		SYSTEM 1 – ~~1st hour~~ 1 hr				SYSTEM 1 st hour hr				
Post-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	16	314	315	15	30	316	317	29	348
2022-06-13	20:00	108 7523	0 1270	0 1272	35 4993	110 2139	0 1291	0 1272	34 3229	0 1270
2022-06-20	8:00	108 7519	0 1270	0 1271	35 4981	110 2133	0 1290	0 1272	34 3207	0 1270
2022-06-21	8:00	108 7519	0 1270	0 1271	35 4980	110 2133	0 1290	0 1273	34 3207	0 1270

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2022-06-09 Manufacturer: Hearthstone Model: 8031

Project #: pT 20270 Run: 5 Tech: MP Reviewer: KP

		SYSTEM 2			
Pre-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	37	318	347	30
2022-06-09	12:00	107 9743	0 1294	0 1289	33 9851
2022-06-13	9:00	107 9744	0 1293	0 1289	33 9852

		SYSTEM 2			
Post-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	37	318	347	30
2022-06-13	20:00	107 9751	0 1307	0 1288	33 9883
2022-06-20	8:30	~~107 9744~~	0 1305	0 1288	33 9862
2022-06-21	8:30	107 9745	0 1305	0 1289	33 9862

Paramètres

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

Code verrouillage:	HEA	

Description du test

Test standard	EPA	
Run #	5	
Date	13-06-2022	
Technicien	M.M	
Project #	PI 20270	

Description de l'unité

Manufacturier	HEARTHSTONE	
Modèle	8031	
Combustion system	Cat	
Appliance type	WOOD STOVE	
Firebox volume	1,9	cu ft.
Appliance weight empty	N.A	lbs
Appliance weight full	N.A	lbs

Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	N.A	BTU/h Donnée fournie par le manfacturier
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):	1,007	Dimensionless
Equipment number (DGM #1):	EM 178	
Calibration Factor (DGM #2):	1,005	Dimensionless
Equipment number (DGM #2):	EM 318	
Calibration Factor (DGM #3):	0,988	
Equipment number (DGM #3):	EM 179	Dimensionless

Tunnel

Targeted tunnel flow rate	350	scfm
Tunnel diameter	8	in.
Molecular weight	29	29 as per ASTM E2515
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	PI 20270
Date	13-06-2022
Technicien	M.M

Fuel data

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

Default Fuel Values

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

	Start	End
Barometer (kPa):	100,5	100,4
Barometer (in.Hg):	29,677639	29,64810884
Dry Bulb (F):	71,6	74,4
Humidity (%):	65,3	62,1
Air velocity (ft/min)	0	0

DGM #1	Final:	23021,537	cuft	Final:	651897,310	Liter
	Initial:	22961,244	cuft	Initial:	650190,000	Liter
DGM #2	Final:	14120,183	cuft	Final:	399839,060	Liter
	Initial:	14061,227	cuft	Initial:	398169,600	Liter
DGM room	Final:	13668,953	cuft	Final:	387061,650	Liter
	Initial:	13619,180	cuft	Initial:	385652,210	Liter

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent: 277

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

Project nu.	PI 20270
Date	13-06-2022
Technicien	M.M

Preload data sheet

Test Load Weight:

Lower	Ideal	Upper
11,97	13,30	14,63

Load Volume: 0,7656 cu. ft

Loading Density: 13,451 lbs./ft3

Number of Spaces:

Spacer weight (lbs):

Load Density (wet): 33,379 lbs./ft3

Dry Wood Density: 27,664399

Piece Size (in): Thick	Wide	x Length	Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x Weight	Volume Cubic Inches
1,5	3,5	14	1,446	21,1	21	20,4	21,3	21,4	30,42384	73,50
1,5	3,5	14	1,106	20	20,2	20,3	20,4	20,8	22,49604	73,50
1,5	3,5	14	1,568	20,7	20,3	20,8	20,7	20,7	32,36352	73,50
1,5	3,5	14	1,472	19,9	20	19,4	19,6	19,3	28,91008	73,50
1,5	3,5	14	1,478	19	19,1	19,2	19,6	19,4	28,46628	73,50
1,5	3,5	14	1,44	22,1	22	22,1	22,3	21,9	31,7952	73,50
1,5	3,5	14	1,478	21,6	21,4	21,3	21,4	21,6	31,71788	73,50
1,5	3,5	14	1,432	20,8	21,4	21,3	21,2	21	30,27248	73,50
1,5	3,5	14	1,392	21,4	21,3	21,8	21,7	21,4	29,95584	73,50
										0,00
1,5	3,5	14	1,136	21,6	21,3	22,4	21,8	21,4	24,6512	73,50
1,5	3,5	14	1,404	21,4	21,9	21	22	21,9	30,38256	73,50
1,5	3,5	14	1,182	20,1	20,4	20	19,9	19,9	23,71092	73,50
1,5	3,5	14	1,444	20,4	20,6	20,3	20,4	20,8	29,602	73,50
1,5	3,5	14	1,462	20,6	20,4	20	20,8	20,4	29,88328	73,50
1,5	3,5	14	1,512	19,9	20	20,6	20,3	20,2	30,5424	73,50
1,5	3,5	14	1,524	19,8	19,3	20,4	19,4	19,3	29,93136	73,50
1,5	3,5	14	1,67	20	20,4	20,3	20,8	20,4	34,0346	73,50
1,5	3,5	14	1,41	20,4	20,6	20,8	20,1	20,2	28,7922	73,50
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
								SUM MC:	527,93168	

PreTest Load Weight: 25,56 lbs.

Dry Weight: 9,61 kg.

Average Moisture Content: %

Dry: 20,66

20,66
Must be 18-28

Wet: 17,12
must be 15,2-22

Project nu.	PI 20270
Date	13-06-2022
Technicien	M.M

FUEL LOAD DATA SHEET, CSA B415

Test Load Weight:

Lower	Ideal	Upper
12,0	13,3	14,6

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

Load Volume: 0,35 cu. ft

Loading Density: 7,1 lbs./ft3

Number of Spaces: 16

Spacer weight: lbs

Load Density (wet): 32,1 lbs./ft3

Dry Wood Density: 26,5 lbs./ft3

Piece Size (in): Thick	Wide	Length	Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x Weight	Volume Cubic Inches	Ave. MC %
1,5	3,5	15	1,72	19,90	20,00	20,10	20,10	20,00	34,39436	78,75	20,0
1,5	3,5	15	1,64	21,50	21,40	21,60	21,30	21,40	35,07584	78,75	21,4
1,5	3,5	15	1,45	21,40	21,30	21,40	21,80	21,40	31,03116	78,75	21,5
3,5	3,5	15	3,30	22,80	22,40	22,30	22,60	22,10	74,052	183,75	22,4
3,5	3,5	15	3,13	21,60	22,10	22,30	22,20	22,00	68,89704	183,75	22,0
										0,00	
										0,00	
										0,00	

1,5	0,75	5	0,13			19,60			2,5872	5,63	19,6
1,5	0,75	5	0,16			19,80			3,0888	5,63	19,8
1,5	0,75	5	0,14			19,90			2,8656	5,63	19,9
1,5	0,75	5	0,15			20,00			3	5,63	20,0
1,5	0,75	5	0,13			20,00			2,64	5,63	20,0
1,5	0,75	5	0,13			19,80			2,6136	5,63	19,8
1,5	0,75	5	0,13			19,70			2,6398	5,63	19,7
1,5	0,75	5	0,16			19,70			3,0732	5,63	19,7
1,5	0,75	5	0,16			19,80			3,1284	5,63	19,8
1,5	0,75	5	0,13			19,90			2,587	5,63	19,9
1,5	0,75	5	0,12			19,90			2,4676	5,63	19,9
1,5	0,75	5	0,13			20,10			2,5728	5,63	20,1
1,5	0,75	5	0,14			21,00			2,856	5,63	21,0
1,5	0,75	5	0,14			21,10			2,8696	5,63	21,1
1,5	0,75	5	0,13			20,90			2,8006	5,63	20,9
1,5	0,75	5	0,13			20,80			2,6624	5,63	20,8
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
								SUM MCx	287,903		20,4 %

Test Load Weight: 13,44 lbs.

Dry Weight: 5,02 kg.

Average Moisture Content: %

Dry: 21,43 Dry(EPA) 21,43

Dry(B415 21,43

21,43
Must be 19-25

Wet: 17,65
must be 15,2-22

Coal Bed Range: 2,7 lbs. to 3,4 lbs.

TEST CHARGE:

Coal bed weight: 2,8 lbs.

Project nu.	PI 20270
Date	13-06-2022
Technicien	M.M

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	30	316	317	29	16	314	315	15	37	318	347		348		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	110,2130	0,1282	0,1274	34,3200	108,7516	0,1272	0,1284	35,4961	107,9743	0,1294	0,1289	33,9851	0,1271	2022-06-09	17:00
Before (6)	110,2131	0,1282	0,1273	34,3199	108,7517	0,1273	0,1283	35,4960	107,9744	0,1293	0,1289	33,9852	0,1270	2022-06-13	09:00
After (1)	110,2139	0,1291	0,1272	34,3229	108,7523	0,1270	0,1272	35,4993	107,9751	0,1307	0,1288	33,9883	0,1270	2022-06-13	20:00
After (2)	110,2133	0,1290	0,1272	34,3207	108,7519	0,1270	0,1271	35,4981	107,9746	0,1305	0,1288	33,9862	0,1270	2022-06-20	08:00
After (3)	110,2133	0,1290	0,1273	34,3207	108,7519	0,1270	0,1271	35,4980	107,9745	0,1305	0,1289	33,9862	0,1270	2022-06-21	08:00
After (4)															
After (5)															
After (6)	110,2133	0,1290	0,1273	34,3207	108,7519	0,1270	0,1271	35,4980	107,9745	0,1305	0,1289	33,9862	0,1270	2022-06-21	08:00
Difference	0,0002	0,0008	0,0000	0,0008	0,0002	-0,0003	-0,0012	0,0020	0,0001	0,0012	0,0000	0,0010	0,0000		
Total (mg)		1,8				2,5				2,3			0		
Total ajusté (mg)		**1,80**				**2,50**				**2,30**					

Project nu.	PI 20270
Date	13-06-2022
Technicien	M.M

Demonstration Purpose only net real numbers negative mass adjusted to zero

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	30	316	317	29	16	314	315	15	37	318	347		348		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	110,2130	0,1282	0,1274	34,3200	108,7516	0,1272	0,1284	35,4961	107,9743	0,1294	0,1289	33,9851	0,1271	2022-06-09	17:00
Before (6)	110,2131	0,1282	0,1273	34,3199	108,7517	0,1273	0,1283	35,4960	107,9744	0,1293	0,1289	33,9852	0,1270	2022-06-13	09:00
After (1)	110,2139	0,1291	0,1272	34,3229	108,7523	0,1270	0,1272	35,4993	107,9751	0,1307	0,1288	33,9883	0,1270	2022-06-13	20:00
After (2)	110,2133	0,1290	0,1272	34,3207	108,7519	0,1270	0,1271	35,4981	107,9746	0,1305	0,1288	33,9862	0,1270	2022-06-20	08:00
After (3)	110,2133	0,1290	0,1273	34,3207	108,7519	0,1270	0,1271	35,4980	107,9745	0,1305	0,1289	33,9862	0,1270	2022-06-21	08:00
After (4)															
After (5)															
After (6)	110,2133	0,1290	0,1273	34,3207	108,7519	0,1273	0,1283	35,4980	107,9745	0,1305	0,1289	33,9862	0,1270	2022-06-21	08:00
Difference	0,0002	0,0008	0,0000	0,0008	0,0002	0,0000	0,0000	0,0020	0,0001	0,0012	0,0000	0,0010	0,0000		
Total (mg)		1,8				4				2,3			0		
Total ajusté (mg)		**1,80**				**4,00**				**2,30**					

Project nu.	PI 20270
Date	13-06-2022
Technicien	M.M

SFBA EPA EMISSION RESULTS

Test Duration: **313** min

PRESSURE FACTOR:	DGM 1	0,96114	
	DGM 2	0,96734	
	DGM 3	0,99141	
TEMPERATURE FACTORS	DGM 1	0,98484	
	DGM 2	0,97546	
	DGM 3	0,98519	
VOLUMES SAMPLED	DGM 1	57,446	SCft
	DGM 2	55,935	Scft
	DGM 3	48,041	SCft
TOTAL TUNNEL VOLUME :		109631	
SAMPLE RATIOS			
Sample Train 1:		1908,426	
Sample Train 2:		1959,986	
Paticulate concentration			
	Sample Train 1	**0,000044**	g/dscf
	Sample Train 2	**0,000041**	g/dscf
	Room	**0,000000**	g/dscf
TOTAL EMISSIONS			
Sample Train 1		**4,77**	g
Sample Train 2		**4,51**	g
EMISSION RATES			
Sample Train 1		**0,91**	g/hr
Sample Train 2		**0,86**	g/hr
1st hour emission rate		**3,44**	g/hr

	Train 1	Train 2
Cs	4,352E-05	4,11195E-05

RESULTS

Average emission rate: 0,89 g/hr

Burn Rate : 0,962 Dry kg/hr

BAROMETRIC PRESSURE

Average:	29,662874	in Hg
Start:	29,677639	in Hg
End:	29,648109	in Hg

DGM CONTROLLER VALUES

DGM 1	Final:	23021,537	Cuft
	Initial:	22961,244	Cuft
DGM 2	Final:	14120,183	Cuft
	Initial:	14061,227	Cuft
DGM #3	Final:	13668,953	Cuft
	Initial:	13619,180	Cuft

TEMPERATURES

DGM 1	536,128	°R
DGM 2	541,283	°R

CALIBRATION FACTORS

DGM 1	1,0066
DGM 2	1,0054
DGM #3	0,9882

TUNNEL FLOW RATE: 350,259 Dscfm

PARTICULATE CATCH

Total Sample Train 1:	2,50	mg
Total Sample Train 2:	2,30	mg
Total Sample Train 1 1st hour:	1,80	mg

DEVIATION: 2,84%

Elapsed Time min	Raw data row	Weight Remaining lbs	CO %	CO_2 %	O_2 %	Flue Gas °F	Room Temp °F	Tunnel Dry Bulb °F	Unit Top °F	Unit Back °F	Unit R.Side °F	Unit L.Side °F	Unit Bottom °F	Catalyst °F	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Change in Surface Temp. °F
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

102,0	379,0	8,7	0,3	13,4	369,6	337,2	75,2	88,1	462,3	328,0	386,5	351,5	321,6	994,6	0,10	78,52	75,60	78,60	0,18	80,76	81,43	78,59	0,06	0,06	-49,68705
103,0	380,0	8,6	0,3	13,4	370,8	338,7	75,2	88,0	464,4	327,3	386,3	352,5	321,2	997,7	0,10	78,47	75,64	78,59	0,18	80,74	81,41	78,64	0,06	0,06	-48,49403
104,0	381,0	8,5	0,3	13,5	372,1	339,4	75,4	88,4	464,4	328,5	390,1	353,3	322,4	998,8	0,10	78,43	75,64	78,68	0,18	80,72	81,36	78,60	0,06	0,07	-47,14016
105,0	381,0	8,4	0,3	13,6	373,7	340,3	75,8	87,3	468,8	330,3	391,7	357,8	323,0	993,7	0,10	78,48	75,64	78,76	0,18	80,72	81,38	78,67	0,06	0,07	-45,60698
106,0	383,0	8,3	0,3	13,6	378,0	341,1	75,8	88,0	470,8	331,8	393,2	359,8	324,8	999,3	0,10	78,52	75,67	78,84	0,18	80,80	81,44	78,78	0,06	0,07	-44,24800
107,0	384,0	8,2	0,3	13,6	376,2	342,2	75,6	87,8	471,0	332,8	394,6	362,2	326,5	999,8	0,10	78,52	75,66	78,84	0,18	80,83	81,50	78,84	0,06	0,07	-43,07801
108,0	385,0	8,1	0,3	13,6	377,7	342,2	75,7	88,7	474,4	334,1	396,2	364,4	326,2	999,0	0,10	78,58	75,60	79,03	0,18	80,87	81,53	78,92	0,07	0,06	-41,61435
109,0	386,0	8,0	0,3	13,6	378,1	342,0	75,8	88,4	477,3	335,4	398,0	366,2	326,8	994,1	0,10	78,64	75,60	79,09	0,18	80,89	81,54	78,96	0,06	0,06	-40,14612
110,0	387,0	4,9	0,3	13,6	380,4	341,5	75,6	88,2	476,7	336,4	399,6	367,3	326,3	978,4	0,18	78,68	75,61	79,03	0,18	80,83	81,51	78,93	0,06	0,07	-38,62987
111,0	388,0	4,8	0,3	13,6	381,8	341,8	75,6	88,2	481,8	338,1	401,6	368,7	317,7	976,7	0,18	78,68	75,61	79,03	0,18	80,79	81,51	78,83	0,06	0,06	-37,42376
112,0	389,0	4,7	0,3	13,3	383,2	340,4	75,8	88,4	484,1	340,0	403,1	371,7	317,2	978,1	0,18	78,55	75,60	78,99	0,18	80,76	81,49	78,80	0,06	0,06	-36,08318
113,0	390,0	4,7	0,3	13,1	384,4	339,8	75,4	87,3	484,8	341,7	404,7	374,1	316,8	982,2	0,18	78,53	75,60	79,02	0,18	80,72	81,49	78,82	0,06	0,06	-34,85402
114,0	391,0	4,8	0,3	13,1	384,0	339,3	75,7	87,4	486,8	343,8	404,3	376,7	316,7	984,3	0,18	78,58	75,60	79,07	0,18	80,76	81,51	78,82	0,06	0,06	-33,32302
115,0	392,0	4,8	0,3	13,0	387,8	339,2	75,7	87,0	488,0	344,8	408,1	378,8	316,8	982,6	0,18	78,57	75,63	79,10	0,18	80,80	81,52	78,83	0,06	0,06	-31,81849
116,0	393,0	4,6	0,3	13,0	388,8	338,2	75,8	86,8	490,4	346,8	409,6	381,1	316,5	987,2	0,18	78,58	75,63	79,09	0,18	80,83	81,53	78,82	0,06	0,06	-30,43994
117,0	394,0	4,3	0,3	12,8	390,3	337,4	75,8	86,8	491,8	348,0	411,7	383,5	316,3	987,8	0,18	78,63	75,64	79,09	0,18	80,87	81,58	78,88	0,06	0,06	-29,00893
118,0	395,0	4,3	0,3	12,7	391,8	336,6	75,0	87,0	494,3	349,7	413,7	385,7	316,3	990,8	0,18	78,71	75,67	79,18	0,18	80,94	81,59	78,88	0,06	0,06	-27,74867
119,0	396,0	4,2	0,3	12,6	393,8	334,8	75,0	86,8	496,1	351,3	415,7	388,1	316,2	995,2	0,18	78,70	75,70	79,23	0,18	80,97	81,63	79,05	0,06	0,06	-26,80808
120,0	397,0	4,1	0,3	12,6	393,8	333,1	75,0	86,1	497,8	353,0	417,7	390,3	316,2	992,8	0,18	78,73	75,71	79,28	0,18	81,03	81,65	79,14	0,06	0,06	-24,72109
121,0	398,0	4,1	0,3	12,3	396,3	331,4	75,0	86,1	498,4	354,4	419,7	392,4	316,1	990,8	0,18	78,78	75,71	79,30	0,18	81,05	81,64	79,18	0,06	0,06	-23,67076
122,0	399,0	4,0	0,3	12,2	397,2	330,0	75,0	86,4	498,4	355,8	421,8	394,4	315,8	987,3	0,18	78,75	75,71	79,33	0,18	81,03	81,66	79,21	0,07	0,06	-22,23631
123,0	400,0	3,9	0,3	12,1	398,6	328,2	75,8	87,6	499,3	357,6	423,8	396,7	315,7	984,1	0,18	78,75	75,72	79,38	0,18	81,03	81,70	79,19	0,06	0,06	-20,84073
124,0	401,0	3,9	0,3	11,8	400,0	326,8	75,6	87,4	500,6	359,2	425,8	398,8	315,8	982,2	0,18	78,77	75,72	79,38	0,18	81,04	81,71	79,19	0,06	0,06	-19,34818
125,0	402,0	3,8	0,3	11,7	401,2	324,6	75,8	87,3	500,8	360,8	427,8	400,8	315,7	980,7	0,18	78,82	75,75	79,37	0,18	81,06	81,70	79,21	0,07	0,06	-18,0884
126,0	403,0	3,7	0,3	11,6	402,4	322,7	75,8	87,0	501,8	362,0	429,6	402,2	315,5	982,8	0,18	78,82	75,74	79,38	0,18	81,08	81,75	79,18	0,06	0,06	-16,9098
127,0	404,0	3,7	0,3	11,7	403,8	320,8	75,7	86,7	501,6	363,6	431,6	404,3	315,3	980,1	0,18	78,78	75,78	79,34	0,18	81,01	81,73	79,13	0,06	0,06	-15,80184
128,0	405,0	3,6	0,3	11,6	405,3	320,5	75,7	86,4	501,3	365,3	432,8	406,7	315,4	980,4	0,18	78,78	75,74	79,29	0,18	80,98	81,72	79,07	0,07	0,06	-15,01809
129,0	406,0	3,6	0,1	11,6	406,7	318,7	75,8	86,3	502,8	366,7	435,2	408,4	315,3	987,8	0,18	78,80	75,78	79,30	0,18	80,98	81,72	79,09	0,06	0,06	-13,61319
130,0	407,0	3,6	0,1	11,6	408,7	316,8	75,8	86,2	503,1	368,4	437,1	410,1	315,1	988,3	0,18	78,72	75,78	79,27	0,18	80,95	81,71	79,04	0,06	0,06	-12,33643
131,0	408,0	3,6	0,1	11,5	407,8	315,6	75,7	86,5	502,0	370,1	439,1	411,4	315,0	986,1	0,18	78,68	75,76	79,24	0,18	80,94	81,68	78,98	0,06	0,06	-11,76482
132,0	409,0	3,4	0,1	11,3	408,8	314,1	75,8	86,8	501,8	371,7	440,7	413,8	314,8	977,4	0,18	78,67	75,74	79,21	0,18	80,92	81,66	78,92	0,06	0,06	-10,78071
133,0	410,0	3,3	0,1	11,1	408,8	312,0	75,8	86,4	500,1	373,4	442,4	415,8	315,0	973,1	0,18	78,67	75,73	79,13	0,18	80,86	81,68	78,84	0,06	0,06	-10,40799
134,0	411,0	3,2	0,1	10,9	410,2	312,6	76,1	84,9	500,4	374,8	443,0	417,8	315,1	970,7	0,18	78,63	75,77	79,13	0,18	81,04	81,75	78,83	0,06	0,06	-9,101618
135,0	412,0	3,2	0,1	10,8	411,1	310,6	76,0	85,8	500,1	376,4	445,2	419,8	315,1	967,1	0,18	78,63	75,77	79,18	0,18	81,10	81,75	78,87	0,06	0,06	-8,157468
136,0	413,0	3,2	0,1	10,6	411,6	309,0	75,9	84,6	499,3	378,3	446,3	420,4	315,1	964,6	0,18	78,61	75,80	79,14	0,18	81,20	81,77	78,84	0,06	0,06	-7,605763
137,0	414,0	3,1	0,1	10,5	412,0	307,8	76,3	85,7	497,4	380,1	448,0	422,2	315,1	962,7	0,18	78,14	75,88	79,16	0,18	81,38	81,83	78,88	0,06	0,06	-7,248614
138,0	415,0	3,1	0,1	10,4	413,2	306,3	76,3	85,0	496,0	381,7	449,2	423,8	315,6	959,3	0,18	78,24	75,88	79,21	0,18	81,45	81,87	78,86	0,06	0,06	-6,031824
139,0	416,0	3,1	0,1	10,3	413,8	304,7	76,1	84,2	495,8	383,4	450,2	424,5	315,7	961,2	0,18	78,23	75,90	79,14	0,18	81,37	81,87	78,80	0,06	0,06	-5,574868
140,0	417,0	3,0	0,1	10,1	414,4	303,7	76,2	83,0	494,3	384,7	451,1	426,1	315,8	964,2	0,18	78,26	75,92	79,06	0,18	81,44	81,84	78,80	0,07	0,06	-4,812038
141,0	418,0	3,0	0,1	9,9	415,1	302,2	76,2	82,6	492,8	386,2	452,8	426,2	315,8	963,3	0,18	78,23	75,94	79,03	0,18	81,44	81,83	78,74	0,06	0,06	-4,087206
142,0	419,0	3,0	0,1	9,8	415,1	300,2	75,8	82,4	491,3	388,2	453,6	426,4	315,8	963,8	0,18	78,15	75,93	79,08	0,18	81,32	81,78	78,88	0,06	0,06	-3,187427
143,0	420,0	2,9	0,0	9,8	415,8	298,4	76,1	82,0	489,6	389,8	454,6	426,1	316,1	963,8	0,18	78,10	75,93	79,79	0,18	81,27	81,78	78,68	0,06	0,06	-2,421393
144,0	421,0	2,8	0,0	9,7	414,3	296,4	76,1	83,0	487,6	391,1	455,6	426,8	316,5	963,8	0,18	78,13	75,95	79,85	0,18	81,31	81,81	78,85	0,06	0,06	-1,840803
145,0	422,0	2,8	0,0	9,6	414,8	294,6	76,2	83,3	486,4	392,7	457,1	427,3	316,8	966,8	0,18	78,10	75,93	79,88	0,18	81,28	81,80	78,83	0,06	0,06	-2,4834
146,0	423,0	2,8	0,0	9,6	417,0	293,0	76,3	84,3	485,0	394,8	457,7	432,8	316,8	962,2	0,18	78,09	75,94	79,90	0,18	81,26	81,79	78,89	0,06	0,06	-1,263748
147,0	424,0	2,7	0,0	9,4	417,7	291,3	76,1	85,4	482,1	396,1	459,1	434,3	317,1	786,4	0,18	78,03	75,94	78,97	0,18	81,27	81,80	78,83	0,06	0,06	-1,836504
148,0	425,0	2,7	0,0	9,3	418,1	289,4	76,1	84,7	480,3	397,3	460,2	435,2	317,4	790,3	0,18	78,04	75,92	78,99	0,18	81,26	81,80	78,89	0,06	0,06	-1,202876
149,0	426,0	2,7	0,0	9,2	418,3	287,1	75,9	83,8	478,8	398,1	461,7	434,8	317,8	788,3	0,18	78,08	75,92	79,00	0,18	81,17	81,78	78,83	0,06	0,05	-0,68831
150,0	427,0	2,7	0,0	9,1	418,8	285,7	76,0	83,6	476,1	400,4	463,0	436,3	317,8	782,3	0,18	78,04	75,91	78,93	0,18	81,08	81,71	78,88	0,06	0,05	-0,761842
151,0	428,0	2,6	0,1	9,0	418,8	283,7	76,1	84,1	474,3	401,7	463,7	437,3	317,8	780,7	0,18	78,03	75,91	78,92	0,18	81,02	81,67	78,89	0,06	0,05	-0,834867
152,0	429,0	2,6	0,1	9,0	419,0	281,7	76,1	84,7	471,8	402,8	463,3	438,8	318,3	779,8	0,18	78,08	75,88	78,88	0,18	81,01	81,68	78,88	0,06	0,05	-0,327366
153,0	430,0	2,6	0,1	9,0	419,0	279,8	75,9	84,7	469,8	404,0	464,0	438,8	318,7	772,8	0,18	78,85	75,88	78,88	0,18	81,03	81,66	78,49	0,06	0,05	-0,288888
154,0	431,0	2,6	0,1	8,9	419,1	278,0	75,9	84,4	468,8	405,2	464,1	440,2	319,2	771,0	0,18	78,86	75,90	78,84	0,18	81,03	81,66	78,42	0,06	0,05	-0,234858
155,0	432,0	2,6	0,1	8,9	419,3	276,3	75,8	83,8	464,2	406,4	464,8	441,3	319,5	769,6	0,18	78,85	75,89	78,77	0,18	81,02	81,66	78,35	0,06	0,05	0,0265074
156,0	433,0	2,6	0,1	8,9	419,8	274,4	75,7	83,8	463,7	407,2	465,4	441,4	320,4	766,8	0,18	78,77	75,88	78,79	0,18	80,98	81,64	78,33	0,06	0,05	0,3218832
157,0	434,0	2,6	0,1	8,9	419,4	274,0	75,8	83,7	461,3	407,8	466,1	441,3	320,7	765,0	0,18	78,78	75,88	78,70	0,18	80,94	81,65	78,31	0,06	0,05	0,1006853
158,0	435,0	2,6	0,1	8,9	419,3	273,8	75,7	83,7	458,8	408,1	466,7	440,8	320,6	762,8	0,18	78,68	75,84	78,82	0,18	80,83	81,67	78,11	0,06	0,05	-0,040359
159,0	436,0	2,6	0,1	8,8	419,1	272,7	75,8	82,8	456,8	408,7	466,8	441,1	321,2	760,8	0,18	78,70	75,81	78,78	0,18	80,81	81,67	78,22	0,06	0,05	-0,184068
160,0	437,0	2,4	0,1	8,8	419,3	271,8	75,8	82,4	454,6	410,3	467,3	442,3	321,8	758,8	0,18	78,68	75,79	78,40	0,18	80,72	81,62	78,20	0,06	0,05	-0,00281
161,0	438,0	2,4	0,1	8,8	419,3	270,7	75,8	84,3	451,3	411,0	467,3	443,4	322,3	757,8	0,18	78,67	75,80	78,47	0,18	80,78	81,63	78,19	0,06	0,05	-0,2448888
162,0	439,0	2,3	0,1	8,8	419,0	269,7	75,8	84,8	449,8	411,2	467,1	443,4	322,8	756,8	0,18	78,64	75,83	78,55	0,18	80,76	81,63	78,17	0,06	0,05	-0,326808
163,0	440,0	2,3	0,1	8,8	419,0	268,8	75,8	84,3	447,8	412,0	467,3	444,8	323,8	755,4	0,18	78,63	75,81	78,59	0,18	80,80	81,67	78,20	0,06	0,05	-0,2758898
164,0	441,0	2,3	0,1	8,8	418,8	268,0	76,0	83,8	444,6	412,3	467,8	445,8	324,3	754,3	0,18	78,68	75,85	78,55	0,18	80,81	81,63	78,21	0,06	0,05	-0,4044888
165,0	442,0	2,3	0,1	8,8	418,8	267,0	76,0	84,0	443,8	413,4	467,6	445,8	324,8	752,8	0,18	78,74	75,85	78,58	0,18	80,87	81,68	78,28	0,06	0,05	-0,4354868
166,0	443,0	2,3	0,1	8,8	418,8	266,8	76,0	84,1	441,8	413,8	467,7	446,4	325,8	750,7	0,18	78,81	75,89	78,58	0,18	81,16	81,70	78,28	0,06	0,05	-0,4923868
167,0	444,0	2,3	0,1	8,8	418,8	265,7	76,1	83,8	439,8	413,2	468,0	446,1	326,0	749,1	0,18	78,80	75,81	78,81	0,18	81,21	81,70	78,17	0,06	0,05	-0,7321101
168,0	445,0	2,3	0,1	8,8	418,3	264,9	76,3	83,4	438,3	413,8	467,1	446,7	326,8	747,8	0,18	78,13	75,84	78,48	0,18	81,28	81,78	78,17	0,06	0,05	-1,1238837
169,0	446,0	2,2	0,1	8,8	418,3	264,0	76,4	84,2	438,8	413,7	467,3	447,3	327,6	747,2	0,18	78,18	75,86	78,58	0,18	81,33	81,87	78,26	0,06	0,05	-0,8908036
170,0	447,0	2,2	0,1	8,8	417,8	263,2	76,3	83,8	433,7	413,8	467,6	448,8	328,1	747,0	0,18	78,17	76,00	78,58	0,18	81,38	81,91	78,28	0,06	0,05	-1,3985946
171,0	448,0	2,2	0,1	8,7	417,4	262,3	76,1	83,8	431,7	413,8	467,8	448,8	328,3	747,8	0,18	78,14	76,01	78,48	0,18	81,36	81,91	78,28	0,06	0,05	-1,8073211
172,0	449,0	2,2	0,1	8,7	417,4	262,0	76,3	83,6	429,8	414,0	467,8	448,7	328,8	748,8	0,18	78,14	76,04	78,53	0,18	81,31	81,88	78,26	0,06	0,05	-1,8338861
173,0	450,0	2,1	0,1	8,8	417,0	261,6	76,1	83,8	427,8	413,8	467,6	448,3	329,3	748,1	0,18	78,18	76,04	78,58	0,18	81,31	81,91	78,26	0,06	0,05	-2,3183881
174,0	451,0	2,1	0,1	8,8	416,8	260,8	76,3	83,4	426,1	413,8	467,8	448,8	329,7	748,8	0,18	78,16	76,05	78,63	0,18	81,30	81,92	78,14	0,07	0,05	-2,7135810
175,0	452,0	2,1	0,1	8,7	416,4	260,8	76,1	83,6	423,7	414,2	467,3	448,8	330,1	749,2	0,18	78,18	76,05	78,62	0,18	81,30	81,89	78,11	0,06	0,05	-2,9814410
176,0	453,0	2,1	0,1	8,7	416,0	260,4	76,1	83,2	422,3	413,8	467,2	448,1	330,8	750,7	0,18	78,17	76,07	78,67	0,18	81,32	81,91	78,18	0,06	0,05	-3,245823
177,0	454,0	2,1	0,1	8,7	415,8	260,3	76,3	83,6	420,8	414,1	467,1	448,1	331,1	751,2	0,18	78,14	76,04	78,67	0,18	81,28	81,91	78,18	0,06	0,05	-3,4998672
178,0	455,0	2,0	0,1	8,7	415,8	260,3	76,4	83,6	417,8	413,8	466,8	447,2	331,7	752,8	0,18	78,18	76,07	78,80	0,18	81,33	81,87	78,22	0,06	0,05	-3,74206
179,0	456,0	2,0	0,1	8,8	415,8	259,0	76,1	83,4	417,3	414,1	466,7	446,8	332,4	753,8	0,18	78,18	76,08	78,67	0,18	81,33	81,86	78,18	0,06	0,05	-3,8285648
180,0	457,0	2,0	0,1	8,7	415,8	259,8	76,1	83,3	414,8	413,8	466,4	447,2	333,0	755,3	0,18	78,16	76,09	78,68	0,18	81,38	82,00	78,13	0,06	0,05	-4,26297
181,0	458,0	2,0	0,1	8,7	415,8	258,6	76,0	83,3	413,7	413,8	466,3	447,0	333,8	756,1	0,18	78,08	76,08	78,68	0,18	81,29	81,87	78,16	0,06	0,05	-4,4082082
182,0	459,0	2,0	0,1	8,3	415,8	258,8	75,9	82,8	412,8	413,8	466,3	447,0	334,3	756,8	0,18	78,08	76,08	78,68	0,18	81,29	81,89	78,16	0,06	0,05	-4,7314888
183,0	460,0	2,0	0,1	8,3	415,8	258,8	75,9	82,9	410,3	413,8	466,0	446,8	334,8	749,8	0,18	78,08	76,09	78,60	0,18	81,28	81,88	78,14	0,06	0,05	-5,2318828
184,0	461,0	2,0	0,1	8,2	413,8	259,1	76,1	82,0	408,8	413,2	465,8	446,4	334,8	752,8	0,18	78,10	76,09	78,58	0,18	81,31	81,87	78,08	0,06	0,05	-5,8326708
185,0	462,0	1,9	0,1	8,1	413,4	258,7	76,0	81,2	407,1	413,1	465,3	446,1	335,3	751,8	0,18	78,10	76,11	78,31	0,18	81,30	81,87	77,98	0,06	0,05	-6,0601016
186,0	463,0	1,9	0,1	8,1	412,8	258,4	75,9	81,1	405,6	412,3	465,2	445,4	335,8	752,8	0,18	78,11	76,08	78,22	0,18	81,27	81,84	77,93	0,06	0,05	-6,4479867
187,0	464,0	1,9	0,1	8,0	412,3	258,5	76,1	81,6	403,3	412,8	465,0	445,8	336,1	752,8	0,18	78,10	76,09	78,22	0,18	81,26	81,85	77,89	0,06	0,05	-6,8811838
188,0	465,0	1,9	0,1	8,0	412,1	258,4	76,1	82,2	402,4	411,8	465,8	445,8	336,8	752,8	0,18	78,09	76,10	78,21	0,18	81,28	81,91	78,02	0,06	0,05	-7,1680648
189,0	466,0	1,8	0,1	8,0	411,8	257,7	76,1	82,8	401,3	411,3	465,8	445,7	337,1	752,8	0,18	78,04	76,09	78,28	0,18	81,28	82,00	78,05	0,06	0,05	-7,4404867
190,0	467,0	1,8	0,1	8,0	410,8	258,4	75,9	82,2	398,4	410,7	461,0	445,7	337,8	754,1	0,18	78,20	76,11	78,22	0,18	81,28	82,04	78,20	0,06	0,05	-8,3843383
191,0	468,0	1,8	0,2	8,0	410,6	258,4	76,0	81,3	397,3	410,8	461,7	445,3	338,1	755,3	0,18	78,28	76,14	78,13	0,18	81,32	82,13	77,94	0,06	0,05	-8,6618917
192,0	469,0	1,8	0,2	8,0	410,1	257,9	76,1	82,0	396,3	409,2	461,7	444,8	338,3	756,4	0,18	78,26	76,16	78,18	0,18	81,34	82,19	77,94	0,06	0,05	-9,1441138
193,0	470,0	1,8	0,2	8,0	409,8	257,8	76,1	82,0	395,3	408,2	461,7	444,8	338,8	755,8	0,18	78,18	76,16	78,18	0,18	81,40	82,22	78,00	0,06	0,05	-9,6411113
194,0	471,0	1,8	0,2	8,0	409,1	257,8	76,3	82,6	392,8	408,3	460,6	444,8	339,0	754,4	0,18	78,13	76,16	78,17	0,18	81,40	82,23	77,99	0,06	0,05	-10,19892
195,0	472,0	1,7	0,2	7,9	408,7	257,3	76,1	82,6	391,6	407,1	461,4	444,0	339,2	755,3	0,18	78,16	76,18	78,18	0,18	81,42	82,24	77,97	0,06	0,05	-10,8403
196,0	473,0	1,7	0,2	7,7	408,1	257,6	76,0	82,8	390,8	406,7	460,7	443,8	339,4	753,8	0,18	78,18	76,17	78,06	0,18	81,33	82,24	77,97	0,06	0,05	-11,18609
197,0	474,0	1,7	0,2	7,6	407,8	257,7	76,3	81,8	389,1	406,3	459,8	443,1	339,6	749,8	0,18	78,21	76,19	78,04	0,18	81,31	82,21	77,93	0,06	0,05	-11,74238
198,0	475,0	1,7	0,2	7,6	406,8	258,1	76,3	82,2	387,2	405,8	459,3	443,4	339,8	773,8	0,18	78,23	76,18	78,09	0,18	81,33	82,22	77,89	0,06	0,05	-12,33691
199,0	476,0	1,7	0,2	7,5	406,8	258,1	76,3	83,1	387,1	404,3	458,8	442,8	340,0	772,3	0,18	78,23	76,18	78,18	0,18	81,38	82,22	77,87	0,06	0,05	-12,70037
200,0	477,0	1,6	0,2	7,5	406,0	258,8	76,4	82,8	385,7	403,3	458,1	442,7	340,0	770,3	0,18	78,41	76,23	78,12	0,18	81,43	82,26	77,84	0,06	0,05	-13,31499
201,0	478,0	1,6	0,2	7,4	405,3	258,8	76,3	82,0	384,0	402,3	457,2	442,4

Manufacturer: HEARTHSTONE
Model: 8031

Run: 5
Project #: PI 20270
Test Duration: 313 min

	HHV	LHV
Eff	78,62%	84,98%
Comb Eff	98,68%	98,68%
HT Eff	79,67%	86,11%
Output	14 969	Btu/h
Burn Rate	0,96	kg/h
Grams CO	119	g
Input	19 065	Btu/h
RC Wt	17,80	

Note: In the "Input data", "Calc. % O_2", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [e], [b], [c], [h], [d], [e], [j], and [k] refer to their respective variables in Clauses

Ultimate CO_2
$CO_{2\,ult}$ 19,64
r_s
1,061

Overall Heating Efficiency: 78,62%
Combustion Efficiency: 98,68%
Heat Transfer Efficiency: 79,67%

Heat Output: 14 219 Btu/h
Heat Input: 18 085 Btu/h

Burn Duration: 5,22 h

Burn Rate: 2,12 lb/h

Stack Temp: 276,6 Deg. F

			8,37	1,87	20,38	11,92	135,91	24,41	0,99	0,80	#DIV/0!
INPUT DATA				Oxygen Calculation			Input Data		Combust	Heat	Net
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO_2 [d]	Excess Air EA	Meas O_2	Calc. % O_2 [g]	Flue Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %
0,00	6,10	0,25	2,26	882,5%	20,77	18,44	135,5	22,9	98,5%	58,4%	52,9%
1,00	6,02	0,59	1,30	929,8%	20,82	19,22	135,0	23,7	77,0%	41,4%	31,9%
2,00	6,02	0,61	2,26	584,0%	20,75	18,18	136,7	23,7	84,1%	59,5%	50,0%
3,00	5,99	0,51	2,93	471,2%	20,71	17,53	142,0	23,7	89,0%	64,6%	57,5%
4,00	5,98	0,44	2,89	489,2%	20,72	17,61	143,7	23,6	90,4%	63,9%	57,8%
5,00	5,93	0,21	3,12	489,8%	20,72	17,49	135,4	23,8	96,3%	67,3%	64,8%
6,00	5,93	0,08	2,89	562,8%	20,74	17,82	127,4	23,8	99,6%	67,4%	67,1%
7,00	5,93	0,06	2,62	633,0%	20,76	18,11	122,5	23,8	100,1%	66,4%	66,5%
8,00	5,91	0,06	2,32	727,2%	20,78	18,44	119,1	23,8	100,3%	64,5%	64,7%
9,00	5,89	0,05	2,29	738,6%	20,79	18,47	116,7	23,8	100,4%	64,8%	65,1%
10,00	5,89	0,05	2,40	703,3%	20,78	18,36	115,0	23,8	100,5%	66,3%	66,6%
11,00	5,84	0,05	2,48	677,9%	20,77	18,27	114,0	23,8	100,5%	67,3%	67,6%
12,00	5,84	0,05	2,59	642,4%	20,77	18,15	113,4	23,9	100,3%	68,4%	68,6%
13,00	5,84	0,05	2,74	602,5%	20,76	17,99	113,2	23,9	100,3%	69,5%	69,7%
14,00	5,84	0,06	3,02	538,3%	20,74	17,69	113,1	23,8	100,2%	71,3%	71,4%
15,00	5,80	0,06	2,96	551,3%	20,74	17,75	112,8	23,9	100,2%	71,0%	71,1%
16,00	5,80	0,06	2,83	578,7%	20,75	17,88	112,5	23,8	100,0%	70,3%	70,3%
17,00	5,80	0,07	2,89	562,1%	20,74	17,81	112,4	23,8	99,7%	70,7%	70,4%
18,00	5,75	0,08	2,96	545,8%	20,74	17,74	112,3	23,8	99,5%	71,1%	70,7%
19,00	5,75	0,08	2,98	542,5%	20,74	17,72	111,8	23,8	99,5%	71,3%	70,9%
20,00	5,71	0,09	3,05	525,7%	20,73	17,64	111,6	23,8	99,2%	71,7%	71,2%
21,00	5,71	0,10	3,31	476,3%	20,71	17,35	111,4	23,8	99,1%	73,1%	72,4%
22,00	5,71	0,10	3,46	452,1%	20,71	17,20	111,8	23,7	99,1%	73,7%	73,0%
23,00	5,66	0,12	3,93	386,5%	20,67	16,69	112,6	23,7	98,7%	75,3%	74,3%
24,00	5,62	0,16	4,58	314,3%	20,63	15,97	114,5	23,7	98,1%	76,9%	75,4%
25,00	5,62	0,14	6,01	219,3%	20,53	14,45	116,8	23,7	98,8%	79,5%	78,5%
26,00	5,57	0,10	6,00	222,2%	20,54	14,49	119,7	23,7	99,3%	79,1%	78,6%
27,00	5,57	0,08	5,15	275,7%	20,59	15,41	121,4	23,8	99,6%	77,4%	77,1%
28,00	5,52	0,07	4,12	367,9%	20,66	16,50	121,7	23,9	99,7%	74,6%	74,3%
29,00	5,53	0,07	3,81	405,9%	20,68	16,83	120,8	23,9	99,8%	73,6%	73,4%
30,00	5,48	0,08	4,85	298,1%	20,61	15,72	121,1	23,8	99,5%	76,7%	76,4%
31,00	5,44	0,12	7,02	175,3%	20,47	13,39	122,5	23,8	99,1%	80,2%	79,5%
32,00	5,40	0,15	7,45	158,5%	20,44	12,91	126,0	23,8	98,9%	80,4%	79,5%
33,00	5,34	0,18	7,50	155,6%	20,43	12,84	130,2	23,9	98,5%	80,1%	78,9%
34,00	5,34	0,17	7,52	155,3%	20,43	12,82	133,2	23,8	98,6%	79,8%	78,7%
35,00	5,30	0,16	7,25	165,0%	20,45	13,12	136,0	23,7	98,7%	79,2%	78,2%
36,00	5,25	0,16	7,98	141,4%	20,40	12,35	137,6	23,6	98,8%	79,9%	78,9%
37,00	5,21	0,16	9,25	108,6%	20,32	10,98	139,5	23,7	98,9%	81,0%	80,0%
38,00	5,16	0,16	9,57	101,8%	20,30	10,64	142,0	23,8	98,9%	81,0%	80,1%
39,00	5,12	0,16	9,69	99,4%	20,29	10,52	144,3	23,9	98,9%	81,0%	80,1%
40,00	5,07	0,16	9,83	96,6%	20,27	10,36	145,9	23,9	99,0%	81,0%	80,2%
41,00	5,03	0,17	9,87	95,8%	20,28	10,33	147,6	23,8	98,9%	80,8%	80,0%
42,00	4,98	0,16	9,67	99,8%	20,29	10,54	149,0	23,8	98,9%	80,6%	79,7%
43,00	4,93	0,15	9,65	100,3%	20,29	10,56	150,5	23,9	99,0%	80,5%	79,7%
44,00	4,93	0,15	9,61	101,4%	20,30	10,62	151,5	24,0	99,0%	80,4%	79,6%
45,00	4,89	0,14	9,39	106,1%	20,31	10,85	152,2	23,9	99,1%	80,1%	79,4%
46,00	4,80	0,14	9,42	105,5%	20,31	10,82	152,9	24,0	99,1%	80,1%	79,4%
47,00	4,80	0,13	9,61	101,8%	20,30	10,63	153,9	24,0	99,2%	80,2%	79,6%
48,00	4,75	0,13	9,82	97,4%	20,28	10,40	155,5	23,9	99,2%	80,3%	79,6%
49,00	4,66	0,13	9,65	100,8%	20,29	10,57	156,8	23,9	99,2%	80,0%	79,4%
50,00	4,64	0,12	9,26	109,5%	20,32	11,00	157,0	24,0	99,3%	79,7%	79,1%
51,00	4,62	0,11	9,03	114,7%	20,34	11,25	156,5	23,9	99,3%	79,5%	79,0%
52,00	4,57	0,11	9,03	114,7%	20,34	11,25	156,5	23,9	99,3%	79,5%	79,0%
53,00	4,53	0,11	9,12	112,9%	20,33	11,16	156,0	24,0	99,3%	79,6%	79,1%
54,00	4,48	0,11	9,49	104,7%	20,31	10,76	155,9	24,0	99,4%	80,0%	79,5%
55,00	4,44	0,10	9,79	98,7%	20,29	10,45	156,0	24,0	99,5%	80,2%	79,8%
56,00	4,39	0,10	10,13	92,0%	20,26	10,08	156,1	24,0	99,5%	80,5%	80,1%
57,00	4,36	0,09	10,38	87,5%	20,25	9,82	156,3	24,0	99,5%	80,7%	80,3%
58,00	4,35	0,09	10,46	86,2%	20,24	9,74	156,3	24,0	99,6%	80,7%	80,4%
59,00	4,30	0,09	10,69	82,2%	20,23	9,49	156,4	23,9	99,6%	80,9%	80,5%
60,00	4,25	0,09	10,87	79,2%	20,22	9,30	156,3	23,9	99,6%	81,0%	80,7%
61,00	4,21	0,09	10,69	82,2%	20,23	9,49	156,3	23,8	99,5%	80,9%	80,5%
62,00	4,16	0,09	10,55	84,7%	20,24	9,65	156,5	23,8	99,5%	80,8%	80,4%
63,00	4,12	0,08	10,37	88,0%	20,25	9,84	156,7	23,8	99,6%	80,6%	80,3%
64,00	4,12	0,08	10,37	88,0%	20,25	9,84	157,0	23,9	99,6%	80,6%	80,3%
65,00	4,03	0,08	10,51	85,4%	20,24	9,69	157,0	24,0	99,6%	80,7%	80,4%
66,00	4,03	0,09	10,66	82,7%	20,23	9,52	157,4	23,9	99,6%	80,8%	80,4%
67,00	3,98	0,09	10,73	81,6%	20,23	9,45	157,2	23,8	99,6%	80,8%	80,5%
68,00	3,94	0,09	10,89	78,9%	20,22	9,28	157,1	23,8	99,6%	81,0%	80,6%
69,00	3,89	0,09	11,07	75,9%	20,20	9,08	157,5	23,7	99,5%	81,0%	80,7%
70,00	3,84	0,09	11,42	70,6%	20,18	8,72	158,1	23,6	99,5%	81,2%	80,8%
71,00	3,80	0,10	11,68	66,7%	20,16	8,43	158,8	23,8	99,5%	81,3%	80,9%
72,00	3,76	0,09	11,69	66,7%	20,16	8,42	159,4	23,9	99,5%	81,3%	80,9%
73,00	3,72	0,10	11,72	66,3%	20,16	8,39	159,9	23,9	99,5%	81,3%	80,9%
74,00	3,66	0,09	11,82	65,0%	20,15	8,29	160,3	24,0	99,5%	81,3%	81,0%
75,00	3,62	0,09	11,83	64,8%	20,15	8,28	160,6	23,9	99,6%	81,3%	81,0%
76,00	3,57	0,09	11,72	66,4%	20,16	8,40	161,2	24,0	99,6%	81,2%	80,9%
77,00	3,57	0,09	11,73	66,2%	20,16	8,38	161,5	24,0	99,6%	81,2%	80,9%
78,00	3,53	0,09	11,58	68,3%	20,17	8,54	161,4	23,9	99,6%	81,1%	80,8%
79,00	3,48	0,08	11,50	69,6%	20,18	8,63	161,3	23,9	99,6%	81,1%	80,8%
80,00	3,44	0,08	11,42	70,8%	20,18	8,72	161,2	24,0	99,6%	81,0%	80,7%
81,00	3,39	0,08	11,32	72,3%	20,19	8,83	161,1	24,1	99,6%	81,0%	80,7%
82,00	3,35	0,08	11,21	74,0%	20,19	8,95	160,7	24,2	99,6%	81,0%	80,7%
83,00	3,35	0,09	11,12	75,3%	20,20	9,03	160,6	24,2	99,6%	80,9%	80,6%
84,00	3,30	0,09	11,17	74,5%	20,20	8,98	160,4	24,3	99,6%	81,0%	80,6%
85,00	3,26	0,09	11,34	71,9%	20,19	8,80	160,3	24,2	99,6%	81,1%	80,7%
86,00	3,21	0,09	11,55	68,7%	20,17	8,57	160,4	24,3	99,5%	81,2%	80,8%
87,00	3,16	0,10	11,76	65,6%	20,16	8,34	160,5	24,3	99,5%	81,3%	80,9%
88,00	3,12	0,10	11,88	63,9%	20,15	8,22	160,9	24,3	99,5%	81,4%	81,0%
89,00	3,12	0,10	11,98	62,6%	20,14	8,11	161,6	24,4	99,5%	81,4%	81,0%
90,00	3,07	0,10	12,10	61,0%	20,13	7,99	161,7	24,2	99,5%	81,4%	81,0%
91,00	3,03	0,11	12,21	59,5%	20,13	7,87	162,1	24,1	99,5%	81,5%	81,0%
92,00	2,98	0,10	12,19	59,7%	20,13	7,88	162,6	24,2	99,5%	81,4%	81,0%

93,00	2,94	0,10	12,29	58,4%	20,12	7,78	163,5	24,3	99,5%	81,4%	81,0%
94,00	2,89	0,11	12,41	56,9%	20,11	7,65	164,1	24,2	99,4%	81,5%	81,0%
95,00	2,85	0,13	12,61	54,3%	20,10	7,43	164,9	24,1	99,3%	81,5%	81,0%
96,00	2,80	0,15	12,75	52,3%	20,09	7,26	165,9	24,1	99,2%	81,5%	80,9%
97,00	2,79	0,17	12,82	51,3%	20,08	7,18	166,7	24,2	99,1%	81,5%	80,8%
98,00	2,74	0,18	12,97	49,4%	20,07	7,01	167,2	24,2	99,0%	81,5%	80,7%
99,00	2,71	0,18	13,13	47,5%	20,06	6,84	167,9	24,2	99,0%	81,6%	80,8%
100,00	2,63	0,24	13,25	45,6%	20,05	6,68	168,4	24,1	98,7%	81,6%	80,5%
101,00	2,60	0,26	13,31	44,7%	20,04	6,60	168,6	24,1	98,5%	81,6%	80,4%
102,00	2,57	0,26	13,43	43,5%	20,04	6,47	169,6	24,0	98,5%	81,6%	80,4%
103,00	2,53	0,32	13,43	42,9%	20,03	6,45	170,4	24,0	98,2%	81,5%	80,1%
104,00	2,48	0,35	13,53	41,6%	20,02	6,32	170,8	24,1	98,0%	81,6%	79,9%
105,00	2,44	0,35	13,58	41,0%	20,02	6,27	171,3	24,2	98,0%	81,6%	79,9%
106,00	2,39	0,31	13,56	41,6%	20,02	6,31	171,7	24,2	98,2%	81,5%	80,1%
107,00	2,35	0,31	13,63	41,0%	20,02	6,24	172,4	24,2	98,2%	81,5%	80,1%
108,00	2,30	0,33	13,56	41,4%	20,02	6,30	172,4	24,3	98,1%	81,5%	79,9%
109,00	2,26	0,34	13,51	41,9%	20,03	6,35	172,2	24,1	98,1%	81,5%	79,9%
110,00	2,21	0,33	13,39	43,2%	20,03	6,48	171,9	24,1	98,1%	81,4%	79,9%
111,00	2,17	0,26	13,38	44,0%	20,04	6,53	171,9	24,2	98,5%	81,5%	80,3%
112,00	2,12	0,20	13,28	45,7%	20,05	6,67	171,3	24,2	98,9%	81,5%	80,5%
113,00	2,12	0,20	13,15	47,2%	20,06	6,81	171,0	24,1	98,9%	81,4%	80,5%
114,00	2,08	0,20	13,09	47,8%	20,06	6,88	170,7	24,3	98,8%	81,4%	80,5%
115,00	2,03	0,18	13,00	49,0%	20,07	6,98	170,6	24,3	99,0%	81,4%	80,6%
116,00	1,98	0,19	13,02	48,7%	20,07	6,95	170,1	24,3	98,9%	81,4%	80,5%
117,00	1,94	0,16	12,83	51,2%	20,08	7,17	169,7	24,2	99,1%	81,3%	80,6%
118,00	1,94	0,16	12,70	52,8%	20,09	7,31	168,7	24,4	99,1%	81,3%	80,6%
119,00	1,89	0,15	12,64	53,6%	20,10	7,38	168,1	24,4	99,2%	81,3%	80,7%
120,00	1,85	0,14	12,44	56,1%	20,11	7,59	167,3	24,4	99,2%	81,3%	80,6%
121,00	1,85	0,14	12,31	57,8%	20,12	7,74	166,4	24,5	99,2%	81,3%	80,6%
122,00	1,80	0,14	12,20	59,2%	20,13	7,86	165,5	24,4	99,2%	81,2%	80,6%
123,00	1,78	0,14	12,10	60,6%	20,13	7,97	164,6	24,3	99,2%	81,2%	80,6%
124,00	1,76	0,13	11,80	64,7%	20,15	8,29	163,8	24,4	99,3%	81,1%	80,6%
125,00	1,71	0,12	11,68	66,5%	20,16	8,42	163,6	24,3	99,4%	81,1%	80,6%
126,00	1,69	0,12	11,65	66,9%	20,16	8,45	161,5	24,4	99,4%	81,2%	80,7%
127,00	1,67	0,11	11,66	66,8%	20,16	8,44	160,5	24,3	99,4%	81,3%	80,8%
128,00	1,62	0,11	11,65	67,0%	20,16	8,46	160,3	24,3	99,4%	81,3%	80,8%
129,00	1,58	0,11	11,62	67,5%	20,17	8,49	159,3	24,4	99,4%	81,3%	80,8%
130,00	1,58	0,11	11,57	68,3%	20,17	8,55	158,2	24,4	99,4%	81,3%	80,9%
131,00	1,53	0,10	11,48	69,7%	20,18	8,65	157,5	24,3	99,5%	81,3%	80,9%
132,00	1,53	0,08	11,25	73,2%	20,19	8,90	156,7	24,3	99,6%	81,3%	80,9%
133,00	1,49	0,08	11,12	75,4%	20,20	9,04	156,1	24,4	99,7%	81,2%	80,9%
134,00	1,47	0,07	10,94	78,3%	20,21	9,23	155,8	24,5	99,7%	81,1%	80,9%
135,00	1,44	0,07	10,81	80,5%	20,22	9,37	154,8	24,4	99,7%	81,1%	80,8%
136,00	1,44	0,07	10,61	83,8%	20,23	9,59	153,9	24,4	99,7%	81,0%	80,8%
137,00	1,39	0,08	10,50	85,7%	20,24	9,70	153,2	24,5	99,7%	81,0%	80,7%
138,00	1,39	0,08	10,43	86,9%	20,25	9,78	152,4	24,6	99,6%	81,0%	80,7%
139,00	1,39	0,07	10,25	90,2%	20,26	9,97	151,5	24,5	99,7%	80,9%	80,7%
140,00	1,35	0,07	10,11	93,0%	20,27	10,13	151,0	24,5	99,7%	80,9%	80,6%
141,00	1,35	0,06	9,90	97,2%	20,28	10,35	150,0	24,4	99,8%	80,8%	80,6%
142,00	1,30	0,05	9,82	98,9%	20,29	10,44	149,0	24,3	99,9%	80,8%	80,7%
143,00	1,30	0,05	9,78	99,9%	20,29	10,49	148,0	24,5	99,9%	80,9%	80,8%
144,00	1,26	0,05	9,74	100,7%	20,29	10,53	146,9	24,5	99,9%	80,9%	80,8%
145,00	1,26	0,05	9,64	102,8%	20,30	10,64	145,9	24,6	99,9%	80,9%	80,8%
146,00	1,26	0,05	9,56	104,5%	20,31	10,72	145,0	24,6	99,9%	80,9%	80,8%
147,00	1,21	0,05	9,44	107,0%	20,31	10,85	144,1	24,5	99,9%	80,9%	80,8%
148,00	1,21	0,05	9,33	109,5%	20,32	10,97	143,0	24,5	99,9%	80,9%	80,8%
149,00	1,21	0,05	9,21	112,2%	20,33	11,10	141,7	24,4	99,9%	80,9%	80,8%
150,00	1,21	0,05	9,10	114,8%	20,34	11,22	140,9	24,4	99,9%	80,8%	80,7%
151,00	1,17	0,05	9,06	115,6%	20,34	11,25	139,8	24,5	99,9%	80,9%	80,8%
152,00	1,17	0,05	9,05	115,9%	20,34	11,27	138,7	24,5	99,9%	81,0%	80,9%
153,00	1,17	0,05	9,00	117,1%	20,34	11,32	137,7	24,4	99,9%	81,0%	80,9%
154,00	1,17	0,05	8,95	118,2%	20,35	11,37	137,1	24,4	99,9%	81,0%	80,9%
155,00	1,12	0,06	8,91	119,0%	20,35	11,41	136,8	24,3	99,9%	81,0%	80,9%
156,00	1,12	0,06	8,90	119,4%	20,35	11,42	135,8	24,3	99,8%	81,0%	80,9%
157,00	1,12	0,06	8,89	119,4%	20,35	11,43	135,0	24,2	99,8%	81,1%	81,0%
158,00	1,11	0,06	8,86	120,1%	20,35	11,46	134,3	24,3	99,8%	81,1%	81,0%
159,00	1,08	0,06	8,81	121,4%	20,35	11,51	133,7	24,2	99,8%	81,1%	81,0%
160,00	1,08	0,06	8,83	120,9%	20,35	11,49	133,0	24,3	99,8%	81,2%	81,0%
161,00	1,08	0,06	8,83	120,8%	20,35	11,49	132,6	24,4	99,8%	81,2%	81,1%
162,00	1,08	0,07	8,81	121,2%	20,35	11,51	132,1	24,3	99,8%	81,3%	81,1%
163,00	1,03	0,07	8,82	121,2%	20,35	11,51	131,5	24,4	99,8%	81,3%	81,1%
164,00	1,03	0,07	8,80	121,6%	20,35	11,52	131,1	24,4	99,7%	81,3%	81,1%
165,00	1,03	0,07	8,85	120,3%	20,35	11,47	130,6	24,4	99,7%	81,4%	81,2%
166,00	1,03	0,07	8,85	120,3%	20,35	11,47	130,3	24,5	99,8%	81,4%	81,2%
167,00	1,03	0,07	8,81	121,2%	20,35	11,51	129,8	24,5	99,7%	81,5%	81,3%
168,00	1,03	0,07	8,80	121,6%	20,35	11,52	129,4	24,6	99,7%	81,5%	81,3%
169,00	0,99	0,07	8,78	122,0%	20,36	11,54	128,9	24,6	99,7%	81,5%	81,3%
170,00	0,99	0,07	8,80	121,6%	20,35	11,52	128,5	24,5	99,7%	81,6%	81,3%
171,00	0,99	0,07	8,75	122,8%	20,36	11,57	128,1	24,5	99,7%	81,5%	81,3%
172,00	0,99	0,07	8,75	122,7%	20,36	11,57	127,8	24,6	99,7%	81,6%	81,3%
173,00	0,94	0,07	8,78	121,8%	20,36	11,54	127,5	24,5	99,7%	81,6%	81,3%
174,00	0,94	0,08	8,75	122,5%	20,36	11,57	127,1	24,5	99,6%	81,6%	81,3%
175,00	0,94	0,08	8,73	122,9%	20,36	11,59	127,0	24,5	99,6%	81,6%	81,3%
176,00	0,94	0,08	8,75	122,4%	20,36	11,57	126,9	24,5	99,6%	81,6%	81,3%
177,00	0,94	0,09	8,72	123,1%	20,36	11,60	126,8	24,6	99,5%	81,6%	81,2%
178,00	0,90	0,09	8,74	122,5%	20,36	11,58	127,0	24,6	99,5%	81,6%	81,2%
179,00	0,90	0,10	8,75	121,9%	20,36	11,55	126,6	24,5	99,4%	81,6%	81,2%
180,00	0,90	0,10	8,72	122,6%	20,36	11,59	126,5	24,5	99,4%	81,6%	81,1%
181,00	0,90	0,10	8,71	122,9%	20,36	11,60	126,4	24,5	99,4%	81,6%	81,1%
182,00	0,90	0,11	8,67	123,7%	20,36	11,63	126,3	24,5	99,4%	81,6%	81,1%
183,00	0,90	0,11	8,32	132,8%	20,38	12,00	126,0	24,4	99,3%	81,3%	80,7%
184,00	0,89	0,13	8,20	136,1%	20,39	12,13	126,1	24,5	99,1%	81,2%	80,5%
185,00	0,85	0,13	8,13	137,7%	20,39	12,20	125,9	24,5	99,1%	81,2%	80,4%
186,00	0,85	0,13	8,10	138,6%	20,40	12,23	125,8	24,4	99,1%	81,1%	80,4%
187,00	0,85	0,14	8,05	140,0%	20,40	12,28	125,8	24,5	99,0%	81,1%	80,3%
188,00	0,85	0,14	8,05	140,0%	20,40	12,28	125,8	24,5	99,0%	81,1%	80,3%
189,00	0,80	0,14	8,05	139,8%	20,40	12,28	125,4	24,5	99,0%	81,1%	80,3%
190,00	0,80	0,15	8,03	140,2%	20,40	12,30	125,8	24,4	98,9%	81,1%	80,2%
191,00	0,80	0,15	8,00	141,0%	20,40	12,33	125,8	24,4	98,9%	81,0%	80,1%
192,00	0,80	0,15	7,96	142,1%	20,40	12,37	125,5	24,5	98,8%	81,0%	80,1%
193,00	0,80	0,16	7,98	141,3%	20,40	12,34	125,2	24,5	98,8%	81,1%	80,1%
194,00	0,80	0,16	8,03	139,8%	20,40	12,29	125,3	24,5	98,8%	81,1%	80,1%
195,00	0,76	0,17	7,90	143,5%	20,41	12,43	125,2	24,5	98,6%	81,0%	79,9%
196,00	0,76	0,18	7,73	148,3%	20,42	12,60	125,2	24,5	98,5%	80,8%	79,6%
197,00	0,76	0,19	7,62	151,5%	20,42	12,71	125,4	24,6	98,4%	80,7%	79,4%
198,00	0,76	0,22	7,56	152,6%	20,43	12,76	125,6	24,6	98,1%	80,6%	79,1%
199,00	0,76	0,22	7,51	154,1%	20,43	12,81	125,6	24,6	98,1%	80,5%	79,0%
200,00	0,71	0,21	7,48	155,4%	20,43	12,85	125,8	24,6	98,1%	80,5%	79,0%
201,00	0,74	0,21	7,43	157,0%	20,44	12,90	126,0	24,6	98,1%	80,4%	78,9%
202,00	0,71	0,21	7,45	156,4%	20,43	12,88	125,7	24,6	98,1%	80,4%	78,9%
203,00	0,71	0,22	7,45	156,4%	20,43	12,88	125,6	24,7	98,1%	80,5%	79,0%
204,00	0,71	0,22	7,43	156,9%	20,44	12,90	125,7	24,8	98,1%	80,5%	78,9%
205,00	0,71	0,21	7,40	158,2%	20,44	12,93	125,8	24,7	98,2%	80,4%	78,9%
206,00	0,71	0,19	7,34	160,9%	20,44	13,01	125,7	24,7	98,4%	80,4%	79,1%

207,00	0,71	0,19	7,39	159,2%	20,44	12,96	125,5	24,7	98,4%	80,4%	79,1%
208,00	0,67	0,20	7,43	157,4%	20,44	12,91	125,0	24,8	98,3%	80,5%	79,1%
209,00	0,67	0,21	7,50	155,8%	20,43	12,83	124,6	24,6	98,2%	80,6%	79,2%
210,00	0,67	0,21	7,54	153,5%	20,43	12,78	124,7	24,7	98,2%	80,7%	79,2%
211,00	0,67	0,21	7,49	155,0%	20,43	12,83	124,6	24,7	98,2%	80,6%	79,2%
212,00	0,62	0,22	7,53	153,6%	20,43	12,79	124,6	24,7	98,1%	80,6%	79,1%
213,00	0,62	0,22	7,45	156,1%	20,43	12,88	124,5	24,7	98,0%	80,6%	79,0%
214,00	0,62	0,23	7,46	155,6%	20,43	12,86	124,5	24,8	98,0%	80,6%	79,0%
215,00	0,62	0,23	7,51	153,8%	20,43	12,80	124,4	24,7	98,0%	80,6%	79,0%
216,00	0,62	0,23	7,46	155,5%	20,43	12,86	124,3	24,8	98,0%	80,6%	79,0%
217,00	0,62	0,22	7,40	157,9%	20,44	12,93	123,9	24,6	98,0%	80,6%	79,0%
218,00	0,62	0,22	7,36	159,1%	20,44	12,97	124,1	24,7	98,1%	80,5%	78,9%
219,00	0,58	0,22	7,36	159,1%	20,44	12,97	124,0	24,5	98,1%	80,5%	79,0%
220,00	0,58	0,22	7,35	159,5%	20,44	12,98	124,0	24,6	98,0%	80,5%	78,9%
221,00	0,58	0,24	7,46	155,2%	20,43	12,85	124,0	24,5	97,9%	80,6%	78,9%
222,00	0,58	0,24	7,54	152,5%	20,43	12,76	124,0	24,5	97,9%	80,7%	79,0%
223,00	0,58	0,24	7,58	151,3%	20,42	12,73	123,7	24,4	97,9%	80,7%	79,0%
224,00	0,58	0,24	7,59	150,7%	20,42	12,71	123,6	24,6	97,9%	80,8%	79,0%
225,00	0,53	0,24	7,58	151,2%	20,42	12,73	123,4	24,7	97,9%	80,8%	79,1%
226,00	0,53	0,24	7,67	148,2%	20,42	12,62	123,2	24,7	97,9%	80,9%	79,2%
227,00	0,53	0,24	7,64	149,1%	20,42	12,65	123,3	24,6	97,8%	80,9%	79,1%
228,00	0,53	0,24	7,66	148,6%	20,42	12,64	122,9	24,7	97,8%	80,9%	79,2%
229,00	0,53	0,25	7,48	154,2%	20,43	12,83	122,9	24,6	97,7%	80,7%	78,9%
230,00	0,53	0,25	7,35	158,6%	20,44	12,97	122,8	24,8	97,7%	80,6%	78,8%
231,00	0,53	0,21	7,30	161,7%	20,44	13,04	122,6	24,8	98,2%	80,6%	79,1%
232,00	0,49	0,21	7,30	161,6%	20,44	13,04	122,5	24,8	98,1%	80,6%	79,1%
233,00	0,49	0,20	7,33	160,7%	20,44	13,01	122,5	24,9	98,2%	80,7%	79,2%
234,00	0,49	0,19	7,37	159,9%	20,44	12,98	122,3	24,7	98,3%	80,7%	79,4%
235,00	0,49	0,19	7,32	161,4%	20,44	13,03	122,1	24,8	98,3%	80,7%	79,3%
236,00	0,49	0,22	7,25	163,8%	20,45	13,09	122,1	24,9	98,0%	80,6%	79,0%
237,00	0,49	0,20	7,24	164,1%	20,45	13,11	122,2	24,8	98,2%	80,6%	79,1%
238,00	0,46	0,20	7,24	164,0%	20,45	13,11	121,8	24,7	98,2%	80,6%	79,2%
239,00	0,44	0,20	7,21	165,3%	20,45	13,14	121,8	24,7	98,3%	80,6%	79,2%
240,00	0,44	0,25	7,30	160,2%	20,44	13,02	121,6	24,8	97,7%	80,7%	78,8%
241,00	0,44	0,26	7,30	160,1%	20,44	13,02	121,6	24,8	97,6%	80,7%	78,7%
242,00	0,44	0,26	7,22	162,8%	20,45	13,10	121,7	24,8	97,6%	80,6%	78,6%
243,00	0,44	0,26	7,18	163,9%	20,45	13,14	121,7	24,7	97,5%	80,5%	78,5%
244,00	0,44	0,26	7,16	164,4%	20,45	13,15	122,1	24,8	97,5%	80,5%	78,5%
245,00	0,44	0,27	7,12	165,9%	20,45	13,20	121,9	24,8	97,4%	80,4%	78,4%
246,00	0,40	0,27	7,12	165,8%	20,45	13,20	121,8	24,8	97,4%	80,4%	78,4%
247,00	0,40	0,27	7,07	167,5%	20,46	13,25	121,7	24,7	97,4%	80,4%	78,2%
248,00	0,40	0,28	7,04	168,6%	20,46	13,28	121,9	24,7	97,3%	80,3%	78,2%
249,00	0,40	0,27	6,99	170,7%	20,46	13,34	121,8	24,6	97,4%	80,3%	78,1%
250,00	0,40	0,26	6,94	172,7%	20,46	13,39	121,6	24,6	97,4%	80,2%	78,2%
251,00	0,40	0,26	6,89	174,8%	20,47	13,45	121,6	24,7	97,5%	80,2%	78,1%
252,00	0,35	0,26	6,89	174,8%	20,47	13,45	121,4	24,7	97,4%	80,2%	78,1%
253,00	0,35	0,26	6,89	174,6%	20,47	13,45	121,3	24,7	97,4%	80,2%	78,1%
254,00	0,35	0,26	6,84	176,4%	20,47	13,50	121,4	24,7	97,4%	80,1%	78,1%
255,00	0,35	0,27	6,86	175,8%	20,47	13,48	121,4	24,7	97,4%	80,1%	78,0%
256,00	0,35	0,27	6,86	175,7%	20,47	13,48	121,2	24,7	97,4%	80,2%	78,1%
257,00	0,35	0,27	6,86	175,5%	20,47	13,47	121,0	24,6	97,4%	80,2%	78,1%
258,00	0,31	0,27	6,86	175,5%	20,47	13,48	120,9	24,6	97,3%	80,2%	78,0%
259,00	0,35	0,27	6,86	175,4%	20,47	13,47	121,1	24,6	97,3%	80,2%	78,0%
260,00	0,30	0,28	6,87	174,9%	20,47	13,46	121,0	24,7	97,3%	80,2%	78,0%
261,00	0,30	0,27	6,86	175,4%	20,47	13,47	121,2	24,7	97,3%	80,2%	78,0%
262,00	0,30	0,27	6,86	175,6%	20,47	13,48	120,9	24,8	97,3%	80,2%	78,1%
263,00	0,30	0,26	6,82	177,1%	20,47	13,52	120,6	24,8	97,4%	80,2%	78,1%
264,00	0,30	0,26	6,86	176,1%	20,47	13,49	120,4	24,7	97,5%	80,3%	78,2%
265,00	0,26	0,26	6,86	176,0%	20,47	13,48	120,2	24,8	97,5%	80,3%	78,3%
266,00	0,30	0,26	6,83	177,1%	20,47	13,51	119,8	24,9	97,5%	80,3%	78,3%
267,00	0,28	0,26	6,73	181,4%	20,48	13,63	119,8	25,0	97,5%	80,2%	78,2%
268,00	0,26	0,25	6,72	181,8%	20,48	13,64	119,6	25,0	97,5%	80,2%	78,2%
269,00	0,26	0,25	6,64	184,8%	20,48	13,71	119,8	25,0	97,5%	80,1%	78,1%
270,00	0,26	0,25	6,64	185,1%	20,49	13,72	119,7	24,9	97,5%	80,1%	78,0%
271,00	0,26	0,26	6,62	185,7%	20,49	13,74	119,5	25,0	97,4%	80,1%	78,0%
272,00	0,26	0,26	6,64	184,8%	20,48	13,72	119,3	24,9	97,4%	80,1%	78,0%
273,00	0,22	0,26	6,65	184,5%	20,48	13,71	119,3	24,9	97,4%	80,1%	78,1%
274,00	0,22	0,26	6,62	185,5%	20,49	13,74	119,3	25,0	97,3%	80,1%	78,0%
275,00	0,22	0,26	6,57	187,5%	20,49	13,79	119,0	25,0	97,3%	80,1%	77,9%
276,00	0,22	0,27	6,53	188,8%	20,49	13,82	119,1	25,0	97,3%	80,0%	77,8%
277,00	0,22	0,27	6,47	191,4%	20,49	13,89	119,1	25,0	97,2%	79,9%	77,7%
278,00	0,22	0,28	6,44	192,4%	20,50	13,92	118,9	25,0	97,1%	79,9%	77,5%
279,00	0,21	0,28	6,45	191,7%	20,50	13,90	118,9	25,0	97,0%	79,9%	77,5%
280,00	0,22	0,28	6,40	193,8%	20,50	13,95	119,2	25,0	97,0%	79,8%	77,4%
281,00	0,22	0,28	6,37	195,1%	20,50	13,99	119,2	25,0	97,0%	79,8%	77,4%
282,00	0,17	0,23	6,44	194,4%	20,50	13,94	118,9	25,0	97,7%	79,9%	78,1%
283,00	0,17	0,22	6,35	199,2%	20,51	14,05	118,3	25,0	97,8%	79,9%	78,1%
284,00	0,17	0,22	6,30	201,4%	20,51	14,10	117,9	25,0	97,8%	79,8%	78,1%
285,00	0,17	0,21	6,28	202,7%	20,51	14,13	117,3	25,1	98,0%	79,9%	78,3%
286,00	0,17	0,21	6,27	203,5%	20,51	14,14	116,8	25,1	98,0%	79,9%	78,3%
287,00	0,17	0,21	6,25	204,1%	20,51	14,16	116,3	25,0	97,9%	79,9%	78,3%
288,00	0,12	0,21	6,20	206,2%	20,52	14,21	115,8	25,0	97,8%	79,9%	78,2%
289,00	0,12	0,21	6,17	207,7%	20,52	14,24	115,6	25,1	97,8%	79,9%	78,2%
290,00	0,12	0,22	6,17	207,7%	20,52	14,24	115,3	25,1	97,8%	79,9%	78,2%
291,00	0,12	0,22	6,17	207,7%	20,52	14,24	115,1	25,1	97,8%	80,0%	78,2%
292,00	0,12	0,22	6,13	209,1%	20,52	14,28	115,0	25,1	97,7%	79,9%	78,1%
293,00	0,12	0,23	6,12	209,7%	20,52	14,29	114,8	25,1	97,6%	79,9%	78,0%
294,00	0,12	0,24	6,19	205,3%	20,52	14,20	114,9	25,1	97,5%	80,0%	78,0%
295,00	0,08	0,24	6,16	206,7%	20,52	14,23	115,0	25,1	97,4%	80,0%	77,9%
296,00	0,08	0,25	6,08	210,4%	20,52	14,32	115,0	25,1	97,3%	79,8%	77,7%
297,00	0,08	0,25	6,04	212,0%	20,52	14,35	115,3	25,1	97,3%	79,7%	77,6%
298,00	0,08	0,25	6,03	212,8%	20,53	14,37	115,5	25,1	97,3%	79,7%	77,5%
299,00	0,08	0,25	6,05	212,0%	20,52	14,35	115,5	25,1	97,3%	79,7%	77,6%
300,00	0,08	0,24	6,05	212,1%	20,52	14,35	115,6	25,1	97,4%	79,7%	77,6%
301,00	0,08	0,25	6,17	206,1%	20,52	14,22	115,7	25,1	97,4%	79,9%	77,8%
302,00	0,08	0,22	6,15	208,6%	20,52	14,26	115,3	25,1	97,8%	79,9%	78,1%
303,00	0,03	0,21	6,08	212,1%	20,52	14,34	114,6	25,1	97,8%	79,9%	78,1%
304,00	0,03	0,21	6,06	212,8%	20,53	14,35	114,3	25,1	97,8%	79,9%	78,1%
305,00	0,03	0,22	6,07	212,4%	20,52	14,35	114,1	25,1	97,7%	79,9%	78,1%
306,00	0,03	0,22	6,10	211,1%	20,52	14,32	113,7	25,1	97,7%	80,0%	78,2%
307,00	0,03	0,22	6,06	212,6%	20,53	14,35	113,6	25,1	97,7%	80,0%	78,1%
308,00	0,03	0,23	6,03	214,1%	20,53	14,39	113,4	25,1	97,6%	79,9%	78,0%
309,00	0,03	0,23	6,03	213,9%	20,53	14,38	113,4	25,1	97,6%	79,9%	78,0%
310,00	0,03	0,23	6,01	214,8%	20,53	14,40	113,2	25,1	97,6%	79,9%	78,0%
311,00	0,03	0,23	5,98	216,1%	20,53	14,43	113,0	25,1	97,6%	79,9%	#DIV/0!
312,00	0,03	0,23	5,94	218,1%	20,53	14,47	113,2	25,1	97,5%	79,8%	77,8%
313,00	0,00	0,23	5,93	218,7%	20,53	14,49	113,1	25,1	97,5%	79,8%	77,8%

Temps acquisition minutes	Flue temp °F	Room temp °F	Tunnel dry bulb °F	Catalyst °F	scale lbs	Right °F	Back °F	bottom °F	Top °F	Left °F
1	81,46	70,48	73,17	84,47	3,07	73,21	73,39	73,12	73,58	73,22
2	96,56	70,44	75,07	104,01	3,07	73,21	73,41	73,12	73,58	73,24
3	139,56	70,36	81,42	169,63	2,97	73,26	73,58	73,21	73,63	73,36
4	179,79	70,36	86,37	253,19	2,87	73,48	74,16	73,45	73,76	73,75
5	210,32	70,38	90,21	300,51	2,77	73,96	75,30	73,91	74,05	74,77
6	254,95	70,34	96,68	337,92	2,58	74,84	77,11	74,62	74,56	76,73
7	350,67	70,56	116,31	445,42	2,37	76,07	80,33	75,73	75,39	79,90
8	413,70	70,57	125,95	513,96	2,07	78,02	85,27	77,25	76,66	84,72
9	471,17	70,66	110,39	620,70	1,88	81,02	90,93	79,20	78,79	91,89
10	484,23	70,68	109,66	657,82	1,67	85,46	96,64	81,69	82,16	101,25
11	491,41	70,78	109,79	668,72	1,47	91,42	102,73	84,82	87,15	112,00
12	491,14	70,82	110,51	667,96	1,37	96,70	109,23	88,50	93,61	123,49
13	494,23	70,81	110,16	674,35	1,18	106,97	116,18	92,78	101,23	135,51
14	484,80	70,73	108,17	671,76	1,07	116,14	123,70	97,89	109,47	147,50
15	493,66	70,67	140,79	621,18	2,47	126,03	131,75	103,93	117,53	159,93
16	403,81	70,52	126,38	399,45	13,71	136,12	140,83	110,57	125,74	172,15
17	352,12	70,42	120,47	421,30	13,58	146,06	149,21	117,24	133,25	183,68
18	349,50	70,44	124,40	634,94	13,38	155,43	156,57	123,55	139,88	194,41
19	363,43	70,44	128,61	607,19	13,28	163,71	163,05	129,29	146,23	203,49
20	373,64	70,45	130,63	614,54	13,00	170,73	168,73	134,49	149,94	211,02
21	448,16	70,53	149,00	624,06	12,78	176,24	174,10	139,22	154,10	217,52
22	461,69	70,51	146,64	656,46	12,58	181,75	179,57	143,69	158,11	223,20
23	430,90	70,55	138,72	617,29	12,28	186,29	184,83	147,84	161,97	228,54
24	435,90	70,62	138,50	533,42	12,08	190,95	189,82	151,90	165,69	233,66
25	407,74	70,58	132,23	560,00	11,98	195,72	194,37	155,88	169,30	238,33
26	400,55	70,42	132,36	580,52	11,78	200,12	198,67	159,63	172,67	243,35
27	406,99	70,44	133,39	616,37	11,58	204,36	202,71	163,41	175,91	248,76
28	423,99	70,48	137,10	631,25	11,38	207,91	206,62	167,13	178,74	253,98
29	416,43	70,44	135,00	591,94	11,18	211,34	210,40	170,70	181,56	258,86
30	421,06	70,44	118,77	614,16	10,98	214,29	214,11	174,05	184,28	263,04
31	405,76	70,36	110,61	695,77	10,88	217,29	217,84	177,38	187,13	267,35
32	393,09	70,39	107,43	672,59	10,78	220,09	221,09	180,37	189,56	272,88
33	389,43	70,40	106,34	661,55	10,68	223,06	223,85	183,54	192,06	276,94
34	392,90	70,45	106,75	659,80	10,48	225,96	226,52	186,41	194,41	281,54
35	389,52	70,58	105,82	647,25	10,38	228,54	228,96	189,25	196,82	285,77
36	392,94	70,62	106,50	632,87	10,28	230,87	231,45	191,87	198,48	290,03
37	400,89	70,67	95,30	620,31	10,08	233,37	233,81	194,26	200,89	293,34
38	416,56	70,75	95,28	651,05	9,98	235,67	235,89	196,55	202,82	297,40
39	435,46	70,73	95,73	679,06	9,78	237,78	237,82	199,43	205,80	300,44
40	453,12	70,78	96,81	699,73	9,58	239,82	239,84	202,61	209,30	303,87
41	470,31	70,75	97,98	722,90	9,48	242,12	242,19	205,59	213,68	306,64
42	484,89	70,87	98,81	755,15	9,20	244,49	244,64	208,66	218,67	310,21
43	496,96	70,96	99,40	786,63	9,07	247,18	247,37	211,53	224,70	314,07
44	501,26	70,89	99,31	801,56	8,88	251,01	249,97	214,64	231,81	318,85
45	505,51	70,91	100,17	807,43	8,73	254,81	252,76	217,52	239,05	320,64
46	512,24	70,85	100,07	814,94	8,58	259,20	255,73	220,52	247,27	323,55
47	521,09	70,78	101,24	830,74	8,37	264,00	258,80	223,19	255,73	327,13
48	531,87	70,68	102,94	848,63	8,18	268,56	261,94	226,08	264,17	331,41
49	540,22	70,73	102,28	864,50	7,98	273,46	265,23	228,95	273,45	335,03
50	545,61	70,74	103,62	881,51	7,77	278,66	268,81	231,60	282,94	340,03
51	550,10	70,94	104,20	904,14	7,57	283,57	272,48	234,15	291,68	345,70
52	551,70	71,01	104,29	901,21	7,48	289,14	276,01	237,05	301,91	350,87
53	551,13	70,99	104,16	888,15	7,28	294,53	279,97	239,78	312,43	356,39
54	549,82	70,95	104,37	880,25	7,17	300,93	284,19	242,45	322,44	360,98
55	547,74	71,14	104,81	875,07	6,97	306,55	288,45	244,63	331,40	367,71
56	543,44	71,34	104,22	866,65	6,88	312,23	292,64	247,25	340,73	373,97
57	538,58	71,44	103,27	859,81	6,68	318,95	297,17	249,40	349,78	379,88
58	533,76	71,33	102,65	856,72	6,58	326,31	301,66	252,32	358,52	384,41
59	530,36	71,19	102,30	856,68	6,47	332,94	306,05	255,25	366,61	390,04
60	526,18	71,15	101,69	855,06	6,29	339,47	310,44	258,15	374,22	395,06
61	523,11	71,23	100,66	851,44	6,18	344,51	314,66	261,02	379,98	402,04
62	519,99	71,54	101,52	849,06	6,08	350,25	319,50	263,42	386,41	407,86
63	517,47	71,57	101,68	848,36	5,98	356,10	323,91	266,63	391,91	413,67
64	515,50	71,57	101,69	847,36	5,87	361,10	328,21	269,95	397,50	419,53
65	513,93	71,66	101,48	846,65	5,71	366,41	332,77	273,11	402,61	424,55
66	511,63	71,56	100,98	847,04	5,57	372,06	337,09	276,85	408,38	428,14
67	511,97	71,62	101,16	850,41	5,48	375,75	341,54	280,39	411,95	434,47
68	512,81	71,67	100,50	848,09	5,38	380,13	346,14	283,70	416,23	439,41
69	511,67	71,79	100,65	841,51	5,17	384,89	350,66	286,80	420,38	444,13
70	509,46	71,85	101,15	834,94	5,17	389,43	355,06	290,28	424,06	448,89
71	506,09	71,95	101,45	829,44	4,97	394,50	359,25	293,82	427,53	453,43
72	502,65	71,79	100,61	825,59	4,87	399,46	363,30	297,51	430,25	457,74
73	501,53	72,06	101,12	822,66	4,78	404,22	367,21	300,50	433,37	461,77
74	499,78	72,10	100,56	818,94	4,68	409,40	370,75	303,99	437,12	464,80
75	497,87	71,99	98,87	817,22	4,58	414,96	374,77	307,48	440,43	467,22
76	494,05	71,98	98,75	816,03	4,47	419,91	378,55	310,74	443,18	469,49
77	491,97	72,04	99,72	814,46	4,37	424,21	382,22	314,05	444,71	473,53
78	490,90	72,02	99,28	812,20	4,27	427,66	385,78	317,11	446,45	477,48
79	486,66	72,18	98,64	808,43	4,17	431,90	389,21	320,16	448,80	480,13
80	482,43	72,36	98,30	803,86	4,08	436,38	392,37	323,40	450,34	483,36
81	479,29	72,10	97,70	799,82	4,05	439,75	395,57	326,46	452,14	485,83
82	475,51	72,38	97,66	798,30	3,97	442,90	398,53	329,42	453,69	488,42
83	471,56	72,38	97,64	795,55	3,87	447,21	401,34	332,69	454,93	491,03
84	468,71	72,56	97,96	790,57	3,77	450,28	404,58	335,94	455,17	493,52
85	466,93	72,70	96,67	786,28	3,67	453,07	407,82	338,85	456,28	495,67
86	464,66	72,51	96,82	783,63	3,57	454,91	411,03	342,29	456,46	498,22
87	461,80	72,50	96,52	780,16	3,51	457,57	414,61	345,55	457,04	500,24
88	459,27	72,76	97,32	775,31	3,47	460,96	417,77	348,98	457,56	502,18

89	466,64	72,75	97,06	771,75	3,38	463,60	421,19	352,90	457,78	503,31
90	466,99	72,78	96,55	771,33	3,28	465,44	424,48	356,07	457,19	505,42
91	466,13	72,55	94,89	772,09	3,17	467,36	427,43	359,95	456,67	507,44
92	465,78	72,47	96,82	772,67	3,07	469,18	429,87	364,22	456,56	509,76
93	466,36	72,74	98,10	772,14	3,07	471,46	432,26	368,83	456,42	512,06
94	503,30	73,00	146,06	745,76	2,97	474,02	434,61	374,25	455,80	513,86
95	474,46	73,20	148,62	573,50	15,68	476,06	438,31	379,66	456,10	516,24
96	461,45	72,95	106,00	577,92	15,58	477,52	441,26	384,42	454,77	518,30
97	466,46	72,76	103,18	714,31	15,38	478,52	442,71	388,42	454,05	519,70
98	465,82	73,12	103,54	787,80	15,18	479,37	442,67	391,82	453,16	520,57
99	514,10	73,17	104,78	854,02	14,98	478,76	441,52	395,56	452,01	520,49
100	534,06	73,24	105,26	894,04	14,78	477,94	439,43	398,33	452,41	518,50
101	547,17	73,14	105,26	915,32	14,58	476,50	436,99	400,35	452,72	515,99
102	557,73	72,99	106,69	931,05	14,38	474,46	434,38	401,91	453,53	514,55
103	564,81	73,13	107,18	941,62	14,18	472,65	431,60	402,91	455,78	512,74
104	568,99	73,32	107,62	948,43	13,98	471,21	428,50	403,73	458,06	510,18
105	572,51	73,45	108,54	954,41	13,78	469,99	425,95	404,00	461,49	507,71
106	573,71	73,39	109,06	956,74	13,58	468,64	423,33	404,00	464,42	505,80
107	576,15	73,63	110,40	961,47	13,38	467,90	421,05	403,10	468,14	504,58
108	580,33	73,77	109,18	966,46	13,17	468,01	418,71	403,54	473,74	501,96
109	584,53	73,56	110,54	971,46	12,98	467,16	416,73	402,94	477,66	501,50
110	587,10	73,67	111,31	976,17	12,73	467,66	414,93	402,53	483,00	500,87
111	588,56	74,14	111,61	977,17	12,48	468,39	413,22	402,74	488,69	499,69
112	590,62	74,05	111,57	979,71	12,28	469,29	411,71	402,65	492,65	498,95
113	593,96	74,22	112,64	983,06	12,08	470,66	410,73	402,75	499,09	498,67
114	597,52	74,13	111,10	986,43	11,88	472,72	409,30	402,80	504,40	497,05
115	599,40	74,05	110,65	990,79	11,68	474,89	408,08	403,01	508,85	496,65
116	601,96	73,89	111,39	994,25	11,48	476,55	407,83	403,12	513,72	496,51
117	604,28	74,20	112,01	996,80	11,28	478,47	407,40	403,36	519,37	496,51
118	607,60	74,42	113,48	999,94	11,08	480,66	407,03	403,18	524,51	496,66
119	610,29	74,31	112,36	1002,50	10,88	482,75	406,75	403,91	530,42	495,86
120	613,27	74,19	112,64	1006,03	10,68	484,96	406,56	404,63	535,83	496,43
121	614,13	74,19	112,25	1009,95	10,48	487,66	406,57	405,31	540,70	496,99
122	616,37	74,01	112,62	1013,08	10,21	489,58	406,77	405,56	544,18	498,47
123	620,72	74,40	113,29	1019,92	10,08	492,01	407,08	405,83	549,68	499,67
124	624,51	74,44	113,88	1024,72	9,88	495,22	407,52	406,98	555,15	500,89
125	628,58	74,67	114,56	1029,20	9,61	498,29	408,12	407,66	559,93	502,71
126	632,14	74,46	114,81	1032,12	9,42	500,92	408,83	408,01	564,91	504,67
127	633,59	74,94	115,20	1033,84	9,27	505,18	409,58	409,23	569,82	506,81
128	633,96	74,83	116,68	1034,29	9,08	509,36	410,67	410,05	574,94	509,36
129	632,90	74,66	114,47	1035,06	8,88	513,53	411,98	411,54	581,31	510,98
130	632,65	75,22	115,45	1035,48	8,68	517,46	413,34	412,04	585,74	513,59
131	632,59	75,32	115,46	1035,67	8,48	521,27	414,66	413,19	591,47	516,06
132	633,72	75,44	115,94	1036,14	8,28	525,96	416,21	414,50	597,39	519,56
133	633,89	75,52	115,53	1040,79	8,08	529,66	417,76	414,73	599,37	522,31
134	631,24	75,61	116,16	1033,07	7,98	533,79	419,40	416,78	604,30	525,00
135	627,71	75,63	116,05	1022,71	7,77	537,32	421,17	418,61	608,87	527,92
136	622,35	75,49	115,37	1012,13	7,57	541,38	422,99	420,33	614,54	529,90
137	617,56	75,30	114,04	1000,11	7,46	545,29	424,78	422,03	618,77	533,21
138	614,03	75,51	114,68	991,91	7,38	548,99	426,56	423,78	620,72	536,70
139	610,46	75,23	113,06	983,76	7,18	552,41	428,11	425,48	625,43	538,51
140	606,02	75,22	112,89	977,80	7,07	555,62	430,37	426,92	627,80	541,46
141	606,86	75,33	113,24	976,43	6,93	558,66	432,20	428,90	630,20	545,15
142	608,64	75,35	114,64	976,05	6,78	561,46	434,09	430,86	633,49	548,03
143	611,43	75,76	113,67	975,76	6,68	563,90	435,91	431,82	634,49	551,16
144	613,24	75,85	114,51	980,09	6,48	566,96	437,77	433,66	636,81	554,07
145	613,53	75,77	113,79	989,61	6,37	569,54	439,67	435,73	638,89	556,53
146	612,33	75,35	113,03	990,24	6,27	572,58	441,95	436,93	640,30	559,43
147	609,39	75,68	112,07	989,15	6,08	574,94	444,02	439,80	642,65	561,82
148	606,69	75,64	111,10	987,56	5,98	577,76	446,10	441,84	645,15	563,37
149	605,17	75,46	112,25	989,02	5,78	580,50	448,30	443,37	646,78	566,57
150	607,39	75,56	111,23	999,65	5,67	582,32	450,35	444,83	646,36	569,06
151	606,44	76,10	109,07	1005,12	5,57	584,27	452,65	447,30	648,58	571,86
152	604,70	75,49	110,17	1006,98	5,48	587,76	454,96	449,21	650,57	574,67
153	601,04	75,72	110,11	1007,66	5,28	590,36	457,16	451,14	652,07	577,07
154	596,82	75,67	110,42	1000,53	5,18	592,95	459,43	451,77	653,34	580,79
155	594,56	75,73	109,55	994,06	5,07	595,24	461,62	453,77	652,30	583,89
156	592,31	75,98	110,67	991,57	4,97	596,07	463,67	456,30	652,85	587,06
157	590,57	76,10	111,06	991,59	4,87	599,73	466,27	458,01	654,31	590,17
158	587,30	75,82	110,68	988,04	4,68	602,36	468,36	460,32	656,29	593,41
159	584,99	76,25	109,67	986,16	4,58	604,78	470,96	462,05	656,95	596,71
160	509,47	75,63	100,11	1052,74	4,58	607,63	473,13	465,26	656,71	599,86
161	467,54	76,31	96,00	1038,45	4,48	609,73	475,33	467,90	656,16	602,19
162	441,47	75,83	96,82	1005,89	4,48	611,15	477,25	470,15	655,35	604,96
163	422,52	76,36	95,42	982,36	4,37	612,34	479,12	472,23	654,58	607,25
164	407,00	76,03	93,84	965,40	4,37	613,26	480,21	473,88	655,40	607,86
165	394,06	76,19	92,77	951,97	4,37	613,06	481,37	475,24	653,81	608,96
166	383,57	75,94	92,11	945,36	4,27	612,36	482,72	476,55	651,26	609,00
167	374,22	75,83	90,16	949,57	4,27	611,30	483,40	477,45	648,84	607,93
168	366,54	75,80	91,19	950,51	4,27	609,66	484,02	478,38	646,46	607,37
169	359,49	76,08	91,82	946,67	4,17	607,46	484,44	479,34	643,24	606,44
170	353,56	76,15	91,27	935,26	4,17	605,25	484,58	480,16	639,75	604,86
171	348,02	76,04	91,25	924,76	4,17	602,92	484,60	480,66	635,67	603,25
172	343,58	75,94	90,82	916,90	4,08	599,82	484,40	481,34	629,76	601,07
173	339,49	75,81	90,43	915,90	4,08	596,92	484,14	481,85	625,74	598,35
174	334,72	75,93	88,27	908,06	4,08	593,69	483,62	481,76	620,99	594,46
175	330,99	75,81	87,42	894,36	4,00	590,27	483,07	481,54	616,24	591,57
176	326,92	75,22	88,41	887,54	4,08	586,66	482,59	481,46	610,54	589,97
177	323,46	75,78	87,63	881,67	3,98	584,14	482,05	481,72	603,78	587,96
178	320,07	75,67	87,32	874,33	3,98	579,93	481,43	481,96	599,21	585,78
179	317,34	75,90	85,38	867,95	3,91	576,63	480,52	481,97	594,00	582,96

180	313,63	75,62	87,35	861,00	3,88	573,01	479,98	481,73	588,84	579,70
181	310,46	75,50	86,76	855,37	3,88	569,71	478,85	481,67	584,95	576,15
182	307,46	75,30	86,42	850,69	3,88	566,69	478,14	481,65	579,00	573,95
183	305,18	75,45	87,54	844,84	3,88	563,30	476,70	481,55	573,95	571,65
184	302,64	75,47	86,86	838,60	3,88	559,83	476,16	481,40	568,29	568,72
185	300,14	75,46	86,42	832,37	3,88	557,06	475,20	481,69	562,68	566,16
186	297,43	75,29	86,09	825,91	3,88	554,54	474,14	481,68	559,95	562,25
187	295,00	74,95	82,28	819,74	3,77	550,93	473,08	481,47	555,52	558,31
188	292,66	75,17	81,94	814,07	3,77	547,66	472,06	481,54	551,14	555,40
189	290,32	75,39	82,87	808,81	3,77	545,11	471,15	481,59	546,97	553,83
190	288,40	74,74	83,87	804,05	3,77	542,39	470,01	481,62	541,70	550,30
191	286,37	75,32	83,96	800,06	3,69	539,51	468,92	481,29	537,32	548,12
192	284,63	75,36	83,40	796,60	3,67	536,77	467,85	480,97	533,00	545,63
193	282,96	74,85	83,96	793,50	3,67	534,34	466,68	481,01	528,05	542,94
194	281,36	75,04	84,62	790,94	3,67	531,66	465,77	480,98	523,40	541,10
195	280,23	74,79	83,87	788,99	3,67	528,46	464,60	481,21	518,41	538,89
196	278,79	75,58	85,19	787,00	3,57	526,21	463,53	481,38	515,21	536,51
197	276,95	75,51	85,65	784,77	3,57	524,43	462,64	481,56	510,53	534,53
198	275,55	75,53	85,13	781,52	3,57	521,72	461,51	481,76	507,64	531,20
199	274,06	75,43	84,59	779,25	3,57	519,05	460,66	481,28	504,30	529,00
200	272,76	75,05	84,27	777,17	3,57	516,45	459,43	481,22	499,08	526,96
201	271,56	75,18	84,96	773,95	3,57	514,54	458,54	481,38	496,26	524,90
202	270,42	74,76	82,89	760,50	3,47	512,29	457,59	481,30	492,64	522,03
203	268,97	75,23	82,44	747,83	3,52	509,75	456,60	481,36	489,26	519,89
204	267,37	75,26	83,17	741,67	3,47	508,17	455,70	481,37	484,56	518,50
205	266,03	74,99	83,46	738,39	3,47	506,37	455,05	481,43	480,95	516,43
206	265,06	74,98	81,40	736,27	3,47	504,01	453,80	481,52	477,20	514,09
207	263,75	75,17	82,89	733,15	3,47	502,12	452,69	481,16	474,34	510,80
208	262,22	75,35	83,03	730,59	3,47	500,37	451,98	480,45	470,64	509,20
209	261,05	75,29	83,49	727,93	3,47	498,46	450,88	479,85	466,78	507,25
210	259,53	75,28	84,05	725,90	3,38	496,94	449,44	479,57	463,22	505,83
211	258,12	75,36	84,08	724,44	3,38	495,33	448,38	479,07	459,77	503,67
212	257,27	75,34	84,16	722,06	3,38	493,16	447,39	478,58	457,80	500,82
213	256,23	74,99	82,32	719,57	3,38	490,94	446,43	477,85	454,83	497,24
214	255,32	74,85	82,82	717,56	3,38	488,87	445,07	477,38	451,05	496,03
215	254,46	74,79	81,79	714,74	3,38	487,15	443,83	476,76	448,81	493,85
216	253,55	74,78	82,20	712,15	3,38	485,63	442,41	475,88	445,43	491,56
217	252,41	74,71	80,95	710,59	3,38	483,74	441,48	475,15	442,71	488,37
218	251,03	74,97	80,03	707,64	3,38	481,72	440,17	474,49	439,55	486,02
219	250,27	74,71	82,04	705,11	3,28	480,52	439,19	473,87	436,23	484,65
220	249,20	74,97	81,18	701,69	3,27	478,65	438,19	473,47	433,94	481,69
221	248,40	75,20	83,10	699,50	3,28	477,81	437,04	473,01	429,64	480,55
222	247,29	75,17	82,94	697,52	3,27	475,76	435,97	472,55	426,57	478,47
223	246,20	75,20	83,36	695,66	3,27	474,49	434,87	472,31	425,17	477,23
224	245,62	75,40	84,06	697,46	3,17	472,90	434,08	471,89	422,67	475,80
225	245,71	75,31	82,11	699,30	3,27	470,56	432,83	471,73	419,41	473,56
226	244,81	75,26	81,74	699,19	3,27	469,59	431,68	471,23	417,60	471,03
227	244,04	74,86	79,53	698,52	3,17	467,58	430,77	470,56	414,83	468,77
228	243,54	75,15	80,22	697,73	3,17	466,36	429,81	469,74	412,69	466,71
229	242,76	74,88	81,29	696,62	3,17	465,06	429,02	468,97	410,14	465,57
230	242,53	75,01	80,98	696,73	3,17	463,44	428,06	468,44	406,55	464,12
231	241,94	75,12	81,54	697,96	3,07	462,29	426,94	467,85	405,26	462,73
232	241,02	75,21	82,49	698,03	3,17	461,58	426,51	467,52	402,70	461,69
233	241,20	75,30	82,38	698,00	3,10	459,65	425,60	467,09	400,00	460,75
234	240,65	75,33	83,58	697,05	3,07	459,04	424,83	466,77	397,65	459,73
235	239,93	75,10	82,88	695,54	3,11	457,17	423,96	466,49	396,16	457,58
236	239,31	74,94	82,35	694,80	3,07	455,76	423,35	466,05	393,31	456,33
237	239,00	75,12	82,10	690,15	3,07	454,42	422,36	465,73	392,29	454,80
238	238,56	74,98	81,54	690,59	3,07	453,20	421,78	465,55	389,84	453,64
239	238,25	75,05	81,70	676,94	3,07	451,64	421,01	465,17	387,66	452,41
240	237,85	75,39	82,50	677,94	2,97	450,28	420,41	464,69	385,76	451,06
241	237,05	75,16	80,88	678,12	2,98	449,09	419,40	463,90	384,42	449,44
242	236,61	75,26	81,37	677,33	2,97	448,03	418,90	463,51	381,96	448,41
243	236,01	75,12	82,05	676,07	2,97	446,84	418,30	462,64	380,94	447,33
244	235,61	75,00	81,74	675,25	2,97	445,55	417,48	461,90	379,72	445,79
245	235,00	74,92	82,09	674,71	2,97	444,53	416,91	461,12	377,84	445,04
246	234,68	74,97	82,15	674,52	2,97	443,58	416,36	460,63	374,74	444,15
247	234,46	74,60	82,00	673,90	2,97	442,42	415,54	460,73	372,90	443,44
248	234,15	74,62	81,35	675,44	2,87	441,01	414,88	460,66	372,12	442,23
249	234,14	74,85	80,48	678,22	2,87	439,93	414,22	460,03	370,52	440,52
250	233,96	74,80	81,66	679,06	2,87	438,75	413,70	459,82	368,31	440,35
251	233,56	75,05	81,88	674,77	2,87	437,49	413,15	459,44	366,60	439,11
252	233,24	74,99	81,76	667,76	2,87	436,27	412,60	458,88	366,23	437,85
253	232,44	74,72	81,76	665,69	2,77	435,26	412,07	458,33	364,76	436,46
254	266,81	74,62	95,96	607,47	2,77	434,45	411,03	458,44	361,76	435,72

POLYTESTS
TESTING THROUGH YOUR REALITY

Date: 2022-04-20 Manufacturer: Hearthstone Model: 8031

Project #: PI 20270 Run: 6 Tech: MM Reviewer: DP

- kindling 32 LBS start FIRE
- by pass open
- Fan off
- At 1 2 LBS insert Find preload
- At 12.5 LBS close Door
- At 3.00 LBS insert Second preload
- close Door immediately
- At 46 LBS close by pass, close air lift and open Fan (low)
- At 2.9 LBS Rock coal Bed
- After 2 min insert load
- At 4 min 30 Sec close bypass
- At 5 min close air lift

TEST LOAD CONFIGURATION

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE / POST CHECKS

Date: 2022-06-20 Manufacturer: Hearth stove Model: 8031

Project #: PT 20270 Run: 6 Tech: MM Reviewer: DP

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
EM-334	7:50	ok	ok

Pre-Test Post-Test

Facility Conditions:

	Pre-Test	Post-Test
Air Velocity from less than 2 feet	0 (max50 Fpm)	0 (max50 Fpm)
Smoke Capture Check (tunnel velocity)	ok	NA
Picture 4 sides	ok	ok

Wood Heater Conditions:

Date Wood Heater Stack Cleaned	2022-06-20
Date Dilution Tunnel Cleaned	2022-06-20
Induced Draft Check (max 0.005 H2O)	ok
Traverse before ignition	ok

Temperature System:

Ambient (65°-90°F)	ok °F

Proportional Checks:

Thermocouple check	ok
Pitot Clean	ok
Pitot verification	ok
Pictures for report: Side	ok
Coal bed	ok
Load	ok
Load in stove	ok
Fuel adjustment	ok
Load Length approximately 5/6 of firebox Lenght	ok

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 2022-06-20 Manufacturer: Hearthstone Model: 8031
Project #: PI 20270 Run: 6 Tech: MP Reviewer: DP

Leakage Checks Tunnel Samplers

	System 1st hour		System 1		System 2	
Unplugged Flow Rate – .25cfm	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)
Vacuum (inches Hg.)	-10	-10	-10	-10	-10	-10
Final 1minute DGM (Liter)	651898 82	653778 34	651895 24	653778 56	399856 68	401681 90
Initial 1minute DGM (Liter)	651898 72	653778 32	651899 20 ~~[illegible]~~	653778 46	399840 68	401681 90
Change (Liter)	0,10	0,02	0,04	0,10	ϕ	ϕ
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)	0.20	0.20	0.20	0.20	0.20	0.20
Check OK	oK	ok	o K	o K	ok	ok

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 2022-06-20 Manufacturer: Hearthstone Model: 8031

Project #: PI 20270 Run: 6 Tech: MM Reviewer: DL

Leakage Checks Flue Gas Sampler

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

Leakage Checks Pitot

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

Scales checks

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Platform	EM-205	10 & 5 kg lbs, Class F	10.00 5 kg lbs
Wood	EM-090	44 lbs, Class F	44 lbs
Analytical	EM-335	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%

POLYTESTS
TESTING THROUGH YOUR REALITY

CONTINUOUS ANALYZERS

Date: 2022-06-20 Manufacturer: Heartland Model: 8031

Project #: PT 20 270 Run: 6 Tech: MM Reviewer: DP

FOR TUNNELS < 12 in

Barometric pressure (P_{bar}) 101.3 (KPa.) Static pressure (P_g) 0.19 (inches w.c.)
Inside diameter: Port A _____ Port B ____.
Tunnel cross sectional area: .1963Ft^2
Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H_2O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.072	67.33
B - Centroid	3.00	3.50	4	0.073	68.94
A-1	0.40	0.50	0.50	0.058	67.32
A-2	1.50	1.75	2	0.067	67.54
A-3	4.50	5.25	6	0.064	67.54
A-4	5.60	6.5	7.5	0.058	67.60
B-1	0.40	0.50	0.50	0.059	68.94
B-2	1.50	1.75	2	0.068	68.98
B-3	4.50	5.25	6	0.075	68.98
B-4	5.60	6.5	7.5	0.058	69.13
				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 H_2O)
T_s = average absolute dilution tunnel temperature (°F + 460)
P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{sg}$
P_g = static pressure $\frac{\text{in. } H_2O}{\{\ 13.6\ \}}$
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.

POLYTESTS
TESTING THROUGH YOUR REALITY

CONTINUOUS ANALYZERS

Date: 2022-06-20 Manufacturer: Hearthstone Model: 8031

Project #: PT 20270 Run: 6 Tech: MM Reviewer: JR

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
CO	0	0	3009	3000	1009	1000
Tolerance CO	0	+/- 0.02	0009	+/- 0.15	0009	+/- 0.05
CO_2	0	0	1803	1800	977	1000
Tolerance CO2	0	+/- 0.02	003	+/- 0.5	023	+/- 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	3016	1010	0	0.02	0007	0.15	0001	0.05	✓	
CO_2	0	1789	982	0	0.02	904	0.5	005	0.5	✓	

POLYTESTS
TESTING THROUGH YOUR REALITY

TEST DATA LOG

Date: 2022-06-20 Manufacturer: Hearthstone Model: 8031

Project #: PI 20270 Run: 6 Tech: M M Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blanck
Final (Liter)	653777.61	401680.41	388608.10 ~~389~~ M~
Initial (Liter)	651899.42 ~~851899.42~~ M~	399840.21	387061.65

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	101.3	101.2
Dry Bulb (F):	70.1	71.6
Humidity (%):	39	38.4

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

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

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2022-06-20 Manufacturer: Hearthstone Model: 8031

Project #: PI 20270 Run: 6 Tech: MR Reviewer: JR

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 14 in.	1332 lbs.	19.9	20.1	20.3	20.7	19.1
1 1/2 x 3 1/2 x 14 in.	1438 lbs.	20.3	20.2	20.4	20.3	20.6
1 1/2 x 3 1/2 x 14 in.	1336 lbs.	19.9	20.1	20.0	20.0	20.4
1 1/2 x 3 1/2 x 14 in.	1178 lbs.	20.4	19.9	20.1	20.6	20.4
1 1/2 x 3 1/2 x 14 in.	1218 lbs.	21.0	21.1	20.9	20.8	20.4
1 1/2 x 3 1/2 x 14 in.	1400 lbs.	20.1	20.4	20.3	20.4	20.1
1 1/2 x 3 1/2 x 14 in.	1450 lbs.	20.3	20.4	20.3	20.8	20.4
1 1/2 x 3 1/2 x 14 in.	~~1428~~ 1408 lbs.	20.8	20.4	20.3	20.2	20.4
1 1/2 x 3 1/2 x 14 in.	1388 lbs.	21.1	21.3	21.4	21.3	21.2
1 1/2 x 3 1/2 x 14 in.	1106 lbs.	21.0	21.4	21.0	21.3	21.4
x x in.	lbs.					
1 1/2 x 3 1/2 x 14 in.	1332 lbs.	19.6	19.3	19.4	19.8	19.6
1 1/2 x 3 1/2 x 14 in.	1156 lbs.	20.1	21.0	21.1	21.0	21.4
1 1/2 x 3 1/2 x 14 in.	1330 lbs.	20.3	20.2	20.6	20.3	20.4
1 1/2 x 3 1/2 x 14 in.	1380 lbs.	19.9	19.6	19.4	19.3	19.6
1 1/2 x 3 1/2 x 14 in.	1254 lbs.	19.4	20.0	20.1	20.1	20.4
1 1/2 x 3 1/2 x 14 in.	1374 lbs.	19.3	19.6	19.8	19.4	19.6
1 1/2 x 3 1/2 x 14 in.	1838 lbs.	20.4	20.3	20.6	20.3	20.4
1 1/2 x 3 1/2 x 14 in.	~~1428~~ 1128 lbs.	19.9	19.3	19.8	19.9	20.0
1 1/2 x 3 1/2 x 14 in.	1110 lbs.	20.9	21.1	21.6	22.0	21.9
1 1/2 x 3 1/2 x 14 in.	1392 lbs.	21.0	21.4	21.3	21.4	21.3
x x in.	lbs.					
x x in.	lbs.					

13,296 – 13,218

TEST LOAD WEIGHT: ~~1357~~ – _____ lbs

MR

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2022-06-20 Manufacturer: Hearthstone Model: 8031

Project #: PT 2022 Run: 6 Tech: MM Reviewer: DP

FUEL DESCRIPTION:

Type of wood :

TEST LOAD

Piece Size	Weight		Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 15 in.	1 4 00	lbs.	20.6	20.9	20.7	20.9	21.0
1 1/2 x 3 1/2 x 15 in.	1' 6 20	lbs.	21.0	20.7	20.9	21.0	21.4
1 1/2 x 3 1/2 x 15 in.	1' 552	lbs.	21.4	21.8	21.0	21.0	21.2
3 1/2 x 3 1/2 x 15 in.	3 366	lbs.	22.3	22.4	22.3	22.0	22.0
3 1/2 x 3 1/2 x 15 in.	3' 314	lbs.	21.0	21.1	21.0	20.8	20.9
x x in.		lbs.					
1 1/2 x 3/4 x 5 in.	0 140	lbs.			20.1		
1 1/2 x 3/4 x 5 in.	0 140	lbs.			20.6		
1 1/2 x 3/4 x 5 in.	0 156	lbs.			20.3		
1 1/2 x 3/4 x 5 in.	0 112	lbs.			20.2		
1 1/2 x 3/4 x 5 in.	0 130	lbs.			19.9		
1 1/2 x 3/4 x 5 in.	0 126	lbs.			20.1		
1 1/2 x 3/4 x 5 in.	0 146	lbs.			20.4		
1 1/2 x 3/4 x 5 in.	0 156	lbs.			21.1		
1 1/2 x 3/4 x 5 in.	0 114	lbs.			21.0		
1 1/2 x 3/4 x 5 in.	0138	lbs.			21.1		
1 1/2 x 3/4 x 5 in.	0 130	lbs.			21.0		
1 1/2 x 3/4 x 5 in.	0 126	lbs.			20.8		
1 1/2 x 3/4 x 5 in.	0 148	lbs.			20.4		
1 1/2 x 3/4 x 5 in.	0 160	lbs.			20.4		
1 1/2 x 3/4 x 5 in.	0 114	lbs.			20.3		
1 1/2 x 3/4 x 5 in.	0 138	lbs.			20.3		
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					

TEST LOAD WEIGHT: 13 84 lbs Min 20%: 28 Max 25%: 346

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2022-06-16 Manufacturer: Hearthstone Model: 8031

Project #: PT 20270 Run: 6 Tech: MM Reviewer: DO

Pre-test Weight Record		SYSTEM 1 – 1st hour				SYSTEM 1				
		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	10	3330	3340	7	15	3350	3360	32	3390
2022-06-16	17:00	94 6360	0 1296	0 1287	34 3083	108 7801	0 1289	0 1295	34 4019	0 1290
2022-06-20	11:00	94 6361	0 1296	0 1287	34 3084	108 7802	0 1288	0 1294	34 4018	0 1291

Post-test Weight Record		SYSTEM 1 – 1st hour				SYSTEM 1				
		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	10	3330	3340	7	15	3350	3360	32	3390
2022-06-20	21:30	94 6366	0 1314	0 1288	34 3113	108 7809	0 1305	0 1298	34 4046	0 1293
2022-06-27	8:30	94 6363	0 1308	0 1287	34 3093	108 7803	0 1302	0 1295	34 4028	0 1291
2022-06-28	8:00	94 6362	0 1308	0 1287	34 3093	108 7803	0 1302	0 1295	34 4028	0 1291

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2022-06-16 Manufacturer: Hearthstone Model: 8031

Project #: PT 20270 Run: 6 Tech: MM Reviewer: DO

Pre-test Weight Record		SYSTEM 2 Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	18	3370	3380	35
2022-06-16	17:00	108 9466	0 1305	0 1290	34 0466
2022-06-20	11:00	108 9465	01305	01290	34,0465

Post-test Weight Record		SYSTEM 2 Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	18	33 70	3380	35
2022-06-21	21:00	108 9469	01346	0 1286	34 0494
2022-06-27	8:00	108 9467	0 1344	0 1283	34 0474
2022-06-28	8:00	108 9467	0 1344	0 1284	34 0474

Paramètres

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

Code verrouillage:	HEA	

Description du test

Test standard	EPA	
Run #	6	
Date	20-06-2022	
Technicien	M.M	
Project #	PI 20270	

Description de l'unité

Manufacturier	HEARTHSTONE	
Modèle	8031	
Combustion system	Cat	
Appliance type	WOOD STOVE	
Firebox volume	1,9	cu ft.
Appliance weight empty	N.A	lbs
Appliance weight full	N.A	lbs

Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	N.A	BTU/h Donnée fournie par le manfacturier
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):	1,007	Dimensionless
Equipment number (DGM #1):	EM 178	
Calibration Factor (DGM #2):	1,005	Dimensionless
Equipment number (DGM #2):	EM 318	
Calibration Factor (DGM #3):	0,988	
Equipment number (DGM #3):	EM 179	Dimensionless

Tunnel

Targeted tunnel flow rate	350	scfm
Tunnel diameter	8	in.
Molecular weight	29	29 as per ASTM E2515
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	PI 20270
Date	20-06-2022
Technicien	M.M

Fuel data

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

Default Fuel Values

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

	Start	End
Barometer (kPa):	101,3	101,2
Barometer (in.Hg):	29,913879	29,88434875
Dry Bulb (F):	70,1	71,6
Humidity (%):	39	38,4
Air velocity (ft/min)	0	0

DGM #1	Final:	23087,939	cuft	Final:	653777,610	Liter
	Initial:	23021,611	cuft	Initial:	651899,420	Liter
DGM #2	Final:	14185,210	cuft	Final:	401680,410	Liter
	Initial:	14120,224	cuft	Initial:	399840,210	Liter
DGM room	Final:	13723,566	cuft	Final:	388608,100	Liter
	Initial:	13668,953	cuft	Initial:	387061,650	Liter

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent: 356

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

Project nu.	PI 20270
Date	20-06-2022
Technicien	M.M

Preload data sheet

Test Load Weight:

Lower	Ideal	Upper
11,97	13,30	14,63

Load Volume: 0,8507 cu. ft

Loading Density: 13,969 lbs./ft3

Number of Spaces:

Spacer weight (lbs):

Load Density (wet): 31,200 lbs./ft3

Dry Wood Density: 25,917805

Piece Size (in): Thick	Wide	x Length	Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x Weight	Volume Cubic Inches
1,5	3,5	14	1,332	19,9	20,1	20,3	20,2	19,1	26,53344	73,50
1,5	3,5	14	1,438	20,3	20,2	20,4	20,3	20,6	29,27768	73,50
1,5	3,5	14	1,336	19,9	20,1	20	20	20,4	26,82688	73,50
1,5	3,5	14	1,178	20	19,9	20,1	20,6	20,4	23,7956	73,50
1,5	3,5	14	1,218	21	21,1	20,9	20,8	20,4	25,38312	73,50
1,5	3,5	14	1,4	20,1	20,4	20,3	20,4	20,3	28,42	73,50
1,5	3,5	14	1,45	20,3	20,4	20,3	20,8	20,4	29,638	73,50
1,5	3,5	14	1,408	20,8	20,4	20,3	20,2	20,4	28,75136	73,50
1,5	3,5	14	1,388	21,1	21,3	21,4	21,3	21,2	29,50888	73,50
1,5	3,5	14	1,1	21	21,4	21	21,3	21,4	23,342	73,50
										0,00
1,5	3,5	14	1,332	19,6	19,3	19,4	19,8	19,6	26,02728	73,50
1,5	3,5	14	1,156	20,1	21	21,1	21	21,4	24,18352	73,50
1,5	3,5	14	1,33	20,3	20,2	20,6	20,3	20,4	27,0788	73,50
1,5	3,5	14	1,38	19,9	19,6	19,4	19,3	19,6	26,9928	73,50
1,5	3,5	14	1,254	19,4	20	20,1	20,1	20,4	25,08	73,50
1,5	3,5	14	1,374	19,3	19,6	19,8	19,4	19,6	26,84796	73,50
1,5	3,5	14	1,838	20,4	20,3	20,6	20,3	20,4	37,4952	73,50
1,5	3,5	14	1,128	19,9	19,3	19,8	19,9	20	22,31184	73,50
1,5	3,5	14	1,11	20,9	21,1	21,6	22	21,9	23,865	73,50
1,5	3,5	14	1,392	21	21,4	21,3	21,4	21,3	29,62176	73,50
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
								SUM MC	540,98112	

PreTest Load Weight: 26,54 lbs.

Dry Weight: 10,00 kg.

Average Moisture Content: %

Dry: 20,38

20,38

Must be 18-28

Wet: 16,93

must be 15,2-22

Project nu. PI 20270
Date 20-06-2022
Technicien

FUEL LOAD DATA SHEET, CSA B415

Test Load Weight:

Lower	Ideal	Upper
12,0	13,3	14,6

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

Load Volume: 0,35 cu. ft

Loading Density: 7,3 lbs./ft3

Number of Spaces: 16

Spacer weight: lbs

Load Density (wet): 33,3 lbs./ft3

Dry Wood Density: 27,5 lbs./ft3

Piece Size (in): Thick	Wide	Length	Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x Weight	Volume Cubic Inches	Ave. MC %
1,5	3,5	15	1,40	20,60	20,90	20,70	20,90	21,00	29,148	78,75	20,8
1,5	3,5	15	1,62	21,00	20,80	20,90	21,00	21,40	34,0524	78,75	21,0
1,5	3,5	15	1,55	21,40	21,80	21,00	21,00	21,20	33,02656	78,75	21,3
3,5	3,5	15	3,37	22,30	22,40	22,30	22,00	22,00	74,7252	183,75	22,2
3,5	3,5	15	3,71	21,00	21,10	21,00	20,80	20,90	77,84544	183,75	21,0
										0,00	
										0,00	
										0,00	

1,5	0,75	5	0,14			20,30			2,842	5,63	20,3
1,5	0,75	5	0,14			20,60			2,884	5,63	20,6
1,5	0,75	5	0,16			20,30			3,1668	5,63	20,3
1,5	0,75	5	0,11			20,20			2,2624	5,63	20,2
1,5	0,75	5	0,13			19,90			2,587	5,63	19,9
1,5	0,75	5	0,13			20,10			2,5326	5,63	20,1
1,5	0,75	5	0,15			20,40			2,9784	5,63	20,4
1,5	0,75	5	0,16			21,10			3,2916	5,63	21,1
1,5	0,75	5	0,11			21,00			2,394	5,63	21,0
1,5	0,75	5	0,14			21,10			2,9118	5,63	21,1
1,5	0,75	5	0,13			21,00			2,73	5,63	21,0
1,5	0,75	5	0,13			20,80			2,6208	5,63	20,8
1,5	0,75	5	0,15			20,40			3,0192	5,63	20,4
1,5	0,75	5	0,16			20,40			3,264	5,63	20,4
1,5	0,75	5	0,11			20,30			2,3142	5,63	20,3
1,5	0,75	5	0,14			20,30			2,8014	5,63	20,3
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
								SUM MCx	293,3978		20,7 %

Test Load Weight: 13,83 lbs.

Dry Weight: 5,17 kg.

Average Moisture Content: %

Dry: 21,22 Dry(EPA) 21,22 Dry(B415 21,22

21,22 Must be 19-25

Wet: 17,51 must be 15,2-22

Coal Bed Range: 2,8 lbs. to 3,5 lbs.

TEST CHARGE:

Coal bed weight: 2,8 lbs.

Project nu.	PI 20270
Date	20-06-2022
Technicien	M.M

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	10	3330	3340	7	15	3350	3360	32	18	3370	3380	35	3390		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	94,6360	0,1296	0,1287	34,3083	108,7801	0,1289	0,1295	34,4019	108,9466	0,1305	0,1290	34,0466	0,1290	2022-06-16	17:00
Before (6)	94,6361	0,1296	0,1287	34,3084	108,7802	0,1288	0,1294	34,4018	108,9465	0,1305	0,1290	34,0465	0,1291	2022-06-20	11:00
After (1)	94,6366	0,1314	0,1288	34,3113	108,7809	0,1305	0,1298	34,4046	108,9469	0,1346	0,1286	34,0494	0,1293	2022-06-20	21:00
After (2)	94,6363	0,1308	0,1287	34,3093	108,7803	0,1302	0,1295	34,4028	108,9467	0,1344	0,1283	34,0474	0,1291	2022-06-27	08:00
After (3)	94,6362	0,1308	0,1287	34,3093	108,7803	0,1302	0,1295	34,4028	108,9467	0,1344	0,1284	34,0474	0,1291	2022-06-28	08:00
After (4)															
After (5)															
After (6)	94,6362	0,1308	0,1287	34,3093	108,7803	0,1302	0,1295	34,4028	108,9467	0,1344	0,1284	34,0474	0,1291	2022-06-28	08:00
Difference	0,0001	0,0012	0,0000	0,0009	0,0001	0,0014	0,0001	0,0010	0,0002	0,0039	-0,0006	0,0009	0,0000		
Total (mg)		2,2				4,8				4,4			0		
Total ajusté (mg)		**2,20**				**4,80**				**4,40**					

Project nu.	PI 20270
Date	20-06-2022
Technicien	M.M

Demonstration Purpose only Not real Numbers negative mass adjusted to zero

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	10	3330	3340	7	15	3350	3360	32	18	3370	3380	35	3390		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	94,6360	0,1296	0,1287	34,3083	108,7801	0,1289	0,1295	34,4019	108,9466	0,1305	0,1290	34,0466	0,1290	2022-06-16	17:00
Before (6)	94,6361	0,1296	0,1287	34,3084	108,7802	0,1288	0,1294	34,4018	108,9465	0,1305	0,1290	34,0465	0,1291	2022-06-20	11:00
After (1)	94,6366	0,1314	0,1288	34,3113	108,7809	0,1305	0,1298	34,4046	108,9469	0,1346	0,1286	34,0494	0,1293	2022-06-20	21:00
After (2)	94,6363	0,1308	0,1287	34,3093	108,7803	0,1302	0,1295	34,4028	108,9467	0,1344	0,1283	34,0474	0,1291	2022-06-27	08:00
After (3)	94,6362	0,1308	0,1287	34,3093	108,7803	0,1302	0,1295	34,4028	108,9467	0,1344	0,1284	34,0474	0,1291	2022-06-28	08:00
After (4)															
After (5)															
After (6)	94,6362	0,1308	0,1287	34,3093	108,7803	0,1302	0,1295	34,4028	108,9467	0,1344	0,1290	34,0474	0,1291	2022-06-28	08:00
Difference	0,0001	0,0012	0,0000	0,0009	0,0001	0,0014	0,0001	0,0010	0,0002	0,0039	0,0000	0,0009	0,0000		
Total (mg)		2,2				4,8				5			0		
Total ajusté (mg)		**2,20**				**4,80**				**5,00**					

Project nu.	PI 20270
Date	20-06-2022
Technicien	M.M

SFBA EPA EMISSION RESULTS

Test Duration: **341** min

PRESSURE FACTOR:	DGM 1	0,97260	
	DGM 2	0,97542	
	DGM 3	0,99930	
TEMPERATURE FACTORS	DGM 1	0,97959	
	DGM 2	0,97088	
	DGM 3	0,98104	
VOLUMES SAMPLED	DGM 1	63,608	SCft
	DGM 2	61,878	Scft
	DGM 3	52,906	SCft

TOTAL TUNNEL VOLUME : 119473

SAMPLE RATIOS

Sample Train 1:	1878,283
Sample Train 2:	1930,775

Paticulate concentration

Sample Train 1	**0,000075**	g/dscf
Sample Train 2	**0,000071**	g/dscf
Room	**0,000000**	g/dscf

TOTAL EMISSIONS

Sample Train 1	**9,02**	g
Sample Train 2	**8,50**	g

EMISSION RATES

Sample Train 1	**1,59**	g/hr
Sample Train 2	**1,49**	g/hr
1st hour emission rate	**4,13**	g/hr

	Train 1	Train 2
Cs	7,546E-05	7,11073E-05

RESULTS

Average emission rate: 1,5 g/hr

Burn Rate : 0,910 Dry kg/hr

BAROMETRIC PRESSURE

Average:	29,899114	in Hg
Start:	29,913879	in Hg
End:	29,884349	in Hg

DGM CONTROLLER VALUES

DGM 1	Final:	23087,939	Cuft
	Initial:	23021,611	Cuft
DGM 2	Final:	14185,210	Cuft
	Initial:	14120,224	Cuft
DGM #3	Final:	13723,566	Cuft
	Initial:	13668,953	Cuft

TEMPERATURES

DGM 1	539,003	°R
DGM 2	543,834	°R

CALIBRATION FACTORS

DGM 1	1,0066
DGM 2	1,0054
DGM #3	0,9882

TUNNEL FLOW RATE: 350,361 Dscfm

PARTICULATE CATCH

Total Sample Train 1:	4,80	mg
Total Sample Train 2:	4,40	mg
Total Sample Train 1 1st hour:	2,20	mg

DEVIATION: 2,97%

Elapsed Time min	Raw data mm	Weight Remaining lb	CO %	CO_2 %	O_2 %	Flue Gas °F	Room Temp °F	Tunnel Dry Bulb °F	Unit Top °F	Unit Back °F	Unit [illegible] °F	Unit L Side °F	Unit Bottom °F	Catalyst °F	Draw Gauge 1 Reading	DGM 1 Inlet T °F	DGM 1 Outlet T °F	Filter 1 Temp °F	Draw Gauge 2 Reading	DGM 2 Inlet T °F	DGM 2 Outlet T °F	Filter 2 Temp °F	Tunnel static Pressure in wc	Flue draft Pressure in wc	Change in Surface Temp. °F
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

102,0	458,0	6,0	0,8	14,1	368,0	344,8	77,8	60,2	458,2	314,2	381,7	366,7	330,3	1003,8	0,19	78,74	78,08	80,64	0,18	83,83	82,60	82,83	0,08	0,00	-51,62488
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
206,0	552,0	1,9	0,2	8,1	382,8	341,3	79,0	88,4	333,0	380,0	441,3	428,7	330,4	710,2	0,19	80,48	79,78	82,82	0,18	88,84	88,01	83,39	0,08	0,00	-37,44291
207,0	553,0	1,9	0,2	8,1	382,5	340,8	79,0	88,4	333,6	380,0	440,8	428,4	330,6	709,8	0,19	80,41	79,78	82,83	0,18	88,84	88,03	83,40	0,08	0,00	-37,69371

108,0	564,0	1,0	0,2	8,1	381,8	340,5	78,7	88,4	331,5	382,3	439,8	424,8	330,8	708,7	0,10	80,44	79,77	82,53	0,18	88,59	88,05	83,38	0,08	0,00	-38,11960
109,0	565,0	1,0	0,2	8,1	381,8	340,2	78,9	88,6	330,9	382,5	439,5	424,6	331,2	708,9	0,10	80,55	79,81	82,56	0,18	88,64	88,07	83,38	0,08	0,00	-38,11158
110,0	566,0	1,0	0,2	8,0	381,4	340,6	79,0	88,6	330,4	382,7	439,0	424,3	331,3	709,2	0,10	80,59	79,82	82,55	0,18	88,68	88,08	83,41	0,08	0,00	-38,07808
111,0	567,0	1,0	0,2	8,0	381,3	340,2	79,0	88,5	329,4	382,8	438,5	424,3	331,6	709,3	0,10	80,61	79,84	82,57	0,18	88,67	88,11	83,41	0,08	0,00	-38,77236
113,0	568,0	1,0	0,2	7,9	380,8	339,8	79,1	88,5	327,1	382,8	438,1	424,0	331,9	709,7	0,10	80,56	79,85	82,56	0,18	88,63	88,13	83,42	0,08	0,00	-39,12674
113,0	569,0	1,8	0,3	7,8	380,4	339,7	79,0	88,5	325,7	382,8	437,7	423,8	332,3	709,8	0,10	80,52	79,84	82,58	0,18	88,67	88,16	83,43	0,08	0,00	-39,4802
114,0	570,0	1,8	0,3	7,8	380,3	340,0	79,0	88,5	324,6	382,9	437,6	423,3	332,7	710,3	0,10	80,48	79,84	82,58	0,18	88,68	88,17	83,42	0,08	0,00	-39,84391
115,0	571,0	1,8	0,3	7,3	380,0	339,7	79,0	88,6	323,8	383,0	436,8	423,0	333,0	710,7	0,10	80,41	79,83	82,56	0,18	88,63	88,16	83,41	0,08	0,00	-39,91101
116,0	572,0	1,8	0,3	7,3	379,7	339,4	79,0	88,6	322,8	382,7	436,3	422,8	333,5	711,8	0,10	80,34	79,81	82,54	0,18	88,58	88,14	83,44	0,08	0,00	-40,23864
117,0	573,0	1,8	0,3	7,3	379,3	339,0	78,9	88,6	322,7	382,4	436,0	422,5	333,8	718,1	0,10	80,31	79,80	82,57	0,18	88,48	88,16	83,44	0,08	0,00	-40,64893
118,0	574,0	1,8	0,3	7,2	378,8	338,4	78,8	88,4	321,8	382,2	435,1	421,8	333,8	718,6	0,10	80,43	79,83	82,55	0,18	88,58	88,17	83,41	0,08	0,00	-41,09538
119,0	575,0	1,8	0,3	7,2	378,5	338,4	79,0	88,5	321,0	381,8	434,7	421,4	333,8	718,4	0,10	80,48	79,84	82,59	0,18	88,62	88,18	83,44	0,08	0,00	-41,41617
120,0	576,0	1,8	0,3	7,2	378,1	338,6	79,1	88,4	319,8	381,7	434,1	421,0	333,8	717,8	0,10	80,51	79,84	82,59	0,18	88,63	88,18	83,48	0,08	0,00	-41,85602
121,0	577,0	1,7	0,3	7,3	377,8	338,4	79,1	88,3	318,7	381,1	433,7	420,8	333,6	717,3	0,10	80,47	79,84	82,58	0,18	88,54	88,20	83,48	0,07	0,00	-42,32702
122,0	578,0	1,7	0,3	7,3	377,1	338,3	79,2	88,3	317,7	380,8	433,3	420,0	334,1	717,1	0,10	80,48	79,84	82,59	0,18	88,53	88,22	83,44	0,08	0,00	-42,80601
123,0	579,0	1,7	0,3	7,3	376,8	338,2	79,1	88,3	317,0	380,1	432,9	419,4	334,3	717,1	0,10	80,43	79,84	82,58	0,18	88,50	88,23	83,48	0,08	0,00	-43,31981
124,0	580,0	1,7	0,4	7,3	376,2	338,0	79,0	88,2	316,3	379,6	431,8	419,1	334,3	716,8	0,10	80,41	79,84	82,59	0,18	88,50	88,22	83,43	0,08	0,00	-43,72427
125,0	581,0	1,7	0,4	7,3	375,7	338,7	78,9	88,2	315,6	379,0	431,3	418,6	334,6	716,4	0,10	80,39	79,85	82,59	0,18	88,47	88,24	83,41	0,08	0,00	-44,36741
126,0	582,0	1,7	0,4	7,3	375,3	338,4	79,0	88,2	314,9	378,4	430,8	418,1	334,8	716,7	0,10	80,39	79,82	82,57	0,18	88,41	88,24	83,43	0,08	0,00	-44,76578
127,0	583,0	1,6	0,4	7,3	374,8	337,8	78,7	88,3	313,8	377,8	430,8	417,7	334,6	716,3	0,10	80,31	79,83	82,54	0,18	88,40	88,27	83,39	0,08	0,00	-45,32824
128,0	584,0	1,7	0,4	7,3	374,1	337,7	78,8	88,3	313,7	377,2	430,1	416,3	334,4	716,3	0,10	80,42	79,87	82,58	0,18	88,34	88,26	83,40	0,08	0,00	-45,86366
129,0	585,0	1,6	0,4	7,3	373,6	338,1	78,9	88,8	312,8	376,4	429,5	415,8	334,3	716,6	0,10	80,50	79,91	82,61	0,18	88,61	88,28	83,46	0,08	0,00	-46,36038
130,0	586,0	1,6	0,4	7,2	373,0	337,7	79,0	88,8	311,4	376,0	427,8	415,5	334,4	717,0	0,10	80,52	79,90	82,63	0,18	88,61	88,28	83,47	0,08	0,00	-46,89656
131,0	587,0	1,6	0,4	7,2	372,5	338,3	79,1	88,3	310,5	376,2	427,3	415,3	334,4	717,3	0,10	80,47	79,91	82,61	0,18	88,58	88,34	83,44	0,08	0,00	-47,44106
132,0	588,0	1,6	0,4	7,2	372,1	338,1	79,1	88,3	310,0	374,8	426,8	414,8	334,5	716,3	0,10	80,38	79,91	82,59	0,18	88,51	88,34	83,44	0,08	0,00	-47,79367
133,0	589,0	1,6	0,4	7,2	371,6	337,8	79,1	88,1	309,3	374,1	426,0	414,0	334,5	715,7	0,10	80,38	79,90	82,61	0,18	88,52	88,38	83,44	0,08	0,00	-48,38808
134,0	590,0	1,6	0,4	7,3	371,2	337,6	79,1	88,3	308,7	373,4	425,1	413,4	334,3	714,8	0,10	80,38	79,90	82,62	0,18	88,52	88,41	83,44	0,08	0,00	-48,81484
135,0	591,0	1,5	0,4	7,3	370,6	337,6	79,1	88,4	307,8	373,0	424,4	413,1	334,6	714,3	0,10	80,34	79,91	82,65	0,18	88,52	88,43	83,48	0,08	0,00	-49,37366
136,0	592,0	1,5	0,4	7,3	370,1	337,8	79,1	88,2	307,0	372,4	423,8	412,8	334,7	714,3	0,10	80,29	79,91	82,63	0,18	88,47	88,41	83,48	0,08	0,00	-49,83560
137,0	593,0	1,5	0,4	7,2	369,7	337,5	79,1	88,1	306,6	371,9	423,2	412,3	334,7	714,8	0,10	80,27	79,88	82,61	0,18	88,45	88,43	83,44	0,08	0,00	-50,32030
138,0	594,0	1,5	0,4	7,2	369,1	337,8	79,1	88,3	305,8	371,3	422,3	411,8	334,7	714,8	0,10	80,30	79,89	82,62	0,18	88,44	88,48	83,48	0,07	0,00	-50,78671
139,0	595,0	1,4	0,4	7,2	368,7	337,7	79,1	88,3	305,5	370,8	421,4	411,3	334,8	715,2	0,10	80,33	79,89	82,63	0,18	88,46	88,44	83,44	0,08	0,00	-51,21816
140,0	596,0	1,4	0,4	7,2	368,3	337,9	79,1	88,2	304,7	370,3	420,7	410,8	334,8	715,2	0,10	80,37	79,88	82,62	0,18	88,48	88,47	83,44	0,08	0,00	-51,64643
141,0	597,0	1,4	0,4	7,2	367,8	337,9	79,0	88,2	304,1	369,7	420,3	410,4	334,6	715,4	0,10	80,34	79,90	82,61	0,18	88,48	88,46	83,48	0,08	0,00	-52,11168
142,0	598,0	1,4	0,4	7,2	367,2	338,8	78,8	88,3	304,0	368,8	419,3	409,8	334,3	713,2	0,10	80,33	79,90	82,62	0,18	88,48	88,48	83,42	0,08	0,00	-52,70844
143,0	599,0	1,4	0,4	6,9	366,7	338,1	78,7	88,4	303,7	368,3	418,7	409,3	333,9	713,4	0,10	80,41	79,91	82,63	0,18	88,57	88,48	83,44	0,08	0,00	-53,21798
144,0	600,0	1,4	0,5	6,8	366,1	338,2	79,1	88,4	303,4	367,8	417,8	408,8	333,8	713,2	0,10	80,46	79,94	82,63	0,18	88,59	88,48	83,47	0,08	0,00	-53,82792
145,0	601,0	1,4	0,5	6,8	365,4	338,1	79,2	88,2	301,7	367,1	417,1	408,1	333,8	712,5	0,10	80,43	79,94	82,64	0,18	88,52	88,47	83,48	0,08	0,00	-54,35844
146,0	602,0	1,3	0,5	6,8	365,1	338,4	79,2	88,2	301,8	366,8	417,0	407,8	333,4	712,4	0,10	80,38	79,94	82,64	0,18	88,52	88,48	83,48	0,08	0,00	-54,7837
147,0	603,0	1,4	0,5	6,8	364,4	338,1	79,1	88,2	300,8	366,4	416,4	407,5	333,3	712,5	0,10	80,33	79,96	82,64	0,18	88,52	88,53	83,48	0,08	0,00	-55,40977
148,0	604,0	1,3	0,5	6,8	363,7	338,1	79,1	88,0	300,1	365,7	415,9	406,7	332,8	717,8	0,10	80,37	79,96	82,64	0,18	88,52	88,50	83,48	0,08	0,00	-56,20178
149,0	605,0	1,3	0,5	6,4	363,2	338,7	79,1	88,1	300,0	362,7	414,7	406,2	332,4	717,2	0,10	80,40	79,97	82,59	0,18	88,57	88,51	83,42	0,08	0,00	-56,72991
150,0	606,0	1,3	0,5	6,4	362,7	338,6	79,1	88,2	299,3	361,8	414,1	405,8	332,4	716,8	0,10	80,38	79,96	82,61	0,18	88,54	88,54	83,42	0,08	0,00	-57,26804
151,0	607,0	1,3	0,5	6,4	362,0	338,7	79,1	87,9	298,8	360,8	413,2	405,4	332,1	716,8	0,10	80,31	79,94	82,62	0,18	88,48	88,52	83,42	0,08	0,00	-57,85866
152,0	608,0	1,3	0,5	6,3	361,4	338,2	79,0	88,0	298,1	359,4	412,5	404,8	331,8	714,0	0,10	80,28	79,99	82,61	0,18	88,48	88,52	83,39	0,08	0,00	-58,40967
153,0	609,0	1,3	0,4	6,3	360,8	338,4	79,0	88,0	297,2	358,1	411,8	404,8	331,8	713,8	0,10	80,28	79,94	82,58	0,18	88,48	88,52	83,42	0,08	0,00	-59,27838
154,0	610,0	1,3	0,4	6,2	360,3	334,0	79,1	88,0	296,8	356,7	410,9	404,0	331,2	710,8	0,10	80,23	79,93	82,58	0,18	88,43	88,51	83,42	0,08	0,00	-60,02301
155,0	611,0	1,3	0,4	6,2	359,3	334,6	79,0	88,0	296,1	355,6	410,3	403,5	330,7	709,8	0,10	80,28	79,93	82,57	0,18	88,44	88,52	83,41	0,08	0,00	-60,68619
156,0	612,0	1,3	0,4	6,2	358,8	334,7	79,1	88,0	295,7	354,3	409,4	403,0	330,2	708,8	0,10	80,28	79,93	82,60	0,18	88,43	88,52	83,43	0,08	0,00	-61,38831
157,0	613,0	1,3	0,4	6,2	358,2	334,7	79,1	88,1	295,3	353,2	408,7	402,5	329,8	708,8	0,10	80,30	79,93	82,58	0,18	88,48	88,54	83,44	0,08	0,00	-61,98594
158,0	614,0	1,3	0,4	6,8	357,1	333,8	79,1	87,9	294,6	351,7	407,8	402,0	329,8	708,6	0,10	80,30	79,93	82,59	0,18	88,48	88,57	83,42	0,08	0,00	-62,79274
159,0	615,0	1,2	0,4	6,8	356,4	333,8	79,1	88,0	294,1	350,7	406,8	401,3	329,0	708,2	0,10	80,34	79,97	82,57	0,18	88,46	88,56	83,42	0,08	0,00	-63,50426
160,0	616,0	1,2	0,4	6,8	355,7	333,8	79,1	88,0	293,6	349,7	406,2	400,7	328,6	708,4	0,10	80,36	79,91	82,56	0,18	88,47	88,57	83,42	0,08	0,00	-64,19439
161,0	617,0	1,2	0,5	6,4	355,0	333,2	79,1	87,9	293,0	348,8	405,3	400,2	328,2	710,0	0,10	80,37	79,93	82,55	0,18	88,48	88,57	83,40	0,07	0,00	-64,87716
162,0	618,0	1,1	0,5	6,3	354,4	333,8	79,1	88,0	292,4	347,9	404,7	399,8	327,8	710,8	0,10	80,36	79,94	82,54	0,18	88,48	88,59	83,42	0,08	0,00	-65,5281
163,0	619,0	1,1	0,5	6,2	353,7	333,8	79,1	87,8	291,9	346,3	403,9	399,0	327,5	710,3	0,10	80,37	79,93	82,56	0,18	88,48	88,59	83,40	0,08	0,00	-66,18621
164,0	620,0	1,1	0,5	6,2	353,1	334,1	78,9	87,8	291,2	345,1	403,3	398,4	327,2	710,7	0,10	80,38	79,92	82,53	0,18	88,42	88,61	83,39	0,07	0,00	-66,86589
165,0	621,0	1,1	0,5	6,2	352,3	334,3	79,1	87,8	290,7	344,0	402,3	397,8	326,7	722,1	0,10	80,41	79,92	82,54	0,18	88,48	88,60	83,42	0,08	0,00	-67,64862
166,0	622,0	1,1	0,5	6,2	351,7	334,4	79,1	88,0	290,4	343,1	401,7	396,8	326,4	723,3	0,10	80,39	79,92	82,57	0,18	88,42	88,58	83,39	0,08	0,00	-68,24262
167,0	623,0	1,1	0,5	6,3	351,0	334,7	79,1	87,9	289,8	342,1	400,8	396,1	326,1	723,8	0,10	80,33	79,90	82,54	0,18	88,38	88,61	83,41	0,08	0,00	-68,82823
168,0	624,0	1,1	0,5	6,3	350,3	334,1	79,0	87,9	289,4	340,8	400,0	395,4	325,7	724,1	0,10	80,32	79,94	82,58	0,18	88,39	88,60	83,40	0,08	0,00	-69,43411
169,0	625,0	1,1	0,5	6,4	349,8	333,2	79,0	87,9	288,8	340,1	399,2	394,8	325,4	724,7	0,10	80,34	79,92	82,51	0,18	88,40	88,60	83,39	0,08	0,00	-70,20334
170,0	626,0	1,0	0,5	6,3	349,0	333,8	79,0	88,0	288,5	338,3	398,3	393,8	325,1	724,8	0,10	80,31	79,91	82,51	0,18	88,38	88,60	83,41	0,08	0,00	-70,8707
171,0	627,0	1,0	0,5	6,4	348,3	333,7	79,0	87,9	287,8	338,2	397,5	393,0	324,8	727,6	0,10	80,31	79,91	82,53	0,18	88,40	88,62	83,43	0,08	0,00	-71,4691
172,0	628,0	1,0	0,5	6,7	347,7	333,7	79,0	87,9	287,4	337,4	396,8	392,4	324,5	733,1	0,10	80,31	79,92	82,51	0,18	88,42	88,60	83,39	0,08	0,00	-72,24182
173,0	629,0	1,0	0,5	6,6	347,1	333,8	79,0	87,9	287,0	336,8	396,1	391,8	324,3	738,6	0,10	80,29	79,91	82,50	0,18	88,39	88,62	83,38	0,07	0,00	-72,79432
174,0	630,0	1,0	0,5	6,6	346,4	334,2	79,1	87,9	286,5	335,8	395,5	391,2	324,0	736,0	0,10	80,31	79,90	82,52	0,18	88,39	88,62	83,39	0,08	0,00	-73,47468
175,0	631,0	1,0	0,5	6,6	345,8	334,4	79,0	88,0	286,3	335,0	394,8	390,1	323,7	736,6	0,10	80,33	79,92	82,51	0,18	88,41	88,63	83,38	0,08	0,00	-74,02638
176,0	632,0	1,0	0,5	6,6	345,3	334,3	79,0	87,9	285,8	334,3	393,6	389,5	323,5	734,8	0,10	80,35	79,91	82,51	0,18	88,48	88,64	83,40	0,08	0,00	-74,59488
177,0	633,0	0,9	0,5	6,6	344,7	334,1	79,0	87,9	285,5	333,6	392,8	388,9	323,2	733,8	0,10	80,34	79,94	82,49	0,18	88,45	88,65	83,41	0,07	0,00	-75,21487
178,0	634,0	0,9	0,5	6,4	344,2	334,0	79,0	87,9	285,3	332,7	392,1	388,2	322,8	733,8	0,10	80,36	79,94	82,50	0,18	88,48	88,66	83,40	0,08	0,00	-75,72813
179,0	635,0	0,9	0,5	6,4	343,7	334,1	79,0	88,0	284,8	331,8	391,6	387,5	322,7	731,4	0,10	80,34	79,94	82,51	0,18	88,43	88,66	83,43	0,08	0,00	-76,24868
180,0	636,0	0,9	0,5	6,3	343,1	333,9	79,0	87,9	284,5	331,3	390,8	386,7	322,4	730,3	0,10	80,36	79,95	82,51	0,18	88,42	88,64	83,42	0,08	0,00	-76,82639
181,0	637,0	0,9	0,5	6,3	342,7	333,8	79,0	88,0	284,0	330,7	390,0	386,0	322,1	728,8	0,10	80,35	79,94	82,50	0,18	88,48	88,64	83,42	0,08	0,00	-77,24084
182,0	638,0	0,9	0,5	6,3	342,2	334,1	79,0	87,9	284,2	330,1	389,4	385,3	321,9	727,1	0,10	80,37	79,94	82,50	0,18	88,48	88,65	83,40	0,08	0,00	-77,7926
183,0	639,0	0,9	0,5	6,2	341,7	333,8	79,0	87,9	283,9	329,5	388,8	384,7	321,7	726,3	0,10	80,37	79,95	82,48	0,18	88,44	88,64	83,39	0,08	0,00	-78,23389
184,0	640,0	0,8	0,5	6,2	341,2	333,6	79,0	88,0	283,4	328,8	387,9	384,1	321,5	723,8	0,10	80,32	79,93	82,49	0,18	88,43	88,64	83,40	0,08	0,00	-78,78323
185,0	641,0	0,9	0,5	6,2	340,7	333,1	79,0	88,0	283,1	328,3	387,3	383,5	321,3	722,8	0,10	80,33	79,95	82,49	0,18	88,43	88,64	83,40	0,08	0,00	-79,2238
186,0	642,0	0,8	0,5	6,2	340,2	334,0	79,0	87,9	282,8	327,8	386,8	382,9	321,1	722,1	0,10	80,33	79,95	82,51	0,18	88,41	88,67	83,40	0,08	0,00	-79,66858
187,0	643,0	0,8	0,5	6,2	339,8	334,0	79,0	87,9	282,6	327,3	386,2	382,3	320,9	720,3	0,10	80,36	79,95	82,49	0,18	88,42	88,64	83,38	0,08	0,00	-80,13358
188,0	644,0	0,8	0,5	6,2	339,4	333,8	79,0	87,9	282,4	326,8	385,5	381,7	320,7	718,4	0,10	80,37	79,96	82,48	0,18	88,43	88,64	83,40	0,07	0,00	-80,59774
189,0	645,0	0,8	0,5	6,2	338,8	334,3	78,9	88,0	282,0	326,3	384,8	381,1	320,5	718,8	0,10	80,38	79,95	82,50	0,18	88,43	88,65	83,41	0,08	0,00	-81,04863
190,0	646,0	0,8	0,5	6,2	338,5	334,3	79,0	88,0	281,8	325,8	384,2	380,5	320,3	718,4	0,10	80,38	79,94	82,50	0,18	88,42	88,63	83,42	0,07	0,00	-81,40488
191,0	647,0	0,8	0,5	6,2	337,9	334,1	79,0	87,9	281,5	325,1	383,5	379,9	319,9	716,2	0,10	80,38	79,97	82,48	0,18	88,41	88,63	83,42	0,08	0,00	-82,02439
192,0	648,0	0,8	0,5	6,1	337,5	333,6	79,0	87,9	281,1	324,6	382,8	379,3	319,7	716,2	0,10	80,38	79,94	82,48	0,18	88,38	88,64	83,39	0,08	0,00	-82,39233
193,0	649,0	0,7	0,4	6,1	337,1	333,2	79,1	87,9	280,9	324,4	382,1	378,8	319,5	713,8	0,10	80,34	79,94	82,47	0,18	88,37	88,65	83,43	0,08	0,00	-82,78673
194,0	650,0	0,7	0,5	6,1	336,7	332,8	79,0	87,9	280,4	324,0	381,3	378,3	319,3	711,3	0,10	80,38	79,94	82,47	0,18	88,38	88,63	83,43	0,08	0,00	-83,24823
195,0	651,0	0,7	0,5	6,1	336,2	332,0	79,0	87,8	279,9	323,6	380,6	377,7	319,1	711,1	0,10	80,38	79,94	82,50	0,18	88,39	88,63	83,40	0,08	0,00	-83,75022
196,0	652,0	0,7	0,5	6,2	335,8	332,1	79,0	87,8	279,6	323,2	379,8	377,2	319,0	708,1	0,10	80,34	79,95	82,47	0,18	88,34	88,63	83,41	0,07	0,00	-84,19507
197,0	653,0	0,7	0,5	6,3	335,4	332,0	79,0	87,8	279,3	322,8	379,3	376,7	318,8	710,2	0,10	80,36	79,94	82,48	0,18	88,32	88,62	83,39	0,08	0,00	-84,61924
198,0	654,0	0,7	0,5	6,3	334,9	332,2	79,0	87,8	278,8	322,4	378,7	376,3	318,7	713,2	0,10	80,36	79,94	82,48	0,18	88,31	88,62	83,39	0,08	0,00	-84,94528
199,0	655,0	0,7	0,5	6,4	334,5	332,6	79,0	87,8	278,4	322,0	377,9	375,8	318,5	713,8	0,10	80,32	79,96	82,47	0,18	88,31	88,64	83,39	0,08	0,00	-85,38384
200,0	656,0	0,6	0,5	6,4	334,3	332,4	79,0	87,8	278,2	322,1	377,2	375,3	318,5	713,2	0,10	80,38	79,97	82,49	0,18	88,32	88,62	83,38	0,08	0,00	-85,65510
201,0	657,0	0,6	0,5	6,4	333,8	332,6	79,0	87,8	278,1	321,8	376,3	374,8	318,4	714,2	0,10	80,38	79,96	82,47	0,18	88,33	88,62	83,40	0,08	0,00	-86,02041
202,0	658,0	0,6	0,5	6,7	333,5	332,7	79,0	87,7	277,8	321,8	375,6	374,5	318,3	716,2	0,10	80,37	79,94	82,48	0,18	88,33	88,62	83,37	0,08	0,00	-86,38489
203,0	659,0	0,6	0,5	6,5	333,2	332,8	78,9	87,8	277,2	321,7	375,0	373,8	318,2	721,3	0,10	80,34	79,99	82,48	0,18	88,32	88,62	83,37	0,08	0,00	-86,7018
204,0	660,0	0,6	0,5	6,5	333,0	333,2	79,0	87,8	277,1	321,7	374,4	373,5	318,3	723,0	0,10	80,38	79,99	82,44	0,18	88,34	88,62	83,41	0,08	0,00	-86,93637
205,0	661,0	0,6	0,5	6,6	332,7	333,3	79,0	87,7	276,7	321,7	373,8	373,0	318,3	724,8	0,10	80,31	79,97	82,44	0,18	88,32	88,63	83,39	0,08	0,00	-87,22869
206,0	662,0	0,6	0,5	6,6	332,4	333,1	78,9	87,8	276,3	321,7	373,3	372,6	318,3	726,8	0,10	80,32	79,98	82,48	0,18	88,31	88,63	83,39	0,08	0,00	-87,61613
207,0	663,0	0,6	0,5	6,5	332,1	333,2	79,0	87,8	276,0	321,8	372,8	372,0	318,3	728,8	0,10	80,31	79,99

314,0	670,0	0,4	0,8	6,3	330,3	233,3	78,9	87,7	274,0	332,2	368,0	368,8	338,4	718,3	0,10	80,33	80,00	83,48	0,18	88,34	88,88	83,38	0,08	0,00	-88,6239
315,0	671,0	0,4	0,8	6,2	330,1	232,8	78,9	87,7	273,9	332,4	367,8	368,4	338,4	718,2	0,10	80,31	80,00	83,43	0,18	88,30	88,86	83,38	0,07	0,00	-89,80263
316,0	672,0	0,4	0,8	6,2	329,8	232,3	78,9	87,6	273,8	332,4	367,6	367,8	338,4	717,4	0,10	80,32	79,99	83,48	0,18	88,32	88,80	83,36	0,07	0,00	-90,07671
317,0	673,0	0,4	0,8	6,1	329,8	232,1	78,9	87,6	273,3	332,3	366,3	367,3	338,3	716,2	0,10	80,29	80,00	83,44	0,18	88,30	88,87	83,37	0,08	0,00	-90,38011
318,0	674,0	0,4	0,8	6,1	329,3	232,1	78,9	87,6	272,8	332,5	365,6	367,1	338,3	714,8	0,10	80,30	80,00	83,43	0,18	88,29	88,88	83,38	0,07	0,00	-90,65793
319,0	675,0	0,4	0,8	6,1	329,0	231,7	78,9	87,6	272,6	332,4	364,9	366,6	338,3	713,1	0,10	80,29	79,99	83,42	0,18	88,28	88,87	83,33	0,08	0,00	-90,68361
320,0	676,0	0,4	0,8	6,1	328,8	231,3	78,9	87,5	272,5	332,7	364,7	366,3	338,3	711,9	0,10	80,27	79,99	83,41	0,18	88,26	88,86	83,34	0,08	0,00	-91,01864
321,0	677,0	0,3	0,8	6,1	328,6	231,4	78,9	87,5	272,3	332,8	364,3	365,8	338,2	711,1	0,10	80,28	80,00	83,43	0,18	88,27	88,88	83,34	0,08	0,00	-91,31838
322,0	678,0	0,3	0,4	6,0	328,3	231,1	78,9	87,5	271,9	332,7	363,7	365,3	338,1	710,1	0,10	80,30	79,99	83,41	0,18	88,28	88,86	83,33	0,08	0,00	-91,58196
323,0	679,0	0,3	0,4	6,0	328,1	230,8	78,9	87,5	271,4	332,8	363,3	364,9	338,1	709,1	0,10	80,27	79,98	83,39	0,18	88,27	88,86	83,31	0,08	0,00	-91,82279
324,0	680,0	0,3	0,4	6,0	327,8	231,1	78,9	87,4	271,1	332,8	362,6	364,4	338,0	708,8	0,10	80,27	79,99	83,42	0,18	88,27	88,85	83,32	0,08	0,00	-92,131
325,0	681,0	0,3	0,4	5,7	327,8	231,2	78,9	87,4	270,7	332,8	362,2	364,0	337,9	708,1	0,10	80,23	79,98	83,40	0,18	88,23	88,85	83,30	0,08	0,00	-92,38041
326,0	682,0	0,3	0,3	5,4	327,3	229,0	78,8	87,4	270,6	332,8	361,8	363,6	337,8	481,4	0,10	80,24	79,99	83,40	0,18	88,25	88,84	83,33	0,08	0,00	-92,39484
327,0	683,0	0,2	0,3	7,3	327,1	228,1	78,9	87,4	270,3	332,8	361,1	363,3	338,0	472,7	0,10	80,27	79,99	83,37	0,18	88,26	88,83	83,30	0,07	0,00	-92,80441
328,0	684,0	0,2	0,3	7,2	327,0	227,0	78,8	87,3	270,0	332,8	360,6	362,8	338,3	469,2	0,10	80,27	80,00	83,37	0,18	88,26	88,83	83,28	0,07	0,00	-92,60848
329,0	685,0	0,2	0,3	7,1	326,9	226,5	78,8	87,3	269,8	333,1	360,0	362,8	338,7	462,3	0,10	80,26	79,99	83,34	0,18	88,26	88,87	83,30	0,08	0,00	-92,99875
330,0	686,0	0,2	0,3	7,4	326,8	224,9	78,8	87,3	269,1	333,2	360,3	362,7	339,0	447,8	0,10	80,28	79,98	83,38	0,18	88,26	88,85	83,26	0,08	0,00	-93,09233
331,0	687,0	0,2	0,3	7,6	326,8	223,7	78,8	87,3	268,8	333,3	360,0	362,7	339,0	440,8	0,10	80,27	79,99	83,38	0,18	88,27	88,85	83,27	0,08	0,00	-93,0947
332,0	688,0	0,1	0,3	7,5	326,8	222,7	78,8	87,3	268,5	333,3	359,8	362,7	339,0	438,8	0,10	80,26	79,99	83,34	0,18	88,25	88,87	83,27	0,07	0,00	-93,06333
333,0	689,0	0,2	0,3	7,3	326,8	221,8	78,8	87,2	268,3	333,3	359,7	362,8	339,0	437,8	0,10	80,29	80,00	83,32	0,18	88,30	88,86	83,28	0,08	0,00	-93,00084
334,0	690,0	0,1	0,3	7,1	327,0	220,8	78,8	87,1	267,9	333,3	359,6	363,1	339,2	437,4	0,10	80,27	79,98	83,31	0,18	88,28	88,86	83,23	0,08	0,00	-92,84507
335,0	691,0	0,1	0,3	7,0	327,1	220,3	78,8	87,1	267,6	333,3	359,5	363,4	339,4	436,8	0,10	80,28	79,99	83,29	0,18	88,30	88,86	83,21	0,08	0,00	-92,85983
336,0	692,0	0,1	0,3	7,1	327,2	219,8	78,8	87,1	267,4	333,3	359,6	363,7	339,6	436,8	0,10	80,26	80,00	83,28	0,18	88,30	88,84	83,20	0,08	0,00	-92,70803
337,0	693,0	0,1	0,3	7,0	327,3	219,0	78,8	86,9	267,0	333,3	359,2	364,1	339,8	436,8	0,10	80,23	80,00	83,26	0,18	88,27	88,83	83,18	0,08	0,00	-92,67378
338,0	694,0	0,1	0,3	6,9	327,4	218,8	78,8	87,0	266,8	333,2	359,3	364,5	339,1	436,2	0,10	80,21	79,98	83,27	0,18	88,24	88,81	83,18	0,08	0,00	-92,80996
339,0	695,0	0,1	0,2	6,9	327,6	218,2	78,8	87,0	266,4	333,2	359,5	365,0	339,8	434,8	0,10	80,22	79,99	83,30	0,18	88,25	88,84	83,16	0,08	0,00	-92,37348
340,0	696,0	0,1	0,2	6,9	327,7	217,8	78,8	86,9	266,0	333,1	359,3	365,4	324,8	434,1	0,10	80,24	79,99	83,28	0,18	88,26	88,84	83,17	0,08	0,00	-92,29828
341,0	697,0	0,0	0,2	6,8	327,8	217,1	78,8	86,9	265,5	333,2	359,1	365,9	326,2	434,3	0,10	80,20	79,99	83,26	0,18	88,25	88,84	83,17	0,08	0,00	-92,19284

Manufacturer: HEARTHSTONE
Model: 8031

Run: 6
Project #: PI 20270
Test Duration: 341 min

	HHV	LHV
Eff	77,96%	84,26%
Comb Eff	97,45%	97,45%
HT Eff	80,00%	86,47%
Output	14 063	Btu/h
Burn Rate	0,91	kg/h
Grams CO	208	g
Input	18 038	Btu/h
MC wet	17,51	
Averages	6,23	6,24

Note: In the "Input data", "Calc. % O_2", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [e], [b], [c], [h], [d], [e], [j], and [k] refer to their respective variables in Clauses

Ultimate CO_2
$CO_{2\,ult}$ 19,64
r_s
1,061

Overall Heating Efficiency: 77,96%
Combustion Efficiency: 97,45%
Heat Transfer Efficiency: 80,00%

Heat Output: 13 340 Btu/h
Heat Input: 17 111 Btu/h
Burn Duration: 5,68 h
Burn Rate: 2,01 lb/h
Stack Temp: 263,7 Deg. F

				1,67	20,77	11,97	128,78	25,67	0,97	0,80	0,78
INPUT DATA				Oxygen Calculation			Input Data		Combust	Heat	Net
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO_2 [d]	Excess Air EA	Meas O_2	Calc. % O_2 [g]	Flue Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %
0,00	6,27	0,19	2,72	572,8%	20,75	17,93	142,3	24,4	96,1%	82,9%	80,5%
1,00	6,21	0,18	0,86	1803,8%	20,87	19,93	126,3	24,6	91,2%	15,9%	14,5%
2,00	6,21	0,38	2,47	588,0%	20,75	18,09	139,2	24,6	90,6%	61,3%	55,6%
3,00	6,16	0,38	3,32	431,5%	20,70	17,19	143,5	24,6	92,7%	67,1%	62,2%
4,00	6,12	0,43	3,78	365,6%	20,66	16,66	145,2	24,5	92,5%	69,4%	64,1%
5,00	6,12	0,48	3,60	381,3%	20,67	16,83	141,4	24,4	91,3%	69,1%	63,1%
6,00	6,12	0,13	3,58	429,0%	20,69	17,05	127,5	24,5	98,4%	71,6%	70,4%
7,00	6,12	0,11	2,57	631,4%	20,76	18,13	120,8	24,5	98,4%	66,6%	65,6%
8,00	6,08	0,10	2,43	676,4%	20,77	18,29	116,7	24,6	98,8%	66,4%	65,6%
9,00	6,07	0,09	2,45	673,2%	20,77	18,28	113,8	24,6	99,0%	67,3%	66,6%
10,00	6,07	0,09	2,51	655,0%	20,77	18,21	111,9	24,5	99,1%	68,3%	67,6%
11,00	6,04	0,09	2,59	632,2%	20,76	18,13	110,7	24,6	99,1%	69,2%	68,5%
12,00	6,02	0,09	2,67	610,7%	20,76	18,04	109,7	24,5	99,0%	70,0%	69,3%
13,00	6,02	0,10	2,79	581,1%	20,75	17,91	108,7	24,6	99,0%	71,0%	70,3%
14,00	6,02	0,10	2,96	543,0%	20,74	17,73	108,4	24,5	99,0%	72,0%	71,3%
15,00	5,98	0,10	3,05	522,9%	20,73	17,63	108,3	24,5	98,9%	72,6%	71,8%
16,00	5,98	0,10	3,16	502,4%	20,72	17,52	107,9	24,5	98,9%	73,2%	72,4%
17,00	5,98	0,11	3,29	477,6%	20,72	17,37	108,1	24,5	98,8%	73,8%	72,9%
18,00	5,93	0,11	3,46	449,9%	20,70	17,19	108,7	24,6	98,7%	74,4%	73,4%
19,00	5,93	0,12	3,60	427,6%	20,69	17,03	109,6	24,6	98,6%	74,8%	73,8%
20,00	5,89	0,12	3,78	403,9%	20,68	16,84	110,3	24,4	98,6%	75,3%	74,3%
21,00	5,89	0,12	3,90	388,5%	20,67	16,72	110,4	24,4	98,6%	75,7%	74,6%
22,00	5,89	0,13	4,05	369,9%	20,66	16,55	111,1	24,5	98,5%	76,1%	75,0%
23,00	5,84	0,13	4,15	358,8%	20,66	16,44	112,2	24,5	98,5%	76,2%	75,1%
24,00	5,84	0,13	4,26	347,2%	20,65	16,32	112,9	24,5	98,5%	76,4%	75,3%
25,00	5,80	0,13	4,37	336,1%	20,64	16,20	114,2	24,5	98,5%	76,5%	75,4%
26,00	5,75	0,11	5,38	257,4%	20,58	15,14	115,2	24,5	99,0%	78,7%	78,0%
27,00	5,75	0,11	5,78	233,6%	20,55	14,72	116,1	24,4	99,2%	79,3%	78,6%
28,00	5,75	0,11	5,73	236,4%	20,55	14,77	116,4	24,5	99,1%	79,2%	78,5%
29,00	5,71	0,12	5,52	248,6%	20,57	14,99	116,8	24,5	99,0%	78,8%	78,0%
30,00	5,66	0,12	5,55	246,2%	20,57	14,95	117,5	24,7	98,9%	78,8%	77,9%
31,00	5,66	0,13	5,50	249,0%	20,57	15,00	118,2	24,7	98,8%	78,6%	77,7%
32,00	5,66	0,13	5,30	261,5%	20,58	15,21	118,8	24,7	98,8%	78,1%	77,2%
33,00	5,62	0,13	5,14	272,7%	20,59	15,39	119,8	24,6	98,7%	77,7%	76,7%
34,00	5,62	0,12	4,91	290,4%	20,61	15,64	119,7	24,6	98,8%	77,2%	76,2%
35,00	5,57	0,12	4,76	302,2%	20,62	15,80	119,1	24,6	98,8%	76,9%	75,9%
36,00	5,57	0,13	4,69	307,5%	20,62	15,87	118,4	24,6	98,7%	76,8%	75,8%
37,00	5,53	0,13	4,71	305,7%	20,62	15,84	118,0	24,6	98,6%	76,9%	75,9%
38,00	5,53	0,14	4,92	288,1%	20,61	15,61	118,0	24,7	98,6%	77,4%	76,3%
39,00	5,48	0,14	5,55	245,4%	20,56	14,95	119,9	24,6	98,7%	78,4%	77,4%
40,00	5,43	0,14	8,72	121,7%	20,36	11,57	122,8	24,7	99,0%	81,9%	81,1%
41,00	5,39	0,14	9,13	111,9%	20,33	11,13	125,4	24,7	99,0%	82,0%	81,3%
42,00	5,39	0,13	9,08	113,3%	20,33	11,19	127,5	24,6	99,1%	81,8%	81,1%
43,00	5,34	0,14	8,91	117,1%	20,34	11,36	129,6	24,6	99,1%	81,6%	80,8%
44,00	5,30	0,16	9,75	98,3%	20,29	10,46	131,9	24,6	98,9%	82,0%	81,1%
45,00	5,25	0,16	10,49	86,5%	20,24	9,67	133,7	24,7	99,0%	82,3%	81,5%
46,00	5,21	0,14	10,19	90,0%	20,26	9,99	134,5	24,7	99,1%	82,1%	81,4%
47,00	5,16	0,16	9,29	108,0%	20,32	10,95	135,9	24,8	98,9%	81,4%	80,5%
48,00	5,12	0,19	10,36	86,3%	20,24	9,79	138,4	24,8	98,8%	81,9%	80,9%
49,00	5,11	0,18	10,78	79,2%	20,22	9,34	140,6	24,8	98,8%	82,0%	81,1%
50,00	5,07	0,17	10,77	79,6%	20,22	9,37	142,2	24,8	99,0%	81,9%	81,1%
51,00	5,01	0,16	11,13	74,1%	20,19	8,99	143,4	24,8	99,1%	82,1%	81,3%
52,00	4,98	0,16	11,05	75,3%	20,20	9,07	145,0	24,6	99,1%	81,9%	81,1%
53,00	4,94	0,16	11,10	74,6%	20,20	9,02	146,0	24,6	99,1%	81,9%	81,1%
54,00	4,89	0,16	11,10	74,4%	20,20	9,01	146,4	24,5	99,0%	81,8%	81,1%
55,00	4,84	0,16	10,94	77,0%	20,21	9,19	146,7	24,6	99,0%	81,7%	80,9%
56,00	4,80	0,16	11,01	75,9%	20,20	9,11	147,3	24,5	99,0%	81,7%	81,0%
57,00	4,75	0,16	10,95	76,7%	20,21	9,17	148,1	24,5	99,0%	81,6%	80,8%
58,00	4,71	0,16	11,25	72,2%	20,19	8,86	148,8	24,6	99,1%	81,8%	81,0%
59,00	4,69	0,13	10,79	79,8%	20,22	9,36	148,5	24,6	99,2%	81,5%	80,9%
60,00	4,66	0,15	9,98	94,0%	20,27	10,22	147,6	24,8	99,1%	81,0%	80,3%
61,00	4,57	0,16	9,78	97,6%	20,28	10,42	147,5	24,8	98,9%	80,9%	80,0%
62,00	4,57	0,17	10,25	88,4%	20,25	9,91	147,7	24,8	98,9%	81,2%	80,3%
63,00	4,53	0,17	10,54	83,4%	20,23	9,61	148,1	24,9	98,9%	81,4%	80,5%
64,00	4,48	0,18	10,74	79,9%	20,22	9,39	148,7	24,9	98,9%	81,5%	80,6%
65,00	4,44	0,17	10,89	77,6%	20,21	9,23	148,7	24,8	98,9%	81,6%	80,7%
66,00	4,39	0,20	10,92	76,6%	20,21	9,18	149,7	25,0	98,7%	81,5%	80,5%
67,00	4,35	0,23	11,40	69,0%	20,17	8,66	150,7	25,0	98,6%	81,7%	80,6%
68,00	4,30	0,23	11,90	61,9%	20,14	8,13	151,9	25,0	98,6%	81,9%	80,8%
69,00	4,25	0,24	12,13	58,8%	20,12	7,87	153,4	25,1	98,5%	82,0%	80,8%
70,00	4,21	0,28	12,39	55,1%	20,10	7,57	154,6	25,1	98,3%	82,0%	80,7%
71,00	4,16	0,29	12,73	50,9%	20,08	7,20	155,7	25,2	98,3%	82,1%	80,7%
72,00	4,12	0,38	13,00	46,8%	20,06	6,86	157,4	24,8	97,7%	82,1%	80,3%
73,00	4,07	0,33	13,18	45,4%	20,05	6,70	159,0	25,1	98,1%	82,1%	80,6%
74,00	4,03	0,34	13,16	45,5%	20,05	6,72	160,6	25,0	98,0%	82,0%	80,4%
75,00	3,98	0,28	13,29	44,7%	20,04	6,61	161,0	25,1	98,4%	82,1%	80,8%
76,00	3,94	0,32	13,06	46,7%	20,06	6,83	162,1	25,2	98,1%	81,9%	80,4%
77,00	3,89	0,30	13,05	47,2%	20,06	6,86	162,6	25,2	98,2%	81,9%	80,5%
78,00	3,85	0,26	12,98	48,3%	20,07	6,95	162,5	25,3	98,5%	81,9%	80,6%
79,00	3,80	0,26	13,00	48,2%	20,06	6,94	162,7	25,2	98,5%	81,9%	80,6%
80,00	3,76	0,26	13,02	47,9%	20,06	6,91	163,7	25,3	98,5%	81,8%	80,6%
81,00	3,71	0,25	13,28	45,2%	20,05	6,64	164,7	25,1	98,6%	81,9%	80,7%
82,00	3,66	0,24	13,27	45,4%	20,05	6,66	165,6	25,1	98,7%	81,8%	80,7%
83,00	3,62	0,25	13,26	45,4%	20,05	6,66	166,0	25,1	98,6%	81,8%	80,7%
84,00	3,53	0,25	13,23	45,7%	20,05	6,69	166,2	25,2	98,6%	81,8%	80,6%
85,00	3,53	0,26	13,30	44,9%	20,05	6,62	166,9	25,2	98,5%	81,8%	80,6%
86,00	3,48	0,26	13,38	44,0%	20,04	6,53	167,4	25,1	98,5%	81,8%	80,6%
87,00	3,44	0,27	13,46	43,1%	20,03	6,44	168,0	25,1	98,5%	81,8%	80,5%
88,00	3,35	0,27	13,57	41,9%	20,03	6,32	168,7	25,2	98,5%	81,8%	80,6%
89,00	3,30	0,27	13,71	40,6%	20,02	6,18	169,5	25,3	98,5%	81,8%	80,6%
90,00	3,26	0,28	13,77	39,7%	20,01	6,10	170,3	25,3	98,4%	81,8%	80,5%
91,00	3,22	0,28	13,78	39,8%	20,01	6,10	170,8	25,3	98,4%	81,8%	80,5%
92,00	3,16	0,29	13,75	39,9%	20,01	6,12	171,1	25,4	98,4%	81,8%	80,4%

93,00	3,12	0,31	13,82	39,0%	20,01	6,03	171,4	25,4	98,3%	81,8%	80,4%
94,00	3,07	0,32	13,86	38,6%	20,00	5,99	172,0	25,4	98,2%	81,7%	80,3%
95,00	3,03	0,33	13,90	38,0%	20,00	5,93	171,6	25,5	98,2%	81,8%	80,3%
96,00	2,98	0,33	13,94	37,7%	20,00	5,90	172,0	25,5	98,2%	81,8%	80,3%
97,00	2,94	0,30	13,85	38,8%	20,01	6,00	172,2	25,4	98,3%	81,7%	80,4%
98,00	2,89	0,31	13,82	39,0%	20,01	6,03	172,1	25,4	98,3%	81,7%	80,3%
99,00	2,85	0,34	13,87	38,1%	20,00	5,95	172,1	25,4	98,1%	81,7%	80,2%
100,00	2,80	0,44	14,02	35,8%	19,99	5,74	172,0	25,4	97,5%	81,8%	79,8%
101,00	2,76	0,64	14,05	33,7%	19,97	5,60	172,6	25,5	96,4%	81,7%	78,8%
102,00	2,71	0,90	14,09	31,1%	19,95	5,41	173,6	25,5	95,1%	81,6%	77,5%
103,00	2,64	1,10	14,24	28,1%	19,93	5,14	174,3	25,4	94,1%	81,5%	76,7%
104,00	2,62	1,46	14,39	24,0%	19,89	4,78	175,2	25,4	92,4%	81,4%	75,2%
105,00	2,57	1,76	14,37	21,8%	19,87	4,62	175,9	25,4	90,9%	81,3%	73,9%
106,00	2,48	1,98	14,30	20,7%	19,86	4,58	176,3	25,6	89,9%	81,2%	73,0%
107,00	2,44	2,05	14,27	20,4%	19,86	4,57	176,2	25,7	89,6%	81,1%	72,7%
108,00	2,39	1,99	14,34	21,1%	19,87	4,64	176,0	25,7	89,8%	81,2%	72,9%
109,00	2,35	1,80	14,22	22,6%	19,88	4,76	176,0	25,9	90,7%	81,2%	73,6%
110,00	2,30	1,52	14,17	25,2%	19,90	4,97	175,3	25,8	92,0%	81,3%	74,8%
111,00	2,26	1,17	14,15	28,2%	19,93	5,19	174,7	25,8	93,7%	81,5%	76,3%
112,00	2,21	0,79	14,12	31,8%	19,96	5,44	173,9	25,8	95,7%	81,6%	78,1%
113,00	2,17	0,53	13,87	36,4%	19,99	5,85	172,7	25,7	97,0%	81,7%	79,2%
114,00	2,12	0,40	13,48	41,5%	20,02	6,35	171,2	25,9	97,7%	81,6%	79,7%
115,00	2,12	0,34	13,13	45,8%	20,05	6,75	170,3	25,8	98,0%	81,5%	79,9%
116,00	2,08	0,31	12,87	49,1%	20,07	7,05	169,1	25,9	98,2%	81,5%	80,0%
117,00	2,03	0,30	12,70	51,1%	20,08	7,23	167,8	25,9	98,2%	81,4%	80,0%
118,00	1,98	0,28	12,57	52,9%	20,09	7,38	167,2	25,8	98,3%	81,4%	80,0%
119,00	1,97	0,27	12,52	53,5%	20,10	7,44	166,5	25,8	98,4%	81,4%	80,1%
120,00	1,90	0,26	12,44	54,7%	20,10	7,53	165,7	25,8	98,4%	81,4%	80,2%
121,00	1,89	0,25	12,39	55,4%	20,11	7,59	165,0	25,8	98,5%	81,5%	80,2%
122,00	1,85	0,24	12,36	57,1%	20,11	7,73	164,0	25,7	98,6%	81,4%	80,3%
123,00	1,82	0,22	12,12	59,1%	20,12	7,89	163,1	25,9	98,7%	81,4%	80,4%
124,00	1,80	0,21	11,95	61,5%	20,14	8,08	162,5	25,9	98,7%	81,4%	80,3%
125,00	1,76	0,21	11,73	64,5%	20,15	8,32	161,5	26,0	98,7%	81,3%	80,2%
126,00	1,76	0,20	11,62	66,2%	20,16	8,44	160,9	25,8	98,7%	81,3%	80,3%
127,00	1,71	0,18	11,42	69,3%	20,17	8,66	159,6	25,9	98,9%	81,3%	80,3%
128,00	1,67	0,17	11,35	70,5%	20,18	8,74	158,3	25,9	99,0%	81,3%	80,5%
129,00	1,67	0,16	11,15	73,7%	20,19	8,96	157,5	25,9	99,0%	81,2%	80,5%
130,00	1,64	0,15	10,89	78,0%	20,21	9,25	156,4	25,8	99,1%	81,1%	80,4%
131,00	1,62	0,13	10,62	82,6%	20,23	9,54	154,9	25,6	99,2%	81,0%	80,4%
132,00	1,62	0,13	10,31	88,2%	20,25	9,88	153,6	25,8	99,2%	80,9%	80,3%
133,00	1,58	0,13	10,08	92,4%	20,27	10,12	152,1	25,9	99,2%	80,9%	80,2%
134,00	1,53	0,12	10,05	93,1%	20,27	10,16	150,6	26,0	99,3%	81,0%	80,4%
135,00	1,53	0,13	10,01	93,7%	20,27	10,19	149,4	26,0	99,2%	81,0%	80,4%
136,00	1,53	0,12	10,02	93,8%	20,27	10,19	148,0	25,9	99,3%	81,1%	80,5%
137,00	1,49	0,13	9,85	96,9%	20,28	10,37	147,1	25,8	99,2%	81,1%	80,4%
138,00	1,49	0,14	9,72	99,2%	20,29	10,50	145,9	25,9	99,1%	81,0%	80,3%
139,00	1,44	0,15	9,47	104,2%	20,30	10,76	144,3	25,8	99,0%	81,0%	80,2%
140,00	1,49	0,14	9,36	106,7%	20,31	10,88	143,2	25,9	99,0%	81,0%	80,2%
141,00	1,44	0,14	9,33	107,6%	20,32	10,92	142,4	26,0	99,1%	81,0%	80,3%
142,00	1,44	0,14	9,29	108,4%	20,32	10,96	141,2	26,0	99,1%	81,1%	80,4%
143,00	1,39	0,14	9,21	110,2%	20,32	11,05	139,8	26,0	99,1%	81,1%	80,4%
144,00	1,39	0,12	9,00	115,4%	20,34	11,28	138,6	25,9	99,2%	81,0%	80,4%
145,00	1,39	0,13	8,82	119,7%	20,35	11,47	137,5	25,9	99,2%	81,0%	80,3%
146,00	1,36	0,14	8,70	122,2%	20,36	11,59	136,1	26,1	99,0%	81,0%	80,2%
147,00	1,35	0,19	8,53	125,2%	20,36	11,74	135,1	26,0	98,5%	80,9%	79,7%
148,00	1,35	0,21	8,35	129,4%	20,37	11,92	134,5	26,0	98,3%	80,8%	79,4%
149,00	1,35	0,22	8,28	130,9%	20,38	11,98	134,1	26,0	98,2%	80,7%	79,2%
150,00	1,35	0,23	8,27	131,1%	20,38	12,00	133,3	25,9	98,1%	80,8%	79,2%
151,00	1,35	0,23	8,21	132,6%	20,38	12,05	132,5	26,0	98,1%	80,8%	79,2%
152,00	1,30	0,23	8,13	134,9%	20,39	12,14	132,0	26,0	98,1%	80,7%	79,2%
153,00	1,30	0,23	8,07	136,7%	20,39	12,21	131,2	25,9	98,1%	80,7%	79,2%
154,00	1,30	0,23	8,04	137,7%	20,39	12,24	130,7	25,9	98,1%	80,8%	79,2%
155,00	1,26	0,22	8,00	138,8%	20,40	12,28	129,9	26,0	98,1%	80,8%	79,3%
156,00	1,26	0,22	7,97	139,8%	20,40	12,32	129,4	26,0	98,1%	80,8%	79,3%
157,00	1,26	0,22	7,94	140,8%	20,40	12,35	128,7	25,9	98,2%	80,8%	79,3%
158,00	1,26	0,22	7,92	141,3%	20,40	12,37	128,0	25,9	98,1%	80,9%	79,4%
159,00	1,26	0,22	7,89	142,3%	20,40	12,41	127,3	25,9	98,1%	80,9%	79,4%
160,00	1,26	0,22	7,87	142,8%	20,41	12,42	126,8	26,0	98,1%	80,9%	79,4%
161,00	1,21	0,22	7,89	142,4%	20,40	12,41	126,4	26,0	98,2%	81,0%	79,5%
162,00	1,21	0,21	7,89	142,6%	20,41	12,41	125,8	26,1	98,2%	81,0%	79,6%
163,00	1,21	0,21	7,89	142,5%	20,41	12,41	125,5	26,0	98,2%	81,1%	79,6%
164,00	1,21	0,21	7,89	142,6%	20,41	12,41	124,8	26,0	98,3%	81,1%	79,7%
165,00	1,21	0,21	7,87	143,2%	20,41	12,43	124,3	25,9	98,3%	81,2%	79,8%
166,00	1,21	0,17	7,91	143,1%	20,41	12,41	123,8	26,1	98,6%	81,3%	80,2%
167,00	1,17	0,16	7,96	141,9%	20,40	12,36	123,5	26,0	98,8%	81,3%	80,4%
168,00	1,17	0,15	7,98	141,6%	20,40	12,35	123,3	25,9	98,9%	81,4%	80,4%
169,00	1,17	0,15	7,96	142,1%	20,40	12,36	123,0	26,1	98,9%	81,4%	80,5%
170,00	1,17	0,15	7,98	141,6%	20,40	12,35	122,4	26,0	98,8%	81,5%	80,5%
171,00	1,12	0,16	7,96	141,9%	20,40	12,36	122,1	26,0	98,8%	81,5%	80,5%
172,00	1,17	0,16	7,96	141,8%	20,40	12,36	121,5	25,9	98,8%	81,5%	80,5%
173,00	1,12	0,16	7,98	141,3%	20,40	12,34	121,4	25,9	98,7%	81,5%	80,5%
174,00	1,12	0,16	7,96	141,9%	20,40	12,36	121,4	26,1	98,8%	81,5%	80,5%
175,00	1,12	0,16	7,95	142,2%	20,40	12,38	121,1	26,1	98,7%	81,5%	80,5%
176,00	1,12	0,16	7,91	143,3%	20,41	12,41	120,9	26,1	98,7%	81,5%	80,5%
177,00	1,12	0,16	7,93	142,9%	20,41	12,40	120,3	26,0	98,8%	81,6%	80,6%
178,00	1,10	0,17	7,88	144,2%	20,41	12,45	119,9	26,1	98,7%	81,6%	80,5%
179,00	1,08	0,17	7,88	144,2%	20,41	12,45	119,5	26,0	98,7%	81,6%	80,5%
180,00	1,08	0,18	7,82	145,6%	20,41	12,50	119,5	26,2	98,6%	81,6%	80,4%
181,00	1,08	0,18	7,84	145,0%	20,41	12,48	119,3	26,1	98,6%	81,6%	80,4%
182,00	1,08	0,18	7,84	145,0%	20,41	12,48	119,1	26,1	98,6%	81,6%	80,5%
183,00	1,03	0,18	7,84	144,9%	20,41	12,48	119,2	26,2	98,6%	81,6%	80,4%
184,00	1,08	0,18	7,87	143,8%	20,41	12,44	118,9	26,0	98,5%	81,6%	80,4%
185,00	1,03	0,18	7,94	142,0%	20,40	12,38	118,7	26,0	98,6%	81,7%	80,6%
186,00	1,03	0,18	7,94	142,0%	20,40	12,38	118,3	26,1	98,6%	81,8%	80,6%
187,00	1,03	0,18	7,97	141,1%	20,40	12,34	118,4	26,1	98,6%	81,8%	80,7%
188,00	1,03	0,19	7,89	143,1%	20,41	12,42	118,7	26,1	98,4%	81,7%	80,4%
189,00	1,03	0,20	7,89	142,9%	20,41	12,42	118,3	26,2	98,4%	81,7%	80,4%
190,00	1,03	0,20	7,94	141,4%	20,40	12,37	118,1	26,1	98,4%	81,8%	80,5%
191,00	0,99	0,20	7,95	141,0%	20,40	12,35	117,9	26,1	98,4%	81,8%	80,5%
192,00	0,99	0,20	7,95	141,1%	20,40	12,35	117,5	26,1	98,4%	81,8%	80,5%
193,00	0,99	0,20	7,93	141,5%	20,40	12,37	117,5	26,1	98,4%	81,8%	80,5%
194,00	0,99	0,21	7,95	140,7%	20,40	12,34	117,5	26,2	98,3%	81,8%	80,4%
195,00	0,99	0,21	7,96	140,6%	20,40	12,34	117,8	26,2	98,3%	81,8%	80,4%
196,00	0,94	0,21	7,97	140,2%	20,40	12,33	117,7	26,2	98,3%	81,8%	80,4%
197,00	0,94	0,20	8,00	139,5%	20,40	12,30	117,6	26,1	98,4%	81,9%	80,5%
198,00	0,94	0,20	8,02	139,1%	20,40	12,28	117,4	26,1	98,4%	81,9%	80,6%
199,00	0,94	0,19	8,02	139,2%	20,40	12,28	117,1	26,1	98,4%	81,9%	80,6%
200,00	0,94	0,20	8,05	138,2%	20,40	12,25	116,9	26,0	98,4%	82,0%	80,7%
201,00	0,94	0,20	8,08	137,1%	20,39	12,21	116,8	26,2	98,4%	82,0%	80,7%
202,00	0,90	0,20	8,07	137,4%	20,39	12,22	116,8	26,2	98,3%	82,0%	80,6%
203,00	0,90	0,20	8,09	136,9%	20,39	12,20	116,8	26,1	98,3%	82,0%	80,6%
204,00	0,90	0,21	8,07	137,3%	20,39	12,22	116,9	26,2	98,3%	82,0%	80,6%
205,00	0,90	0,21	8,10	136,4%	20,39	12,19	116,4	26,2	98,3%	82,1%	80,7%
206,00	0,88	0,21	8,12	135,9%	20,39	12,17	116,2	26,1	98,3%	82,1%	80,7%

207,00	0,85	0,21	8,12	136,0%	20,39	12,17	116,0	26,1	98,3%	82,1%	80,7%
208,00	0,85	0,21	8,09	136,9%	20,39	12,20	115,9	26,0	98,3%	82,1%	80,7%
209,00	0,85	0,21	8,10	136,3%	20,39	12,19	115,7	26,1	98,3%	82,1%	80,7%
210,00	0,85	0,22	8,04	137,8%	20,39	12,25	115,9	26,1	98,1%	82,0%	80,5%
211,00	0,85	0,23	7,98	139,1%	20,40	12,30	115,7	26,1	98,1%	82,0%	80,4%
212,00	0,85	0,23	7,94	140,4%	20,40	12,35	115,4	26,1	98,0%	82,0%	80,4%
213,00	0,80	0,24	7,81	144,3%	20,41	12,49	115,4	26,1	98,0%	81,9%	80,2%
214,00	0,81	0,28	7,57	150,2%	20,42	12,71	115,5	26,1	97,5%	81,6%	79,6%
215,00	0,80	0,30	7,34	157,1%	20,44	12,95	115,4	26,0	97,2%	81,4%	79,1%
216,00	0,80	0,31	7,28	158,8%	20,44	13,00	115,3	26,1	97,0%	81,3%	78,9%
217,00	0,80	0,32	7,26	159,2%	20,44	13,02	115,5	26,0	97,0%	81,3%	78,8%
218,00	0,80	0,33	7,25	159,4%	20,44	13,03	115,2	26,1	96,9%	81,3%	78,7%
219,00	0,80	0,34	7,23	159,6%	20,44	13,04	115,2	26,1	96,7%	81,3%	78,6%
220,00	0,80	0,34	7,21	160,0%	20,44	13,06	115,3	26,2	96,7%	81,3%	78,6%
221,00	0,78	0,34	7,28	157,8%	20,44	12,99	115,2	26,2	96,7%	81,3%	78,7%
222,00	0,76	0,34	7,31	156,7%	20,43	12,95	115,2	26,2	96,7%	81,4%	78,7%
223,00	0,76	0,35	7,31	156,6%	20,43	12,95	115,1	26,2	96,6%	81,4%	78,6%
224,00	0,76	0,35	7,29	156,9%	20,44	12,97	115,0	26,1	96,6%	81,4%	78,6%
225,00	0,76	0,35	7,28	157,4%	20,44	12,98	114,8	26,1	96,6%	81,3%	78,6%
226,00	0,75	0,35	7,26	158,0%	20,44	13,00	114,8	26,1	96,6%	81,3%	78,6%
227,00	0,71	0,36	7,28	157,1%	20,44	12,98	114,4	25,9	96,5%	81,4%	78,5%
228,00	0,76	0,36	7,31	156,8%	20,43	12,94	114,3	25,9	96,5%	81,4%	78,5%
229,00	0,71	0,39	7,28	156,4%	20,43	12,97	114,5	26,1	96,2%	81,4%	78,3%
230,00	0,71	0,39	7,21	158,3%	20,44	13,03	114,3	26,1	96,1%	81,3%	78,2%
231,00	0,71	0,39	7,21	158,6%	20,44	13,04	114,6	26,1	96,2%	81,3%	78,2%
232,00	0,71	0,39	7,23	157,9%	20,44	13,02	114,5	26,1	96,2%	81,3%	78,2%
233,00	0,71	0,38	7,24	157,6%	20,44	13,00	114,3	26,2	96,3%	81,4%	78,3%
234,00	0,67	0,38	7,26	157,1%	20,44	12,99	114,2	26,2	96,3%	81,4%	78,4%
235,00	0,67	0,38	7,28	156,6%	20,43	12,97	114,1	26,2	96,3%	81,4%	78,4%
236,00	0,67	0,39	7,27	156,4%	20,43	12,97	114,3	26,2	96,2%	81,4%	78,3%
237,00	0,67	0,38	7,24	157,5%	20,44	13,00	114,2	26,1	96,2%	81,4%	78,3%
238,00	0,67	0,39	7,20	159,0%	20,44	13,05	114,2	26,2	96,2%	81,3%	78,2%
239,00	0,62	0,39	7,18	159,5%	20,44	13,07	114,3	26,2	96,1%	81,3%	78,2%
240,00	0,63	0,40	7,20	158,6%	20,44	13,04	114,4	26,2	96,0%	81,3%	78,1%
241,00	0,62	0,37	7,24	158,1%	20,44	13,01	114,4	26,1	96,4%	81,3%	78,4%
242,00	0,62	0,35	7,17	161,3%	20,44	13,10	113,8	26,0	96,6%	81,3%	78,5%
243,00	0,62	0,39	6,95	167,6%	20,46	13,31	113,4	26,0	96,0%	81,1%	77,9%
244,00	0,62	0,45	6,75	172,6%	20,46	13,49	113,4	26,2	95,2%	80,9%	77,0%
245,00	0,62	0,46	6,64	176,9%	20,47	13,61	113,4	26,2	95,1%	80,7%	76,8%
246,00	0,58	0,45	6,60	178,5%	20,47	13,65	113,6	26,1	95,2%	80,7%	76,8%
247,00	0,62	0,45	6,49	182,9%	20,48	13,76	113,4	26,1	95,1%	80,6%	76,6%
248,00	0,58	0,45	6,46	184,3%	20,48	13,80	113,4	26,2	95,1%	80,5%	76,6%
249,00	0,58	0,45	6,43	185,5%	20,49	13,83	113,2	26,2	95,0%	80,5%	76,5%
250,00	0,58	0,46	6,41	186,1%	20,49	13,85	113,1	26,2	95,0%	80,5%	76,4%
251,00	0,58	0,45	6,38	187,4%	20,49	13,88	113,1	26,2	95,0%	80,4%	76,4%
252,00	0,58	0,45	6,33	189,7%	20,49	13,94	112,9	26,1	95,0%	80,4%	76,4%
253,00	0,58	0,45	6,26	192,8%	20,50	14,01	113,0	26,1	95,0%	80,3%	76,3%
254,00	0,58	0,45	6,24	193,6%	20,50	14,03	112,7	26,1	95,0%	80,3%	76,3%
255,00	0,56	0,44	6,21	195,2%	20,50	14,07	112,5	26,1	95,0%	80,3%	76,3%
256,00	0,58	0,44	6,20	196,0%	20,50	14,09	112,6	26,1	95,0%	80,3%	76,3%
257,00	0,53	0,42	6,51	183,5%	20,48	13,76	112,3	26,1	95,4%	80,7%	77,0%
258,00	0,53	0,41	6,54	182,5%	20,48	13,73	112,2	26,1	95,6%	80,8%	77,2%
259,00	0,53	0,42	6,49	184,2%	20,48	13,78	112,0	26,1	95,5%	80,7%	77,0%
260,00	0,53	0,42	6,49	184,0%	20,48	13,78	111,9	26,2	95,4%	80,7%	77,0%
261,00	0,53	0,45	6,43	185,5%	20,49	13,83	111,8	26,2	95,0%	80,6%	76,6%
262,00	0,51	0,47	6,26	191,7%	20,50	14,00	112,1	26,1	94,7%	80,4%	76,1%
263,00	0,49	0,47	6,22	193,9%	20,50	14,05	112,1	26,1	94,7%	80,3%	76,1%
264,00	0,49	0,47	6,21	193,9%	20,50	14,05	112,3	26,1	94,7%	80,3%	76,0%
265,00	0,49	0,48	6,23	192,5%	20,50	14,02	112,4	26,1	94,5%	80,3%	75,9%
266,00	0,49	0,49	6,24	191,9%	20,50	14,01	112,5	26,2	94,4%	80,3%	75,8%
267,00	0,49	0,50	6,27	190,5%	20,49	13,98	112,6	26,1	94,4%	80,3%	75,8%
268,00	0,49	0,50	6,30	188,9%	20,49	13,94	112,9	26,1	94,4%	80,3%	75,8%
269,00	0,49	0,51	6,36	185,9%	20,49	13,87	112,9	26,1	94,4%	80,4%	75,9%
270,00	0,44	0,51	6,35	186,6%	20,49	13,89	113,1	26,1	94,3%	80,4%	75,8%
271,00	0,44	0,51	6,43	182,9%	20,48	13,80	113,2	26,1	94,3%	80,5%	75,9%
272,00	0,44	0,53	6,66	173,3%	20,47	13,54	113,2	26,1	94,3%	80,7%	76,1%
273,00	0,44	0,53	6,61	175,4%	20,47	13,60	113,2	26,1	94,3%	80,7%	76,1%
274,00	0,44	0,52	6,57	176,7%	20,47	13,63	113,5	26,1	94,3%	80,6%	76,0%
275,00	0,44	0,52	6,56	177,6%	20,47	13,66	113,5	26,1	94,4%	80,6%	76,0%
276,00	0,44	0,51	6,51	179,7%	20,48	13,71	113,5	26,1	94,4%	80,5%	76,0%
277,00	0,40	0,51	6,48	180,9%	20,48	13,74	113,1	26,1	94,4%	80,5%	76,0%
278,00	0,40	0,51	6,48	181,1%	20,48	13,75	113,3	26,1	94,4%	80,5%	76,0%
279,00	0,40	0,51	6,42	183,2%	20,48	13,80	113,4	26,1	94,4%	80,4%	75,9%
280,00	0,40	0,51	6,34	186,8%	20,49	13,89	113,3	26,1	94,4%	80,3%	75,8%
281,00	0,40	0,50	6,31	188,3%	20,49	13,93	113,3	26,1	94,4%	80,3%	75,8%
282,00	0,40	0,50	6,30	189,0%	20,49	13,94	113,4	26,1	94,4%	80,3%	75,7%
283,00	0,40	0,50	6,25	191,1%	20,49	14,00	113,0	26,1	94,3%	80,2%	75,7%
284,00	0,35	0,50	6,25	191,2%	20,49	14,00	113,0	26,1	94,4%	80,2%	75,7%
285,00	0,40	0,50	6,23	192,0%	20,50	14,02	112,8	26,1	94,3%	80,2%	75,7%
286,00	0,35	0,50	6,25	191,2%	20,49	14,00	112,7	26,1	94,4%	80,3%	75,7%
287,00	0,35	0,49	6,20	193,6%	20,50	14,05	112,5	26,1	94,4%	80,2%	75,7%
288,00	0,35	0,49	6,18	194,4%	20,50	14,07	112,6	26,1	94,4%	80,2%	75,7%
289,00	0,35	0,50	6,25	191,3%	20,49	14,00	112,4	26,1	94,4%	80,3%	75,8%
290,00	0,35	0,48	6,23	192,7%	20,50	14,02	112,5	26,1	94,6%	80,3%	75,9%
291,00	0,35	0,46	6,18	195,7%	20,50	14,09	112,3	26,1	94,7%	80,3%	76,0%
292,00	0,35	0,46	6,13	198,1%	20,50	14,15	112,0	26,1	94,7%	80,2%	76,0%
293,00	0,30	0,45	6,08	200,8%	20,51	14,20	111,8	26,1	94,9%	80,2%	76,1%
294,00	0,30	0,45	6,14	198,1%	20,50	14,14	111,4	26,1	94,8%	80,3%	76,1%
295,00	0,30	0,46	6,15	197,3%	20,50	14,13	111,1	26,1	94,8%	80,3%	76,1%
296,00	0,30	0,48	6,20	194,4%	20,50	14,07	111,1	26,1	94,6%	80,4%	76,0%
297,00	0,30	0,49	6,30	189,4%	20,49	13,95	111,1	26,1	94,5%	80,5%	76,1%
298,00	0,30	0,50	6,31	188,5%	20,49	13,93	111,1	26,1	94,4%	80,5%	76,0%
299,00	0,30	0,50	6,32	188,2%	20,49	13,92	111,2	26,1	94,4%	80,5%	76,0%
300,00	0,29	0,50	6,39	185,4%	20,49	13,85	111,3	26,1	94,5%	80,6%	76,2%
301,00	0,26	0,50	6,41	184,8%	20,48	13,82	111,4	26,1	94,4%	80,6%	76,1%
302,00	0,26	0,53	6,66	173,4%	20,47	13,54	111,5	26,1	94,3%	80,9%	76,3%
303,00	0,26	0,52	6,54	178,2%	20,47	13,67	111,6	26,1	94,3%	80,8%	76,2%
304,00	0,26	0,51	6,53	179,2%	20,48	13,69	111,8	26,1	94,5%	80,7%	76,3%
305,00	0,26	0,51	6,59	176,9%	20,47	13,63	111,8	26,1	94,5%	80,8%	76,4%
306,00	0,26	0,51	6,55	178,2%	20,47	13,67	111,7	26,1	94,5%	80,8%	76,3%
307,00	0,26	0,50	6,53	179,1%	20,48	13,69	111,8	26,1	94,5%	80,7%	76,3%
308,00	0,21	0,50	6,49	181,2%	20,48	13,74	112,0	26,1	94,5%	80,7%	76,2%
309,00	0,21	0,50	6,49	181,3%	20,48	13,74	111,9	26,1	94,6%	80,7%	76,3%
310,00	0,21	0,49	6,44	183,5%	20,48	13,80	111,7	26,1	94,6%	80,6%	76,3%
311,00	0,21	0,49	6,45	182,9%	20,48	13,78	111,9	26,1	94,6%	80,6%	76,3%
312,00	0,21	0,49	6,39	185,7%	20,49	13,85	111,8	26,1	94,6%	80,6%	76,2%
313,00	0,17	0,48	6,28	191,0%	20,49	13,98	111,7	26,0	94,7%	80,4%	76,1%
314,00	0,18	0,47	6,26	191,9%	20,50	14,00	111,8	26,1	94,7%	80,4%	76,1%
315,00	0,17	0,47	6,22	193,5%	20,50	14,04	111,6	26,1	94,7%	80,4%	76,1%
316,00	0,17	0,47	6,20	194,7%	20,50	14,07	111,3	26,1	94,7%	80,4%	76,1%
317,00	0,17	0,46	6,15	197,3%	20,50	14,13	111,1	26,0	94,7%	80,3%	76,1%
318,00	0,17	0,46	6,10	199,8%	20,51	14,18	111,2	26,0	94,7%	80,3%	76,0%
319,00	0,17	0,45	6,09	200,1%	20,51	14,19	111,0	26,0	94,8%	80,3%	76,1%
320,00	0,17	0,45	6,06	201,7%	20,51	14,22	110,7	26,0	94,8%	80,3%	76,1%

321,00	0,12	0,45	6,06	201,8%	20,51	14,23	110,8	26,0	94,8%	80,2%	76,1%
322,00	0,12	0,45	6,01	204,2%	20,51	14,28	110,6	26,0	94,8%	80,2%	76,1%
323,00	0,12	0,44	5,99	205,1%	20,51	14,30	110,3	26,0	94,8%	80,2%	76,1%
324,00	0,12	0,45	5,99	205,1%	20,51	14,30	110,6	26,0	94,8%	80,2%	76,0%
325,00	0,12	0,41	6,67	177,7%	20,47	13,60	110,6	26,0	95,7%	81,1%	77,6%
326,00	0,12	0,32	7,41	154,3%	20,43	12,86	109,4	26,0	97,0%	82,0%	79,5%
327,00	0,11	0,32	7,28	158,6%	20,44	13,00	108,9	26,0	96,9%	81,9%	79,4%
328,00	0,08	0,32	7,17	162,3%	20,45	13,11	108,3	26,0	96,9%	81,9%	79,4%
329,00	0,08	0,30	7,14	164,1%	20,45	13,16	108,1	26,0	97,1%	81,9%	79,5%
330,00	0,08	0,27	7,44	154,8%	20,43	12,86	107,1	26,0	97,6%	82,3%	80,2%
331,00	0,08	0,26	7,36	157,8%	20,44	12,95	106,5	26,0	97,6%	82,2%	80,2%
332,00	0,06	0,26	7,33	158,9%	20,44	12,98	105,9	26,0	97,6%	82,3%	80,3%
333,00	0,08	0,26	7,27	160,6%	20,44	13,04	105,4	26,0	97,6%	82,3%	80,2%
334,00	0,07	0,26	7,11	166,5%	20,45	13,21	104,9	26,0	97,6%	82,2%	80,2%
335,00	0,03	0,26	7,02	170,2%	20,46	13,32	104,6	26,0	97,6%	82,1%	80,1%
336,00	0,03	0,26	7,06	168,4%	20,46	13,27	104,2	26,0	97,6%	82,2%	80,2%
337,00	0,03	0,25	7,00	171,1%	20,46	13,34	103,9	26,0	97,6%	82,2%	80,2%
338,00	0,03	0,25	6,95	173,0%	20,46	13,39	103,8	26,0	97,6%	82,1%	80,1%
339,00	0,03	0,25	6,93	173,5%	20,47	13,41	103,5	26,0	97,6%	82,1%	80,2%
340,00	0,03	0,24	6,87	176,2%	20,47	13,48	103,1	26,0	97,6%	82,1%	80,2%
341,00	0,00	0,24	6,80	179,0%	20,48	13,56	102,8	26,0	97,6%	82,1%	80,1%

Tempa acquisition minutes	Flue temp °F	Room temp °F	Tunnel dry bulb °F	Catalyst °F	scale lbs	Right °F	Back °F	bottom °F	Top °F	Left °F
1	75,06	67,76	69,54	74,24	3,07	68,90	68,99	68,84	69,57	69,17
2	68,68	67,93	70,89	67,49	3,07	68,91	69,03	69,01	69,58	69,18
3	121,69	67,98	74,55	126,93	3,00	68,97	69,11	69,58	69,61	69,23
4	158,89	68,05	79,09	165,06	2,92	69,06	69,38	70,39	69,72	69,37
5	193,21	68,12	83,26	197,84	2,77	69,35	69,84	71,32	69,89	69,80
6	192,71	68,08	83,10	187,82	2,77	69,82	70,60	72,33	70,27	70,77
7	207,06	68,19	85,87	187,56	2,67	70,53	71,59	73,44	70,77	72,32
8	226,30	68,34	89,21	203,10	2,57	71,42	72,74	74,67	71,47	74,46
9	248,51	68,36	92,96	258,37	2,47	72,46	74,17	75,94	72,32	77,18
10	279,53	68,42	96,34	287,45	2,37	73,80	75,85	77,26	73,36	80,64
11	294,39	68,50	100,66	298,30	2,17	75,38	77,85	78,83	74,69	84,84
12	289,06	68,49	100,36	302,90	2,07	77,30	80,19	80,66	76,20	89,77
13	280,87	68,44	99,93	264,23	1,97	79,57	82,87	82,90	77,96	95,48
14	284,99	68,39	101,16	263,20	1,97	82,17	85,82	85,41	79,89	101,64
15	312,23	68,47	105,73	286,51	1,77	84,97	88,89	88,22	81,94	108,06
16	308,21	68,47	104,83	338,29	1,67	87,84	92,15	91,19	84,21	114,67
17	304,56	68,50	105,31	361,47	1,57	90,89	95,58	94,44	86,50	121,22
18	309,12	68,57	105,67	366,41	1,47	94,35	99,12	97,94	88,90	127,80
19	316,05	68,59	107,17	375,63	1,37	97,86	102,75	102,00	91,33	133,71
20	328,68	68,56	109,61	386,20	1,27	101,58	106,48	106,29	93,84	139,52
21	329,76	68,72	114,32	356,42	2,44	105,72	110,39	110,91	96,34	144,82
22	256,21	68,75	101,00	275,54	14,38	109,99	114,48	115,24	98,85	150,09
23	225,41	68,65	92,75	220,64	14,38	114,09	118,13	119,20	101,35	154,99
24	226,85	68,74	92,23	221,45	14,28	117,58	121,15	123,04	103,57	159,46
25	230,07	68,72	91,49	245,24	14,27	120,53	123,70	126,39	105,90	163,24
26	208,12	68,63	90,29	231,33	14,18	122,80	125,89	129,57	107,90	166,22
27	196,55	68,62	89,63	207,21	14,08	124,36	128,10	132,17	109,53	168,61
28	185,89	68,69	87,89	201,95	13,98	125,74	130,33	134,43	111,20	170,60
29	173,62	68,68	85,17	183,05	14,08	126,61	132,42	136,47	112,64	171,96
30	164,19	68,59	83,52	171,64	13,98	127,49	134,28	138,29	113,84	173,12
31	171,12	68,58	85,07	194,22	13,87	128,01	135,83	139,85	114,66	174,07
32	201,02	68,56	90,39	283,84	13,78	128,44	137,27	141,26	115,69	174,88
33	226,83	68,53	92,55	333,47	13,68	128,70	138,68	142,58	116,36	175,09
34	270,36	68,54	100,77	436,03	13,48	129,22	140,34	143,87	117,09	175,49
35	336,28	68,57	106,96	693,16	13,24	129,87	142,56	146,05	117,89	176,10
36	350,95	68,58	96,44	657,59	13,08	131,29	145,27	146,15	118,44	177,23
37	355,71	68,64	96,06	643,71	12,98	133,40	147,56	147,38	119,42	179,09
38	361,43	68,65	96,25	648,21	12,87	135,70	149,50	148,70	120,53	181,17
39	359,96	68,63	97,64	636,96	12,68	138,27	151,46	149,87	122,14	183,13
40	374,80	68,55	99,18	644,71	12,57	141,09	153,35	150,78	123,88	185,54
41	402,26	68,52	91,68	647,69	12,38	144,06	155,29	151,40	125,73	188,10
42	431,24	68,77	91,26	694,26	12,18	147,25	157,07	152,09	128,33	190,67
43	460,53	68,81	92,02	728,76	12,00	150,42	159,22	152,75	131,79	193,07
44	466,53	68,88	92,76	744,99	11,78	153,94	161,42	153,36	136,22	195,92
45	468,43	68,85	94,54	761,65	11,58	157,77	163,81	153,94	141,92	198,81
46	501,79	68,82	96,16	785,04	11,38	161,82	166,43	154,51	148,60	201,91
47	510,67	68,98	97,37	794,83	11,17	166,04	169,18	155,01	156,37	205,21
48	517,52	69,13	98,14	799,60	11,05	170,53	172,05	155,62	164,79	208,57
49	524,52	69,22	98,75	806,14	10,88	175,15	175,07	156,77	173,87	211,86
50	531,56	69,25	99,36	816,77	10,60	179,86	178,28	157,75	183,03	215,61
51	542,28	69,34	99,69	830,27	10,47	184,66	181,75	158,25	192,57	219,96
52	552,34	69,39	99,86	843,31	10,18	189,91	185,26	159,51	202,64	224,40
53	575,21	69,38	102,74	884,50	9,97	195,10	188,91	160,72	212,72	229,35
54	576,29	69,57	102,78	906,73	9,77	200,48	192,73	161,93	223,38	234,20
55	579,75	69,59	103,46	898,25	9,58	206,09	196,68	163,10	234,36	239,33
56	585,69	69,55	104,04	895,66	9,38	211,96	201,30	163,98	245,24	244,96
57	594,63	69,73	104,76	903,36	9,17	217,96	205,61	165,38	256,78	250,90
58	600,21	69,92	105,49	915,21	8,98	224,34	210,09	166,70	268,08	256,96
59	601,86	69,99	106,17	914,09	8,78	230,70	214,57	168,01	279,73	263,24
60	601,57	69,97	105,78	905,43	8,57	236,74	219,37	169,22	290,55	269,67
61	604,17	70,12	107,41	903,64	8,37	243,63	224,12	170,72	302,78	276,37
62	605,96	70,19	107,69	907,23	8,18	250,23	229,11	172,11	313,48	283,17
63	605,64	70,21	106,41	911,40	7,97	256,86	234,32	173,67	324,48	289,86
64	602,76	70,39	107,22	913,66	7,77	263,66	239,34	175,54	335,45	296,02
65	602,21	70,29	106,46	916,30	7,58	270,94	244,57	177,50	346,44	302,73
66	600,55	70,27	106,12	924,86	7,48	277,94	249,87	179,50	356,53	309,46
67	599,67	70,33	106,15	932,35	7,27	284,96	255,33	181,55	366,14	316,76
68	598,23	70,40	106,55	936,55	7,17	292,17	260,51	183,74	375,97	323,76
69	597,79	70,45	106,62	937,15	6,93	299,19	265,69	186,19	385,33	330,89
70	595,82	70,52	107,00	940,87	6,78	306,05	270,92	188,85	394,05	337,84
71	595,51	70,60	106,74	945,70	6,67	312,77	276,44	191,37	402,11	345,02
72	592,50	70,62	106,45	948,55	6,47	319,55	281,62	194,09	409,93	352,10
73	591,44	70,55	105,91	950,86	6,28	325,81	287,25	196,78	416,69	359,86
74	591,44	70,84	105,54	955,15	6,18	332,40	292,44	199,98	424,12	366,95
75	590,30	70,98	106,16	954,80	5,97	339,11	298,04	203,06	430,81	374,02
76	586,26	71,10	105,80	950,06	5,87	345,92	303,43	206,42	437,15	381,07
77	586,50	71,29	106,65	941,03	5,67	352,43	309,07	209,84	443,19	387,96
78	581,23	71,27	105,74	929,86	5,57	359,13	314,30	213,27	448,91	394,83
79	574,73	71,28	105,78	913,31	5,37	365,46	319,49	216,53	454,94	401,91
80	571,78	71,22	105,57	906,86	5,27	372,24	324,14	219,86	460,31	408,69
81	571,67	71,28	105,03	912,20	5,17	378,89	328,57	223,21	465,40	415,31
82	568,07	71,33	104,43	914,09	4,97	385,68	332,96	226,23	469,64	422,28
83	563,54	71,24	103,90	908,57	4,87	392,64	337,29	228,75	474,31	428,96
84	559,02	71,58	103,58	900,86	4,78	399,74	341,13	232,48	477,91	435,06
85	556,87	71,40	103,36	895,43	4,57	406,51	345,12	235,99	480,97	441,12
86	556,10	71,59	103,17	895,90	4,47	413,39	349,37	238,81	484,73	447,22
87	554,25	71,56	102,27	896,63	4,37	420,43	353,32	242,97	487,58	451,89
88	553,36	71,48	102,49	895,05	4,27	426,74	357,51	247,16	488,94	456,19

89	549,48	71,60	101,58	890,01	4,17	432,89	381,29	251,54	491,54	463,41
90	540,21	71,93	101,87	883,66	4,08	440,13	384,81	256,05	494,47	468,37
91	531,66	71,75	100,93	878,81	3,97	446,31	388,61	260,31	496,59	473,57
92	524,83	71,78	100,12	872,70	3,87	451,95	371,92	264,37	497,59	478,02
93	516,24	72,09	100,07	864,46	3,77	457,27	375,10	269,49	498,14	482,81
94	510,79	72,32	100,93	853,87	3,67	462,92	377,96	274,58	499,58	486,97
95	509,12	72,23	100,05	849,41	3,57	467,56	381,02	279,39	499,14	490,66
96	505,96	72,13	99,01	847,62	3,49	471,72	383,52	284,44	500,62	493,90
97	502,67	72,26	98,96	843,67	3,42	476,10	386,42	289,62	501,42	496,53
98	499,37	72,22	98,47	834,36	3,38	479,27	389,42	294,43	501,83	499,62
99	496,19	72,29	97,27	826,06	3,27	482,20	391,69	298,91	501,34	502,04
100	491,79	72,19	97,01	819,45	3,17	485,28	394,07	303,48	501,28	503,92
101	489,80	72,52	96,83	813,87	3,17	488,06	396,68	308,55	500,17	506,06
102	526,52	72,81	124,36	833,91	3,08	490,46	397,69	314,10	498,83	508,26
103	552,75	73,61	157,57	758,85	14,73	493,51	400,60	320,74	497,95	510,94
104	517,24	72,81	121,11	730,24	15,88	495,61	404,45	325,52	496,43	512,74
105	548,63	73,09	111,37	801,19	15,68	497,71	407,44	330,16	495,66	513,64
106	580,04	72,52	110,64	902,58	15,38	499,24	409,16	333,37	494,63	514,62
107	596,43	72,94	110,49	938,05	15,18	499,41	409,72	337,41	494,90	515,29
108	601,19	73,16	110,21	950,51	14,88	499,25	409,47	340,53	493,38	515,17
109	601,36	73,23	109,66	961,03	14,78	498,97	408,77	343,10	493,18	515,09
110	606,76	73,21	110,34	969,63	14,48	498,76	407,69	345,27	494,35	515,04
111	609,09	73,31	110,21	975,82	14,28	497,96	406,21	347,16	495,31	514,91
112	607,88	73,28	111,20	977,57	14,08	497,43	404,68	348,98	496,67	514,72
113	606,15	73,24	110,40	974,81	13,88	496,73	403,08	350,15	501,37	514,11
114	607,23	73,24	110,10	970,19	13,71	495,90	401,54	351,15	505,17	513,27
115	609,63	73,37	108,59	971,51	13,48	495,40	400,14	351,96	509,59	512,94
116	609,21	73,43	109,96	973,53	13,28	494,86	398,58	352,39	513,36	512,72
117	608,43	73,46	109,23	974,81	13,18	494,92	396,92	353,19	517,16	511,62
118	614,00	73,38	108,92	983,32	12,88	495,33	395,16	353,73	521,53	510,20
119	619,96	73,31	110,22	993,60	12,68	493,79	394,38	353,77	525,59	510,31
120	632,15	73,15	111,46	1007,59	12,48	493,51	393,32	353,32	528,29	510,16
121	647,09	73,60	114,09	1025,18	12,18	493,35	392,13	353,21	532,10	510,26
122	655,25	73,84	114,96	1034,28	12,07	493,04	391,08	353,87	536,10	509,89
123	664,09	73,95	116,08	1042,73	11,78	492,85	390,48	354,43	540,87	509,44
124	673,34	74,04	116,58	1053,55	11,48	492,69	389,93	355,00	547,19	509,01
125	681,01	74,13	117,44	1061,86	11,30	492,93	389,48	355,41	551,61	508,89
126	686,23	74,13	117,53	1066,73	11,08	493,21	389,23	355,49	556,83	509,42
127	689,30	74,19	118,03	1068,91	10,78	493,92	389,20	356,38	564,16	509,39
128	691,27	73,89	117,99	1068,46	10,58	494,57	389,37	356,76	569,06	509,74
129	695,16	74,09	118,69	1072,91	10,28	495,09	390,07	357,10	573,56	510,67
130	696,56	74,21	118,87	1077,66	10,08	495,92	390,66	357,64	581,46	511,90
131	696,62	74,30	120,57	1080,45	9,88	496,77	391,67	357,77	585,59	512,49
132	698,64	74,10	119,30	1084,35	9,58	497,67	393,17	358,15	591,04	513,78
133	699,94	74,23	119,35	1086,46	9,38	498,95	394,78	358,42	596,92	515,36
134	700,00	74,44	120,23	1087,85	9,15	500,47	396,40	358,92	600,90	516,86
135	701,01	74,52	120,73	1088,98	8,88	501,71	398,24	359,19	605,91	518,46
136	701,60	74,60	121,00	1087,96	8,68	503,39	400,24	359,60	610,35	520,44
137	700,57	74,11	120,28	1086,76	8,37	505,46	402,06	360,36	616,73	521,76
138	701,80	74,07	120,81	1087,51	8,18	507,41	404,43	360,28	621,03	524,79
139	697,86	74,64	121,18	1079,75	7,88	509,56	406,56	361,02	624,91	526,86
140	692,80	74,84	120,63	1075,18	7,67	511,79	408,78	362,30	631,04	528,70
141	689,99	74,83	120,29	1073,58	7,38	514,28	411,27	363,16	635,32	531,06
142	688,51	74,74	120,86	1073,06	7,18	517,11	413,66	363,98	637,95	533,78
143	685,44	74,92	120,60	1074,07	6,97	520,21	416,66	364,95	642,80	536,15
144	683,07	74,96	120,43	1078,38	6,68	523,92	419,58	365,86	644,97	539,51
145	681,96	75,02	119,76	1080,39	6,40	527,59	422,58	366,91	650,25	541,85
146	684,96	74,95	119,61	1082,58	6,27	531,49	425,84	367,25	652,48	544,88
147	688,37	74,80	119,99	1084,15	6,08	535,71	429,24	367,88	656,44	548,40
148	689,46	74,97	119,83	1086,98	5,77	539,40	432,72	368,89	658,79	550,92
149	689,80	75,16	119,92	1094,07	5,57	543,59	436,23	369,73	661,65	554,00
150	715,52	75,35	120,64	1095,02	5,48	548,11	440,03	370,95	665,42	557,51
151	714,71	75,07	120,41	1087,34	5,28	552,29	443,99	372,82	670,90	561,13
152	707,32	74,89	120,11	1083,91	5,18	556,56	448,52	374,04	675,82	564,21
153	691,12	75,55	118,68	1081,11	5,07	561,29	453,12	375,22	677,92	567,80
154	674,56	74,96	117,67	1074,78	4,87	565,42	457,72	376,29	680,54	570,20
155	660,40	74,91	116,30	1070,14	4,78	569,53	462,70	377,15	683,17	574,09
156	647,20	74,71	114,79	1062,19	4,68	573,65	467,66	378,98	686,08	576,80
157	634,26	74,93	113,56	1050,78	4,58	577,54	472,79	380,80	688,64	580,09
158	550,61	74,72	103,22	1078,55	4,48	581,59	479,75	383,48	686,66	582,75
159	496,80	74,78	99,96	1078,92	4,47	586,16	484,98	386,85	684,14	586,48
160	467,40	75,56	98,33	1046,37	4,37	590,44	489,98	388,28	684,00	589,85
161	447,22	75,35	96,53	1018,42	4,37	593,06	493,64	390,61	682,70	591,40
162	430,57	75,13	95,33	995,56	4,37	595,92	496,59	392,79	679,57	593,91
163	417,18	75,77	93,59	974,37	4,27	597,34	498,82	394,85	676,01	595,75
164	403,46	75,17	93,06	954,46	4,27	598,29	500,58	396,74	673,29	596,83
165	392,96	75,29	92,74	943,41	4,17	598,92	501,44	398,45	669,11	597,13
166	383,21	75,15	92,58	932,73	4,17	598,96	502,10	399,83	665,44	597,03
167	375,49	75,07	91,75	925,24	4,17	598,82	502,90	401,54	660,60	596,33
168	367,59	75,47	91,22	912,29	4,17	597,65	503,59	403,17	654,95	595,21
169	360,47	75,68	90,59	899,40	4,17	596,49	503,24	404,39	649,65	594,10
170	353,61	75,77	89,83	887,39	4,17	594,61	503,08	405,79	643,49	591,67
171	347,59	75,87	89,96	875,16	4,08	592,41	502,48	406,77	637,87	589,91
172	342,27	75,27	89,07	864,21	4,08	590,35	503,04	408,36	630,34	587,66
173	337,13	75,84	89,34	853,91	3,98	588,26	501,98	409,41	623,53	585,87
174	331,45	75,80	89,06	844,76	3,98	585,79	501,29	410,53	617,00	584,27
175	326,41	75,56	88,54	836,26	3,98	583,21	500,78	411,70	609,89	581,59
176	322,57	75,44	87,43	829,14	3,98	580,31	499,84	413,06	602,19	579,37
177	318,51	75,80	88,15	823,66	3,98	577,47	498,30	413,95	597,05	576,33
178	314,76	75,85	87,80	818,41	3,94	575,01	497,31	414,67	591,24	573,66
179	311,79	75,48	86,80	812,86	3,88	571,54	496,27	415,59	582,16	571,50

180	306,82	75,26	86,38	807,27	3,68	569,96	494,72	416,36	576,44	569,68
181	305,70	75,33	86,50	801,40	3,68	566,76	493,03	417,10	569,49	566,94
182	302,06	75,41	86,75	795,36	3,66	564,34	491,11	418,02	564,35	564,04
183	299,69	75,23	86,25	789,60	3,62	561,71	489,85	418,87	557,47	562,16
184	297,51	75,59	85,75	784,72	3,77	559,27	487,83	419,76	551,92	559,92
185	294,46	75,11	86,37	779,95	3,77	556,57	485,95	420,21	546,60	557,33
186	292,60	75,11	85,45	775,81	3,77	553,74	484,99	420,80	538,69	555,06
187	290,26	75,27	85,31	772,01	3,77	552,91	483,35	422,01	534,31	552,53
188	287,63	75,89	86,07	767,82	3,77	549,99	481,28	422,47	528,66	550,06
189	285,76	75,10	85,36	764,31	3,76	547,39	479,60	423,42	521,42	548,02
190	283,25	74,98	86,23	760,76	3,71	546,51	477,66	424,14	517,96	545,52
191	281,10	75,70	86,07	757,50	3,67	543,82	475,88	424,57	511,81	543,23
192	278,70	75,58	85,32	754,93	3,67	541,44	474,55	425,11	507,21	540,82
193	277,51	75,53	84,96	752,93	3,67	539,35	473,34	425,74	501,97	538,15
194	275,59	75,39	85,15	750,40	3,67	537,15	472,06	426,30	496,37	535,83
195	274,55	75,45	84,11	748,11	3,67	534,80	470,39	426,74	490,49	533,07
196	273,16	75,51	84,39	745,86	3,67	533,02	469,04	427,20	487,99	530,55
197	271,53	75,80	84,81	743,43	3,67	531,09	467,36	427,57	483,75	527,99
198	269,75	75,33	83,89	741,10	3,67	529,28	466,11	427,76	479,79	525,27
199	268,07	75,46	84,05	739,01	3,67	527,81	464,58	427,90	475,95	522,43
200	266,34	75,24	83,47	737,54	3,47	526,55	463,59	428,23	471,90	519,80
201	264,76	75,29	83,85	735,91	3,51	524,09	462,40	428,58	468,01	516,77
202	263,45	75,17	83,83	734,46	3,47	521,80	461,09	428,86	464,40	515,30
203	262,61	75,50	83,73	733,30	3,47	519,70	460,00	429,37	460,29	513,32
204	261,40	75,32	84,74	731,95	3,47	518,40	458,71	429,40	456,95	510,94
205	260,52	75,47	83,93	730,32	3,38	517,20	457,72	429,68	453,43	508,36
206	259,36	75,44	83,90	729,39	3,38	516,36	456,60	429,57	449,82	506,21
207	258,29	75,35	84,04	728,14	3,38	515,40	455,59	429,62	446,35	504,36
208	257,55	75,07	83,94	727,27	3,38	512,83	454,56	429,64	442,84	502,04
209	256,24	75,39	84,28	727,16	3,38	510,46	453,79	430,36	440,15	501,14
210	255,41	75,38	84,19	726,85	3,38	509,16	452,61	430,71	436,79	498,46
211	254,56	75,64	84,36	726,34	3,38	507,01	451,62	431,32	433,66	496,82
212	253,72	75,76	83,99	726,56	3,38	505,14	450,81	431,90	430,45	494,92
213	252,87	75,68	84,17	725,83	3,28	503,70	449,70	432,22	427,53	493,37
214	252,19	75,74	84,63	720,37	3,28	502,29	448,61	432,46	424,57	491,31
215	251,06	75,81	84,36	712,96	3,28	500,32	447,62	432,92	421,59	489,57
216	250,11	75,62	84,24	709,23	3,28	499,49	446,66	433,11	418,75	486,96
217	249,02	75,46	84,34	708,19	3,28	498,23	445,82	433,07	416,08	484,96
218	248,13	75,44	84,40	707,46	3,28	496,34	445,07	433,28	413,43	483,45
219	247,72	75,68	84,72	703,87	3,28	494,17	444,35	433,85	410,87	482,24
220	246,54	75,34	84,36	699,15	3,17	493,08	443,10	433,92	407,59	478,97
221	245,09	75,52	84,51	697,56	3,17	491,36	442,29	434,38	405,30	478,24
222	244,86	75,84	83,90	695,59	3,17	489,25	440,61	434,97	402,44	476,23
223	244,23	75,92	84,23	695,39	3,17	487,86	439,36	435,20	400,40	474,60
224	243,66	75,91	84,28	693,52	3,17	487,24	437,77	435,10	398,17	472,80
225	243,42	75,86	84,18	692,63	3,07	485,23	436,50	434,90	395,92	471,23
226	242,57	76,00	84,46	692,01	3,17	483,66	434,92	434,85	393,66	470,14
227	242,64	75,83	84,60	690,67	3,07	482,44	433,45	434,75	391,15	468,47
228	242,10	75,89	84,72	689,71	3,07	481,23	431,91	434,81	388,85	467,03
229	241,66	75,99	84,97	689,54	3,07	479,83	430,26	434,82	386,57	465,07
230	240,99	75,85	84,64	689,96	3,07	478,59	428,56	434,91	384,19	462,83
231	240,12	75,82	84,53	689,34	2,97	477,52	427,15	434,85	381,92	460,29
232	239,63	75,86	84,35	686,97	2,97	476,56	425,62	434,84	379,68	458,65
233	238,53	76,00	84,56	682,96	2,98	475,71	424,11	434,74	377,57	456,77
234	237,35	75,77	84,47	675,82	2,97	475,05	422,65	434,65	375,43	454,59
235	236,16	75,91	84,39	669,65	2,97	474,36	421,41	434,51	373,56	453,14
236	234,34	75,84	84,50	665,55	2,97	473,35	419,82	434,56	371,33	450,52
237	233,36	75,92	84,63	662,31	2,97	472,29	418,40	434,71	369,54	449,56
238	233,02	75,94	84,78	660,05	2,97	470,75	417,09	434,69	367,59	448,35
239	232,01	76,02	84,89	658,21	2,97	469,57	415,88	434,71	366,07	447,13
240	231,21	75,95	84,67	656,45	2,94	467,96	414,23	434,99	364,05	445,16
241	230,69	76,04	84,43	655,00	2,87	467,20	413,19	434,92	361,51	443,65
242	229,45	75,81	84,62	654,26	2,87	465,53	412,07	435,64	360,17	443,06
243	229,25	75,93	84,61	653,27	2,87	464,00	411,03	436,19	358,43	441,55
244	228,62	76,14	84,82	653,80	2,87	463,00	410,12	436,72	356,74	440,76
245	264,70	76,01	90,07	579,05	2,87	462,43	409,27	437,44	355,41	439,09

POLYTESTS
TESTING THROUGH YOUR REALITY

Date: 2022-06-21 Manufacturer: Hearthstone Model: 8031

Project #: PT 20270 Run: 7 Tech: MA Reviewer: DP

- kindling 31 LBS stand F.R.
- by pass open
- Fan off
- At 12 LBS insert preload
- After 5 min close Door
- At 300 LBS insert second preload
- close Door immediatly
- close bypass and open Fan immediatly
- At 31 LBS rack load Bed
- After 2 min insert load
- close Door and bypass immediatly

TEST LOAD CONFIGURATION

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE / POST CHECKS

Date: 2022-06-21 Manufacturer: Hearthstone Model: 8031

Project #: PT 20270 Run: 7 Tech: M M Reviewer: DB

Moisture Meter Calibration Check:	Equipment #	Time	12%	22%
	EM-334	7:30	ok	ok
		Pre-Test		Post-Test

Facility Conditions:

	Pre-Test	Post-Test
Air Velocity from less than 2 feet	0 (max50 Fpm)	0 (max50 Fpm)
Smoke Capture Check (tunnel velocity)	ok	NA
Picture	4 sides ok	ok

Wood Heater Conditions:

Date Wood Heater Stack Cleaned	2022-06-20
Date Dilution Tunnel Cleaned	2022-06-20
Induced Draft Check (max 0.005 H2O)	ok
Traverse before ignition	ok

Temperature System:

Ambient (65°-90°F)	ok °F

Proportional Checks:

Thermocouple check	ok
Pitot Clean	ok
Pitot verification	ok

Pictures for report	
Side	ok
Coal bed	ok
Load	ok
Load in stove	ok
Fuel adjustment	ok

Load Length approximately 5/6 of firebox Lenght: ok

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 2022-06-21 Manufacturer: Hearthstone Model: 8031

Project #: P2 20270 Run: 7 Tech: M S Reviewer: DB

Leakage Checks Tunnel Samplers

	System 1st hour		System 1		System 2	
Unplugged Flow Rate = .25cfm	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test ASTM (-15) CSA B415 (-5)
Vacuum (inches Hg.)	-10	-10	-10	-10	-10	-10
Final 1minute DGM (Liter)	653779.14	654600.10	653779.24	654600.18	701682.09	702481.98
Initial 1minute DGM (Liter)	653779.12	654600.10	653779.22	654600.18	701682.00	702481.98
Change (Liter)	0.02	0	0.02	0	0.09	0
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)	**0.20**	**0.20**	**0.20**	**0.20**	**0.20**	**0.20**
Check OK	Ok	Ok	Ok	Ok	Ok	Ok

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 2022-06-01 Manufacturer: Hearthstone Model: 8031

Project #: PT 2070 Run: 7 Tech: MR Reviewer: DP

Leakage Checks Flue Gas Sampler

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

Leakage Checks Pitot

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

Scales checks

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Platform	EM-205 ~~33~~ mm	10.00 kg mm lbs, Class F	10,00 kg mm ~~lbs~~
Wood	EM-090	440 lbs, Class F	440 lbs
Analytical	EM-335	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%

POLYTESTS
TESTING THROUGH YOUR REALITY

CONTINUOUS ANALYZERS

Date: 2022-06-27 Manufacturer: Heartstone Model: 8031

Project #: PT 20270 Run: 7 Tech: MM Reviewer: DP

FOR TUNNELS < 12 in

Barometric pressure (P_{bar}) 101.4 (KPa.) Static pressure (P_g) 0.18 (inches w.c.)
Inside diameter: Port A _____ Port B _____
Tunnel cross sectional area: .1963Ft^2
Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_t (inches H_2O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.073	75.79
B - Centroid	3.00	3.50	4	0.072	75.80
A-1	0.40	0.50	0.50	0.059	75.79
A-2	1.50	1.75	2	0.065	75.83
A-3	4.50	5.25	6	0.067	75.83
A-4	5.60	6.5	7.5	0.059	75.79
B-1	0.40	0.50	0.50	0.059	75.80
B-2	1.50	1.75	2	0.061	75.84
B-3	4.50	5.25	6	0.077	75.84
B-4	5.60	6.5	7.5	0.060	75.51
				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 H_2O)
T_s = average absolute dilution tunnel temperature (°F + 460)
P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{sg}$
P_g = static pressure $\frac{\text{in. } H_2O}{\{\ 13.6\ \}}$
M_s = 28.56, wet molecular weight of stack gas (alternatively, i 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_t) measured at each traverse point.

POLYTESTS
TESTING THROUGH YOUR REALITY

CONTINUOUS ANALYZERS

Date: 2022-06-21 Manufacturer: Heathstone Model: 8031

Project #: PI 20270 Run: 7 Tech: JM Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
CO	0	0	2985	3000	1009	1000
Tolerance CO	0	+/- 0.02	0015	+/- 0.15	0009	+/- 0.05
CO_2	0	0	17.93	18.00	998	10.00
Tolerance CO2	0	+/- 0.02	0.07	+/- 0.5	002	+/- 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	2.990	1.013	0	0.02	0.005	0.15	0004	0.05	✓	
CO_2	0	17.93	9.96	0	0.02	0.01	0.5	002	0.5	✓	

POLYTESTS
TESTING THROUGH YOUR REALITY

TEST DATA LOG

Date: 2022-06-21 Manufacturer: Hearthstone Model: 8031

Project #: PT 20270 Run: 7 Tech: MM Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blanck
Final (Liter)	654599,39	402479,88	389285,70
Initial (Liter)	653779,40	401681,35	388608,11

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	101,4	101,4
Dry Bulb (F):	75,3	77,3
Humidity (%):	45,7	41,7

Flow Meter

	Start	End
Flow meter reading	N.A	NA

Flow Meter Verification

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

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2022-07-21 Manufacturer: Hearthstone Model: 8031

Project #: pI 20270 Run: 7 Tech: MM Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight		Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 14 in.	1506	lbs.	20.1	20.4	20.6	20.8	20.9
1 1/2 x 3 1/2 x 14 in.	1292	lbs.	20	20.1	20.6	20.4	20.1
1 1/2 x 3 1/2 x 14 in.	1548	lbs.	19.9	20.0	20.0	20.1	20.3
1 1/2 x 3 1/2 x 14 in.	1634	lbs.	21.1	21.0	21.0	21.0	21.3
1 1/2 x 3 1/2 x 14 in.	1568	lbs.	20.8	20.9	20.6	20.4	20.3
1 1/2 x 3 1/2 x 14 in.	1568	lbs.	21.0	21.3	21.6	21.4	21.3
1 1/2 x 3 1/2 x 14 in.	1438	lbs.	21.6	21.4	21.4	21.8	21.4
1 1/2 x 3 1/2 x 14 in.	1460	lbs.	22.0	22.1	22.3	22.4	22.3
1 1/2 x 3 1/2 x 14 in.	1298	lbs.	21.6	21.0	21.1	21.3	21.4
x x in.		lbs.					
1 1/2 x 3 1/2 x 14 in.	1516	lbs.	22.0	22.1	22.3	22.4	22.3
1 1/2 x 3 1/2 x 14 in.	1438	lbs.	21.9	21.4	21.3	21.2	21.4
1 1/2 x 3 1/2 x 14 in.	1310	lbs.	20.8	20.9	20.8	21	20.9
1 1/2 x 3 1/2 x 14 in.	1308	lbs.	20.4	20.3	20.4	20.6	20.9
1 1/2 x 3 1/2 x 14 in.	1344	lbs.	21.1	21.3	21.4	21.3	21.6
1 1/2 x 3 1/2 x 14 in.	1634	lbs.	21.4	21.3	21.2	21.3	21.9
1 1/2 x 3 1/2 x 14 in.	1574	lbs.	22.0	22.1	22.1	22.3	22.4
1 1/2 x 3 1/2 x 14 in.	1616	lbs.	19.9	20.0	20.1	20.4	20.3
1 1/2 x 3 1/2 x 14 in.	1648	lbs.	20.4	20.6	20.9	20.6	20.7
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					

TEST LOAD WEIGHT: 13 388 +13 304 lbs

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2022-06-21 Manufacturer: 2022-06-21 Model: 8031

Project #: PI 20270 Run: 3 Tech: MM Reviewer: DP

FUEL DESCRIPTION:

Type of wood :

TEST LOAD

Piece Size	Weight		Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 15 in.	1446	lbs.	19'	19.8	19.4	19.3	~~19.7~~ 19.2
1 1/2 x 3 1/2 x 15 in.	1448	lbs.	20'	19.9	19.8	20.0	20.0
1 1/2 x 3 1/2 x 15 in.	1466	lbs.	20.4	19.6	19.7	19.7	19.9
3 1/2 x 3 1/2 x 15 in.	3600	lbs.	21'	21.4	21'	20.9	20.8
3 1/2 x 3 1/2 x 15 in.	3572	lbs.	20.8	20.4	20.9	20.9	20.8
x x in.		lbs.					
1 1/2 x 3/4 x 5 in.	0124	lbs.			19'		
1 1/2 x 3/4 x 5 in.	0'130	lbs.			20.0		
1 1/2 x 3/4 x 5 in.	0'144	lbs.			20'		
1 1/2 x 3/4 x 5 in.	0'128	lbs.			19.6		
1 1/2 x 3/4 x 5 in.	0'140	lbs.			19.8		
1 1/2 x 3/4 x 5 in.	0'134	lbs.			19.8		
1 1/2 x 3/4 x 5 in.	0'158	lbs.			19.9		
1 1/2 x 3/4 x 5 in.	0'130	lbs.			20.4		
1 1/2 x 3/4 x 5 in.	0'146	lbs.			20.3		
1 1/2 x 3/4 x 5 in.	0'134	lbs.			20.4		
1 1/2 x 3/4 x 5 in.	0'130	lbs.			20.4		
1 1/2 x 3/4 x 5 in.	0'134	lbs.			21'		
1 1/2 x 3/4 x 5 in.	0'158	lbs.			21.0		
1 1/2 x 3/4 x 5 in.	0'138	lbs.			20.0		
1 1/2 x 3/4 x 5 in.	0'136	lbs.			20.8		
1 1/2 x 3/4 x 5 in.	0'130	lbs.			20.9		
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					
x x in.		lbs.					

TEST LOAD WEIGHT: 13.75 lbs Min 20%: 2.75 Max 25%: 3.43

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2022-06-20 Manufacturer: Heartland Model: 8031

Project #: pI 20 270 Run: 7 Tech: JM Reviewer: DP

Pre-test Weight Record		SYSTEM 1 – 1st hour				SYSTEM 1				
		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	003	3420	3430	6	005	3440	3450	36	3480
2022-06-20	17:00	61,4536	0,1301	0,1279	34,8674	61,5006	0,1296	0,1296	34,5867	0,1299
2022-06-21	11:00	61,4537	0,1302	0,1278	34,8673	61,5007	0,1297	0,1296	34,5866	0,1300

Post-test Weight Record		SYSTEM 1 – 1st hour				SYSTEM 1				
		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	003	3420	3430	~~6~~ ~~34,8705~~	005	3440	3450	36	3480
2022-06-21	16:00	61,4543	0,1351	0,1273	~~34,0785~~	61,5011	0,1296	0,1295	34,5889	0,1301
2022-06-27	8:00	~~61,4539~~ 61,4543	0,1343	0,1273	34,8688	61,5008	0,1295	0,1294	34,5874	0,1301
2022-06-28	8:00	61,4539	0,1343	0,1273	34,8688	61,5008	0,1295	0,1294	34,5874	0,1301

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2022-06-20 Manufacturer: Hearthstone Model: 4631

Project #: PI 20 270 Run: 7 Tech: M M Reviewer: BP

		SYSTEM 2			
Pre-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	42	3460	3470	37
2022-06-20	17:30	110 3106	01299	01290	34 3252
2022-06-24	11:30	110 3107	01300	01290	34,3253

		SYSTEM 2			
Post-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	42	3460	3470	37
2022-06-24	16:30	110 3118	01343	01278	34 3293
2022-06-27	8:00	110 3109	01339	01278	34 3276
2022-06-28	8:00	110 3109	01339	01278	34 3276

Paramètres

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

Code verrouillage:	HEA	

Description du test

Test standard	EPA	
Run #	7	
Date	21-06-2022	
Technicien	M.M	
Project #	PI 20270	

Description de l'unité

Manufacturier	HEARTHSTONE	
Modèle	8031	
Combustion system	Cat	
Appliance type	WOOD STOVE	
Firebox volume	1,9	cu ft.
Appliance weight empty	N.A	lbs
Appliance weight full	N.A	lbs

Paramètres du test

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

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	1,007	Dimensionless
Equipment number (DGM #1):	EM 178	
Calibration Factor (DGM #2):	1,005	Dimensionless
Equipment number (DGM #2):	EM 318	
Calibration Factor (DGM #3):	0,988	
Equipment number (DGM #3):	EM 179	Dimensionless

Tunnel

Targeted tunnel flow rate	350	scfm
Tunnel diameter	8	in.
Molecular weight	29	29 as per ASTM E2515
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	PI 20270
Date	21-06-2022
Technicien	M.M

Fuel data

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

Default Fuel Values

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

	Start	End
Barometer (kPa):	101,4	101,4
Barometer (in.Hg):	29,943409	29,94340873
Dry Bulb (F):	75,3	77,3
Humidity (%):	45,7	41,7
Air velocity (ft/min)	0	0

DGM #1	Final:	23116,960	cuft	Final:	654599,390	Liter
	Initial:	23088,002	cuft	Initial:	653779,400	Liter
DGM #2	Final:	14213,443	cuft	Final:	402479,880	Liter
	Initial:	14185,243	cuft	Initial:	401681,350	Liter
DGM room	Final:	13747,495	cuft	Final:	389285,700	Liter
	Initial:	13723,566	cuft	Initial:	388608,110	Liter

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent: 250

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

Project nu.	PI 20270
Date	21-06-2022
Technicien	M.M

Preload data sheet

Test Load Weight:

Lower	Ideal	Upper
11,97	13,30	14,63

Load Volume: 0,7656 cu. ft

Loading Density: 14,053 lbs./ft3

Number of Spaces:

Spacer weight (lbs):

Load Density (wet): 34,873 lbs./ft3

Dry Wood Density: 28,79891

Piece Size (In): Thick	Wide	x Length	Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x Weight	Volume Cubic Inches
1,5	3,5	14	1,506	20,1	20,4	20,6	20,8	20,9	30,96336	73,50
1,5	3,5	14	1,292	20,6	20,3	20,6	20,4	20,1	26,3568	73,50
1,5	3,5	14	1,548	19,9	20	20	20,1	20,3	31,05288	73,50
1,5	3,5	14	1,634	21,1	21	21	21	21,3	34,44472	73,50
1,5	3,5	14	1,568	20,8	20,9	20,6	20,4	20,3	32,3008	73,50
1,5	3,5	14	1,568	21	21,3	21,6	21,4	21,3	33,42976	73,50
1,5	3,5	14	1,438	21,6	21,4	21,4	21,8	21,4	30,94576	73,50
1,5	3,5	14	1,46	22	22,1	22,3	22,4	22,3	32,4412	73,50
1,5	3,5	14	1,298	21,6	21	21,1	21,3	21,4	27,62144	73,50
										0,00
1,5	3,5	14	1,516	22	22,1	22,3	22,4	22,3	33,68552	73,50
1,5	3,5	14	1,438	21,9	21,4	21,3	21,2	21,4	30,83072	73,50
1,5	3,5	14	1,31	20,8	20,9	20,8	20,6	20,4	27,117	73,50
1,5	3,5	14	1,308	20,4	20,3	20,4	20,6	20,9	26,84016	73,50
1,5	3,5	14	1,344	21,1	21,3	21,4	21,3	21,6	28,68096	73,50
1,5	3,5	14	1,634	21,4	21,3	21,2	21,3	21,9	35,00028	73,50
1,5	3,5	14	1,574	22	22,1	22,1	22,3	22,4	34,91132	73,50
1,5	3,5	14	1,616	19,9	20	20,1	20,4	20,3	32,54624	73,50
1,5	3,5	14	1,648	20,4	20,6	20,9	20,6	20,7	34,01472	73,50
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
										0,00
									SUM MC	563,18364

PreTest Load Weight: 26,70 lbs.

Dry Weight: 10,00 kg.

Average Moisture Content: %

Dry: 21,09

21,09

Must be 18-28

Wet: 17,42

must be 15,2-22

Project nu.	PI 20270
Date	21-06-2022
Technicien	M.M

FUEL LOAD DATA SHEET, CSA B415

Test Load Weight:

Lower	Ideal	Upper
12,0	13,3	14,6

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

Load Volume: 0,35 cu. ft

Loading Density: 7,2 lbs./ft3

Number of Spaces: 16

Spacer weight: lbs

Load Density (wet): 33,0 lbs./ft3

Dry Wood Density: 27,4 lbs./ft3

Piece Size (in):			Weight	Meter Moisture Content					Ave. MC x	Volume	Ave. MC
Thick	Wide	Length	lbs	Dry Uncorrected %					Weight	Cubic Inches	%
1,5	3,5	15	1,45	19,10	19,80	19,40	19,30	19,30	28,02348	78,75	19,4
1,5	3,5	15	1,45	20,10	19,90	19,80	20,00	20,00	28,90208	78,75	20,0
1,5	3,5	15	1,47	20,40	19,60	19,70	19,70	19,90	29,11476	78,75	19,9
3,5	3,5	15	3,60	21,10	21,40	21,10	20,90	20,80	75,816	183,75	21,1
3,5	3,5	15	3,57	20,80	20,40	20,90	20,90	20,80	74,15472	183,75	20,8
										0,00	
										0,00	
										0,00	

1,5	0,75	5	0,12			19,10			2,3684	5,63	19,1
1,5	0,75	5	0,13			20,00			2,6	5,63	20,0
1,5	0,75	5	0,14			20,10			2,8944	5,63	20,1
1,5	0,75	5	0,13			19,60			2,5088	5,63	19,6
1,5	0,75	5	0,14			19,80			2,772	5,63	19,8
1,5	0,75	5	0,13			19,80			2,6532	5,63	19,8
1,5	0,75	5	0,16			19,90			3,1442	5,63	19,9
1,5	0,75	5	0,13			20,40			2,652	5,63	20,4
1,5	0,75	5	0,15			20,30			2,9638	5,63	20,3
1,5	0,75	5	0,13			20,40			2,7336	5,63	20,4
1,5	0,75	5	0,13			20,40			2,652	5,63	20,4
1,5	0,75	5	0,13			21,10			2,8274	5,63	21,1
1,5	0,75	5	0,16			21,00			3,318	5,63	21,0
1,5	0,75	5	0,14			21,00			2,898	5,63	21,0
1,5	0,75	5	0,14			20,80			2,8288	5,63	20,8
1,5	0,75	5	0,13			20,90			2,717	5,63	20,9
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
								SUM MCx	280,54264		20,3 %

Test Load Weight: 13,73 lbs.

Dry Weight: 5,17 kg.

Average Moisture Content: %

Dry: 20,44 Dry(EPA) 20,44

Dry(B415 20,44

20,44
Must be 19-25

Wet: 16,97
must be 15,2-22

Coal Bed Range: 2,7 lbs. to 3,4 lbs.

TEST CHARGE:

Coal bed weight: 3,1 lbs.

Project nu.	PI 20270
Date	21-06-2022
Technicien	M.M

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	3	3420	3430	6	5	3440	3450	36	42	3460	3470	37	3480		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,4536	0,1301	0,1279	34,8674	61,5006	0,1296	0,1296	34,5867	110,3106	0,1299	0,1290	34,3252	0,1299	2022-06-20	17:00
Before (6)	61,4537	0,1302	0,1278	34,8673	61,5007	0,1297	0,1296	34,5866	110,3107	0,1300	0,1290	34,3253	0,1300	2022-06-21	11:00
After (1)	61,4543	0,1351	0,1273	34,8705	61,5011	0,1296	0,1295	34,5889	110,3118	0,1343	0,1278	34,3293	0,1301	2022-06-21	16:00
After (2)	61,4539	0,1343	0,1273	34,8688	61,5008	0,1295	0,1294	34,5874	110,3109	0,1339	0,1278	34,3276	0,1301	2022-06-27	08:00
After (3)	61,4539	0,1343	0,1273	34,8688	61,5008	0,1295	0,1294	34,5874	110,3109	0,1339	0,1278	34,3276	0,1301	2022-06-28	08:00
After (4)															
After (5)															
After (6)	61,4539	0,1343	0,1273	34,8688	61,5008	0,1295	0,1294	34,5874	110,3109	0,1339	0,1278	34,3276	0,1301	2022-06-28	08:00
Difference	0,0002	0,0041	-0,0005	0,0015	0,0001	-0,0002	-0,0002	0,0008	0,0002	0,0039	-0,0012	0,0023	0,0001		
Total (mg)		5,3				5,8				5,2			0,1		
Total ajusté (mg)		**5,20**				**5,70**				**5,10**					

Project nu.	PI 20270
Date	21-06-2022
Technicien	M.M

Demonstration Purpose only not real numbers negative mass adjusted to zero

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	3	3420	3430	6	5	3440	3450	36	42	3460	3470	37	3480		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,4536	0,1301	0,1279	34,8674	61,5006	0,1296	0,1296	34,5867	110,3106	0,1299	0,1290	34,3252	0,1299	2022-06-20	17:00
Before (6)	61,4537	0,1302	0,1278	34,8673	61,5007	0,1297	0,1296	34,5866	110,3107	0,1300	0,1290	34,3253	0,1300	2022-06-21	11:00
After (1)	61,4543	0,1351	0,1273	34,8705	61,5011	0,1296	0,1295	34,5889	110,3118	0,1343	0,1278	34,3293	0,1301	2022-06-21	16:00
After (2)	61,4539	0,1343	0,1273	34,8688	61,5008	0,1295	0,1294	34,5874	110,3109	0,1339	0,1278	34,3276	0,1301	2022-06-27	08:00
After (3)	61,4539	0,1343	0,1273	34,8688	61,5008	0,1295	0,1294	34,5874	110,3109	0,1339	0,1278	34,3276	0,1301	2022-06-28	08:00
After (4)															
After (5)															
After (6)	61,4539	0,1343	0,1278	34,8688	61,5008	0,1297	0,1296	34,5874	110,3109	0,1339	0,1290	34,3276	0,1301	2022-06-28	08:00
Difference	0,0002	0,0041	0,0000	0,0015	0,0001	0,0000	0,0000	0,0008	0,0002	0,0039	0,0000	0,0023	0,0001		
Total (mg)		5,8				6,7				6,4			0,1		
Total ajusté (mg)		**5,70**				**6,60**				**6,30**					

Project nu.	PI 20270
Date	21-06-2022
Technicien	M.M

SFBA EPA EMISSION RESULTS

Test Duration: **150** min

PRESSURE FACTOR:	DGM 1	0,97119	
	DGM 2	0,97490	
	DGM 3	1,00078	
TEMPERATURE FACTORS	DGM 1	0,98524	
	DGM 2	0,97756	
	DGM 3	0,98563	
VOLUMES SAMPLED	DGM 1	27,890	SCft
	DGM 2	27,021	Scft
	DGM 3	23,324	SCft

TOTAL TUNNEL VOLUME : 49765

SAMPLE RATIOS

Sample Train 1:	1784,318
Sample Train 2:	1841,675

Paticulate concentration

Sample Train 1	**0,000208**	g/dscf
Sample Train 2	**0,000192**	g/dscf
Room	**0,000004**	g/dscf

TOTAL EMISSIONS

Sample Train 1	**10,14**	g
Sample Train 2	**9,36**	g

EMISSION RATES

Sample Train 1	**4,05**	g/hr
Sample Train 2	**3,75**	g/hr
1st hour emission rate	**9,46**	g/hr

	Train 1	Train 2
Cs	0,000208	0,00019244

RESULTS

Average emission rate: 3,9 g/hr

Burn Rate : 2,068 Dry kg/hr

BAROMETRIC PRESSURE

Average:	29,943409	In Hg
Start:	29,943409	In Hg
End:	29,943409	In Hg

DGM CONTROLLER VALUES

DGM 1	Final:	23116,960	Cuft
	Initial:	23088,002	Cuft
DGM 2	Final:	14213,443	Cuft
	Initial:	14185,243	Cuft
DGM #3	Final:	13747,495	Cuft
	Initial:	13723,566	Cuft

TEMPERATURES

DGM 1	535,908	°R
DGM 2	540,119	°R

CALIBRATION FACTORS

DGM 1	1,0066
DGM 2	1,0054
DGM #3	0,9882

TUNNEL FLOW RATE: 331,764 Dscfm

PARTICULATE CATCH

Total Sample Train 1:	5,80	mg
Total Sample Train 2:	5,20	mg
Total Sample Train 1 1st hour:	5,30	mg

DEVIATION: 3,96%

# Elapsed Time		# Weight Remaining	#	#	#	#1 Flue	#2 Boom	#3 Tunnel	#4 Limit	#5 Limit	#6 Limit	#7 Limit	#8 Limit	# Cetal yel	Oven Zone 1 Heating	#OVEN 2 Driver T	#OVEN 3 Outlet T	#Oven 3 Temp	Oven Zone 4 Heating	#OVEN 4 Driver T	#OVEN 5 Outlet T	#Oven 5 Temp	Cannon Inlet Pressure	Flow (SCFM) Pressure	Pressure vs. Surface Temp.
min	New data row	lbs	CO	CO_2	O_2	Gas	Temp	Dry Bulb	Time	Bed 1	Bed 2	Limit	Rotisserie		Heating	Driver T	Outlet T	Temp	Heating	Driver T	Outlet T	Temp	in wc	in wc	Temp.
min		lbs	%	%	%	°F	°F	°F	°F	°F	°F	°F	°F		Preference	°F	°F	°F	Preference	°F	°F	°F	in wc	in wc	°F
0,00	2/02,00	13,7	0,0	3,8	0,0	388,8	76,4	300,2	389,8	800,3	664,2	864,3	476,2	882,4	0,10	76,03	74,01	76,50	0,10	76,80	76,30	80,17	0,07	0,08	0
1,0	181,0	13,8	0,2	4,6	0,0	364,4	76,4	96,1	383,2	499,4	564,3	868,2	477,4	784,2	0,10	76,14	73,06	76,22	0,10	76,66	76,35	79,88	0,07	0,07	-0,861791
2,0	182,0	13,4	0,1	8,3	0,0	386,1	76,4	98,7	380,8	497,3	562,7	862,3	478,7	908,4	0,10	76,13	73,04	76,20	0,10	76,66	76,47	80,01	0,07	0,07	-1,577637
3,0	183,0	13,2	0,1	9,0	0,0	401,0	76,3	96,0	378,0	492,8	559,0	860,8	479,4	978,0	0,10	76,02	73,01	76,20	0,10	76,16	76,55	80,12	0,07	0,07	-4,670898
4,0	184,0	13,1	0,1	10,8	0,0	413,3	76,3	94,0	375,7	488,2	556,4	859,2	480,1	981,8	0,10	75,95	73,00	76,18	0,10	76,16	76,61	80,20	0,07	0,07	-7,324658
5,0	185,0	12,9	0,1	10,8	0,0	432,7	76,3	94,0	374,0	483,8	552,8	858,3	480,3	1018,1	0,10	74,94	74,99	76,68	0,10	76,43	76,99	80,82	0,07	0,08	-6,944837
6,0	186,0	12,8	0,1	11,4	0,0	450,2	76,3	97,8	373,0	479,4	548,7	858,8	480,0	1068,8	0,10	74,91	74,97	76,68	0,10	76,54	76,76	80,72	0,07	0,08	-13,18652
7,0	187,0	12,6	0,2	12,8	0,0	440,8	76,9	98,0	372,4	478,8	544,8	848,3	479,4	1108,4	0,10	74,89	74,94	80,07	0,10	76,84	76,83	80,83	0,07	0,08	-14,488068
8,0	188,0	12,4	0,3	13,6	0,0	448,2	76,1	98,1	372,4	484,4	539,8	840,8	478,9	1128,8	0,10	74,91	74,93	80,22	0,10	76,84	76,81	81,18	0,07	0,08	-19,693738
9,0	189,0	12,2	0,3	14,1	0,0	457,3	75,9	98,8	372,6	488,4	534,7	837,8	478,2	1144,8	0,10	74,99	74,94	80,44	0,10	77,08	77,00	81,36	0,07	0,08	-22,838626
10,0	240,0	12,1	0,4	14,1	0,0	462,3	76,8	99,8	374,3	492,8	530,6	831,3	477,2	1162,8	0,10	74,99	74,93	80,68	0,10	77,18	77,07	81,56	0,07	0,08	-26,780238
11,0	241,0	11,9	0,5	14,2	0,0	446,8	76,8	100,4	376,1	446,8	534,1	827,8	476,2	1162,8	0,10	74,81	74,90	80,88	0,10	77,28	77,14	81,76	0,07	0,08	-28,307738
12,0	242,0	11,7	0,5	14,4	0,0	471,1	76,8	100,0	378,0	441,7	522,0	824,0	476,2	1168,8	0,10	74,81	74,88	81,06	0,10	77,38	77,21	81,88	0,07	0,08	-30,844615
13,0	243,0	11,5	0,4	14,6	0,0	474,4	76,8	99,8	382,2	436,8	518,3	819,8	474,1	1168,8	0,10	74,88	74,88	81,23	0,10	77,58	77,30	82,18	0,07	0,08	-32,636677
14,0	244,0	11,3	0,5	14,7	0,0	478,6	76,8	100,2	386,1	431,8	518,3	818,2	472,6	1170,1	0,10	74,88	74,88	81,37	0,10	77,67	77,38	82,26	0,07	0,08	-34,674951
15,0	245,0	11,1	0,5	14,8	0,0	481,3	76,8	99,6	389,7	428,1	512,0	812,1	471,3	1173,8	0,10	74,78	74,88	81,48	0,10	77,74	77,41	82,42	0,07	0,08	-36,237871
16,0	246,0	10,9	0,5	14,9	0,0	488,0	76,8	100,4	394,1	423,7	508,6	808,3	469,8	1178,7	0,10	74,84	74,81	81,61	0,10	77,77	77,44	82,56	0,07	0,08	-37,755859
17,0	247,0	10,7	0,6	15,2	0,0	488,1	76,4	100,7	398,6	420,0	504,3	804,7	468,6	1178,4	0,10	74,88	74,77	81,78	0,10	77,81	77,48	82,72	0,07	0,08	-38,788693
18,0	248,0	10,5	0,6	15,4	0,0	491,3	76,2	101,1	403,6	416,8	504,7	803,1	466,8	1185,7	0,10	74,81	74,72	81,90	0,10	77,80	77,51	82,88	0,07	0,08	-39,842361
19,0	249,0	10,3	0,8	15,7	0,0	493,8	76,2	101,4	408,0	413,4	502,7	801,1	465,2	1183,8	0,10	74,64	74,69	82,00	0,10	77,80	77,53	82,96	0,07	0,08	-40,624609
20,0	250,0	10,1	0,8	15,8	0,0	496,7	76,3	101,8	414,1	410,8	500,7	799,8	463,7	1188,8	0,10	74,48	74,67	82,10	0,10	77,88	77,59	83,11	0,07	0,08	-41,113389
21,0	251,0	9,9	1,1	16,0	0,0	500,3	76,3	101,9	419,1	407,8	499,3	798,3	462,1	1187,3	0,10	74,33	74,65	82,28	0,10	78,00	77,66	83,24	0,07	0,08	-41,470898
22,0	252,0	9,7	1,3	16,1	0,0	501,0	76,4	102,6	428,0	408,7	499,1	796,5	460,2	1188,8	0,10	74,55	74,65	82,40	0,10	78,07	77,72	83,41	0,07	0,08	-41,604443
23,0	253,0	9,5	1,4	16,1	0,0	502,4	76,4	102,8	430,4	403,3	498,4	796,3	459,6	1184,8	0,10	74,59	74,68	82,53	0,10	78,16	77,81	83,58	0,07	0,08	-41,486614
24,0	254,0	9,3	1,5	16,1	0,0	503,0	76,4	102,5	438,8	401,8	498,4	796,0	458,7	1184,8	0,10	74,61	74,65	82,64	0,10	78,18	77,84	83,66	0,07	0,08	-41,18279
25,0	255,0	9,1	1,6	16,1	0,0	505,3	76,5	103,3	441,3	399,8	498,8	795,4	458,4	1180,3	0,10	74,65	74,67	82,68	0,10	78,27	77,89	83,73	0,07	0,08	-40,423863
26,0	256,0	8,9	1,7	16,1	0,0	506,6	76,5	103,2	444,7	398,2	499,3	797,2	458,3	1182,3	0,10	74,74	74,69	82,73	0,10	78,31	77,97	83,80	0,07	0,08	-39,821155
27,0	257,0	8,7	1,7	16,1	0,0	506,8	76,5	103,0	452,3	397,2	500,8	797,7	458,3	1183,3	0,10	74,74	74,69	82,88	0,10	78,32	77,97	83,81	0,07	0,08	-38,866858
28,0	258,0	8,4	1,8	16,1	0,0	506,6	76,5	102,6	457,8	396,3	501,8	799,1	458,7	1177,7	0,10	74,78	74,69	82,97	0,10	78,88	78,08	84,04	0,07	0,08	-37,812364
29,0	259,0	8,3	1,8	16,0	0,0	507,1	76,5	102,5	463,0	396,2	503,6	800,5	459,4	1178,7	0,10	74,79	74,71	83,10	0,10	78,88	78,10	84,13	0,07	0,08	-36,84602
30,0	260,0	8,1	2,0	16,0	0,0	506,8	76,6	102,3	468,3	394,3	505,7	801,8	447,8	1177,8	0,10	74,77	74,72	83,17	0,10	78,78	78,22	84,23	0,07	0,08	-35,30286
31,0	261,0	7,9	2,1	16,0	0,0	505,8	76,6	102,6	473,1	393,8	506,2	803,7	446,2	1178,8	0,10	74,83	74,75	83,22	0,10	78,81	78,29	84,26	0,07	0,08	-34,07881
32,0	262,0	7,7	2,1	16,0	0,0	505,6	76,4	102,8	478,1	393,2	506,8	805,7	445,0	1178,8	0,10	74,72	74,71	83,28	0,10	78,78	78,32	84,34	0,07	0,08	-32,801025
33,0	263,0	7,5	2,1	16,0	0,0	505,4	76,4	102,4	482,8	393,1	507,3	806,0	443,7	1177,4	0,10	74,71	74,70	83,34	0,10	78,82	78,36	84,38	0,07	0,08	-30,815364
34,0	264,0	7,3	2,2	16,0	0,0	504,0	76,5	102,6	487,8	392,7	507,3	805,3	442,2	1173,2	0,10	74,78	74,70	83,39	0,10	78,87	78,41	84,44	0,07	0,08	-29,486648
35,0	265,0	7,1	2,3	16,0	0,0	503,8	76,1	102,6	491,6	392,8	507,8	804,8	441,0	1169,8	0,10	74,68	74,67	83,46	0,10	78,82	78,44	84,44	0,07	0,08	-27,626324
36,0	266,0	6,9	2,2	15,8	0,0	504,0	76,3	102,8	494,7	393,2	508,4	805,1	439,8	1168,1	0,10	74,67	74,68	83,52	0,10	78,82	78,50	84,50	0,06	0,08	-28,6351
37,0	267,0	6,7	2,1	15,8	0,0	502,8	76,3	102,5	496,1	393,2	508,4	805,3	438,6	1166,8	0,10	74,70	74,68	83,61	0,10	78,81	78,61	84,58	0,07	0,08	-34,248736
38,0	268,0	6,6	1,8	15,8	0,0	502,0	76,3	103,1	504,3	393,0	507,0	804,8	437,8	1168,3	0,10	74,80	74,67	83,67	0,10	78,87	78,61	84,72	0,07	0,08	-33,753327
39,0	269,0	6,4	1,8	15,8	0,0	502,0	76,4	102,2	508,0	393,2	506,7	803,4	436,4	1164,8	0,10	74,89	74,67	83,68	0,10	78,84	78,64	84,71	0,07	0,08	-30,864414
40,0	270,0	6,2	1,8	15,8	0,0	505,8	76,6	102,1	511,4	393,8	505,8	802,7	435,4	1163,8	0,10	74,70	74,68	83,71	0,10	78,68	78,71	84,78	0,07	0,08	-19,1284
41,0	271,0	6,0	2,0	15,7	0,0	505,8	76,7	101,9	514,8	394,2	505,7	802,4	434,4	1164,8	0,10	74,66	74,70	83,72	0,10	79,11	78,79	84,78	0,07	0,08	-17,457703
42,0	272,0	5,8	1,8	15,8	0,0	500,7	76,6	102,8	518,4	394,8	506,3	802,0	433,4	1164,0	0,10	74,69	74,75	83,74	0,10	79,22	78,83	84,77	0,07	0,08	-15,76821
43,0	273,0	5,6	1,8	15,8	0,0	498,2	76,0	102,3	521,3	396,2	504,1	803,8	432,8	1160,4	0,10	75,11	74,79	83,78	0,10	79,34	78,90	84,84	0,07	0,08	-13,922388
44,0	274,0	5,5	1,8	15,8	0,0	498,3	75,9	101,6	523,7	398,8	503,0	807,2	431,6	1162,0	0,10	75,18	74,85	83,82	0,10	79,48	78,99	84,89	0,07	0,08	-12,22266
45,0	275,0	5,3	1,8	15,8	0,0	500,2	75,1	102,0	524,3	398,8	502,3	809,4	430,6	1160,7	0,10	75,35	74,91	83,84	0,10	79,60	79,07	84,92	0,07	0,08	-10,5563
46,0	276,0	5,2	1,7	15,8	0,0	500,0	75,1	102,8	529,3	397,7	501,8	811,1	429,7	1158,7	0,10	75,37	74,94	83,83	0,10	79,68	79,13	84,93	0,06	0,08	-8,053864
47,0	277,0	5,0	1,7	15,8	0,0	501,8	75,1	102,7	531,8	398,8	504,3	810,3	428,3	1158,8	0,10	75,42	74,98	83,84	0,10	79,66	79,14	84,96	0,07	0,08	-7,003701
48,0	278,0	4,8	1,8	15,8	0,0	502,4	75,2	103,0	533,8	400,3	507,3	847,8	428,3	1158,1	0,10	75,51	75,03	83,86	0,10	79,70	79,23	84,98	0,07	0,08	-6,944214
49,0	279,0	4,7	1,4	16,0	0,0	502,3	75,8	101,9	536,0	401,8	560,1	849,8	427,1	1307,2	0,10	75,59	75,04	83,87	0,10	79,79	79,29	84,99	0,07	0,08	-3,817963
50,0	300,0	4,5	1,3	16,0	0,0	501,1	75,4	102,5	538,2	403,3	562,8	852,5	426,4	1308,2	0,10	75,66	75,09	83,84	0,10	79,83	79,36	85,04	0,07	0,08	-1,218597
51,0	301,0	4,4	1,3	16,0	0,0	500,6	75,8	102,8	540,7	405,8	565,8	854,1	425,8	1198,4	0,10	75,71	75,13	83,82	0,10	79,87	79,40	85,07	0,06	0,08	-0,894364
52,0	302,0	4,2	0,7	15,9	0,0	500,7	75,7	101,9	541,4	407,7	568,4	857,2	424,6	1180,8	0,10	75,76	75,15	83,79	0,10	79,95	79,45	85,04	0,07	0,08	0,8277588
53,0	303,0	4,1	0,8	15,8	0,0	500,7	75,8	101,4	543,3	409,8	571,1	858,8	423,6	1185,2	0,10	75,78	75,19	83,76	0,10	79,98	79,48	85,02	0,07	0,08	2,8320289
54,0	304,0	4,0	0,4	15,8	0,0	500,1	75,3	101,8	545,0	412,4	574,1	859,3	423,0	1177,2	0,10	75,70	75,20	83,74	0,10	79,98	79,53	84,99	0,07	0,08	5,0931592
55,0	305,0	3,9	0,3	15,3	0,0	498,8	75,3	101,8	545,8	415,1	576,7	862,0	422,4	1163,8	0,10	75,59	75,20	83,74	0,10	79,90	79,60	85,01	0,07	0,08	6,8063134
56,0	306,0	3,7	0,3	14,9	0,0	496,6	75,1	101,5	547,8	417,2	579,8	863,1	421,6	1154,1	0,10	75,60	75,18	83,74	0,10	79,88	79,63	85,02	0,07	0,08	7,0823135
57,0	307,0	3,6	0,2	14,8	0,0	494,8	75,1	101,1	548,0	420,3	581,8	865,1	420,9	1148,7	0,10	75,55	75,15	83,74	0,10	79,79	79,70	85,01	0,07	0,08	8,3579788
58,0	308,0	3,4	0,2	14,7	0,0	493,0	75,2	101,2	548,4	423,8	584,3	866,3	420,3	1138,8	0,10	75,48	75,20	83,69	0,10	79,68	79,75	85,10	0,07	0,08	8,6448884
59,0	309,0	3,4	0,2	14,4	0,0	492,4	75,4	101,4	550,0	426,8	586,8	867,8	419,8	1133,8	0,10	75,60	75,22	83,63	0,10	79,61	79,83	85,08	0,06	0,08	11,331831
60,0	310,0	3,3	0,2	13,9	0,0	488,8	75,8	101,3	550,3	429,8	589,1	869,4	419,2	1137,4	0,10	75,74	75,24	83,64	0,10	80,01	79,90	85,02	0,06	0,08	12,6004607
61,0	311,0	3,2	0,2	13,6	0,0	485,8	75,8	100,8	550,4	432,8	592,0	870,1	418,6	1083,1	0,10	75,87	75,31	80,41	0,10	80,16	79,94	84,99	0,07	0,08	13,8408867
62,0	312,0	3,1	0,1	13,4	0,0	479,4	76,0	100,0	549,8	436,3	594,0	871,8	418,2	1079,3	0,10	76,07	75,34	80,63	0,10	80,28	80,00	84,87	0,07	0,08	15,041321
63,0	313,0	3,0	0,1	13,1	0,0	474,2	76,1	100,4	549,8	439,8	596,6	872,8	417,6	1081,8	0,10	76,16	75,42	80,83	0,10	80,37	80,08	84,88	0,07	0,08	16,334712
64,0	314,0	2,9	0,1	12,7	0,0	470,0	76,1	100,2	548,8	443,2	598,1	874,8	417,2	1049,1	0,10	76,28	75,48	81,08	0,10	80,44	80,14	84,86	0,07	0,08	17,615387
65,0	315,0	2,8	0,1	12,5	0,0	466,8	76,1	100,0	548,3	446,8	600,7	876,0	416,8	1037,1	0,10	76,37	75,54	81,23	0,10	80,58	80,21	84,89	0,07	0,08	18,822967
66,0	316,0	2,8	0,1	12,3	0,0	463,1	76,3	99,8	547,3	450,3	602,8	876,7	416,3	1024,8	0,10	76,48	75,62	81,40	0,10	80,67	80,30	84,82	0,07	0,08	19,953384
67,0	317,0	2,7	0,1	12,1	0,0	459,1	76,3	99,2	546,8	453,8	604,9	877,8	415,8	1014,8	0,10	76,65	75,66	81,53	0,10	80,68	80,34	84,81	0,07	0,08	20,787446
68,0	318,0	2,7	0,1	11,9	0,0	455,1	76,3	98,6	544,2	457,3	606,8	878,3	415,3	1004,8	0,10	76,71	75,71	81,68	0,10	80,70	80,38	84,80	0,07	0,08	21,435311
69,0	319,0	2,8	0,1	11,8	0,0	453,3	76,4	99,0	542,3	460,7	607,7	879,4	414,8	998,4	0,10	76,83	75,74	81,68	0,10	80,68	80,34	84,84	0,07	0,08	22,088
70,0	320,0	2,8	0,1	11,7	0,0	451,0	76,4	98,9	540,0	463,8	608,6	881,2	414,7	988,4	0,10	76,88	75,78	81,68	0,10	80,63	80,66	84,87	0,07	0,08	22,84527
71,0	321,0	2,4	0,1	11,5	0,0	447,4	76,2	98,4	537,2	466,8	610,1	881,8	414,4	979,8	0,10	76,88	75,81	82,08	0,10	80,68	80,74	84,88	0,07	0,08	23,080389
72,0	322,0	2,3	0,1	11,1	0,0	444,2	76,2	98,1	535,3	469,8	611,8	883,0	414,0	971,8	0,10	76,87	75,86	82,20	0,10	80,64	80,82	84,81	0,07	0,07	23,835857
73,0	323,0	2,2	0,1	10,9	0,0	440,7	76,3	97,8	532,8	472,8	612,4	884,3	413,7	968,8	0,10	76,84	75,87	82,29	0,10	80,66	80,86	84,82	0,07	0,07	24,238416
74,0	324,0	2,2	0,1	10,8	0,0	438,8	76,4	98,0	530,4	476,1	612,7	885,7	413,8	962,7	0,10	76,48	75,88	82,38	0,10	80,68	80,89	84,79	0,06	0,07	24,484183
75,0	325,0	2,2	0,1	10,8	0,0	436,8	76,3	97,8	527,0	477,8	613,6	886,7	413,8	952,8	0,10	76,82	75,91	82,47	0,10	80,69	80,88	84,81	0,07	0,07	24,798346
76,0	326,0	2,1	0,1	10,0	0,0	435,8	76,2	97,6	524,0	479,8	614,3	887,4	413,4	939,3	0,10	76,88	75,93	82,58	0,10	81,06	81,06	84,79	0,07	0,07	24,853888
77,0	327,0	2,0	0,1	9,8	0,0	427,4	76,2	97,3	520,7	481,8	614,3	888,8	413,3	930,4	0,10	76,84	75,94	82,61	0,10	81,03	81,09	84,73	0,07	0,07	24,828302
78,0	328,0	2,0	0,1	9,6	0,0	428,0	76,2	97,1	518,1	483,8	614,8	888,4	413,3	921,8	0,10	76,88	75,96	82,67	0,10	81,03	81,12	84,68	0,07	0,07	24,484817
79,0	329,0	2,0	0,1	9,3	0,0	421,8	76,2	97,1	514,8	485,8	614,8	888,2	413,2	914,8	0,10	76,88	75,98	82,77	0,10	81,08	81,18	84,62	0,07	0,07	24,030388
80,0	330,0	1,9	0,1	9,3	0,0	418,8	76,3	97,0	511,3	483,0	614,6	888,7	413,0	908,8	0,10	76,87	76,01	82,83	0,10	81,07	81,19	84,62	0,07	0,07	23,2091
81,0	331,0	1,9	0,1	9,3	0,0	416,1	76,4	96,8	507,4	483,1	614,2	889,0	412,8	903,8	0,10	76,83	76,04	82,93	0,10	81,08	81,27	84,61	0,07	0,07	22,40628
82,0	332,0	1,8	0,1	9,1	0,0	412,0	76,5	96,5	504,3	483,0	613,8	889,3	412,8	898,8	0,10	76,70	76,07	83,02	0,10	81,14	81,33	84,62	0,07	0,07	21,815863
83,0	333,0	1,8	0,1	9,1	0,0	410,1	76,5	96,0	500,1	483,8	613,0	889,7	412,6	894,1	0,10	76,77	76,11	83,01	0,10	81,23	81,44	84,57	0,07	0,07	20,483746
84,0	334,0	1,8	0,1	9,0	0,0	407,1	76,2	96,3	496,6	481,7	611,6	887,8	412,4	889,1	0,10	76,74	76,13	83,07	0,10	81,28	81,48	84,57	0,07	0,07	19,148868
85,0	335,0	1,7	0,1	8,7	0,0	406,8	76,1	96,3	492,3	481,3	610,8	887,3	412,3	888,8	0,10	76,84	76,11	83,08	0,10	81,18	81,51	84,52	0,07	0,07	17,774902
86,0	336,0	1,7	0,1	8,4	0,0	404,7	75,9	96,1	488,3	480,1	609,3	887,6	412,3	883,6	0,10	76,90	76,11	83,10	0,10	81,08	81,58	84,50	0,07	0,07	16,84619
87,0	337,0	1,7	0,1	8,2	0,0	401,8	76,0	95,7	484,3	479,2	607,8	886,1	412,0	873,8	0,10	76,98	76,10	83,11	0,10	81,10	81,63	84,50	0,07	0,07	15,506073
88,0	338,0	1,6	0,1	8,2	0,0	398,8	76,1	95,4	480,7	477,8	607,2	885,8	411,7	868,8	0,10	76,98	76,13	83,12	0,10	81,14	81,68	84,49	0,07	0,07	13,359613
89,0	339,0	1,6	0,1	8,2	0,0	396,8	76,0	95,2	476,8	476,3	606,3	885,3	411,8	863,8	0,10	76,98	76,14	83,11	0,10	81,08	81,68	84,38	0,07	0,07	11,787988
90,0	340,0	1,6	0,1	8,2	0,0	394,3	76,0	95,0	472,8	475,7	604,8	884,1	411,7	857,7	0,10	76,93	76,14	83,13	0,10	81,12	81,68	84,33	0,07	0,07	10,214441
91,0	341,0	1,6	0,1	8,2	0,0	392,8	76,0	95,2	469,1	474,8	603,8	879,3	411,2	854,3	0,10	76,98	76,13	83,11	0,10	81,08	81,66	84,30	0,07	0,07	8,4648636
92,0	342,0	1,6	0,1	8,1	0,0	390,8	75,8	95,1	465,1	473,1	601,8	877,0	411,0	852,8	0,10	76,90	76,14	83,08	0,10	80,98	81,62	84,31	0,07	0,07	6,6745042
93,0	343,0	1,6	0,1	8,1	0,0	388,4	75,8	95,1	461,4	471,8	600,0	876,8	410,8	849,8	0,10	76,39	76,11	83,11	0,10	80,90	81,58	84,18	0,07	0,07	5,0277712
94,0	344,0	1,6	0,1	8,0	0,0	387,8	75,8	95,3	457,8	470,3	598,4	875,3	410,8	846,3	0,10	76,37	76,11	83,08	0,10	80,87	81,57	84,11	0,07	0,07	3,1178864
95,0	345,0	1,6	0,1	8,0	0,0	386,7	75,8	95,5	453,6	468,2	596,8	873,8	410,4	844,8	0,10	76,32	76,08	83,14	0,10	80,85	81,54	84,10	0,06	0,07	1,3899994
96,0	346,0	1,4	0,1	7,9	0,0	386,0	75,8	95,3	449,8	466,2	594,8	870,3	410,3	843,3	0,10

102,0	382,0	1,3	0,1	7,3	0,0	379,2	76,8	94,8	427,4	460,1	883,4	880,3	409,6	839,4	0,10	76,79	76,26	83,21	0,18	81,22	81,71	84,08	0,07	0,07	-10,75834
103,0	383,0	1,2	0,1	7,3	0,0	378,2	76,7	94,8	424,3	458,4	881,2	880,3	409,6	839,3	0,10	76,81	76,30	83,23	0,18	81,26	81,77	84,23	0,07	0,07	-12,35638
104,0	384,0	1,2	0,1	7,3	0,0	377,5	76,8	94,8	420,7	456,8	879,7	887,1	409,4	837,8	0,10	77,16	76,39	83,29	0,18	81,44	81,88	83,87	0,07	0,07	-14,23869
105,0	385,0	1,3	0,3	7,3	0,0	376,8	76,8	94,8	417,2	454,8	877,8	888,2	409,3	836,1	0,10	77,31	76,44	83,33	0,18	81,60	81,98	83,56	0,07	0,07	-16,0723
106,0	386,0	1,3	0,3	7,4	0,0	376,7	76,8	94,7	413,7	452,8	876,2	894,1	409,0	826,8	0,10	77,27	76,80	83,38	0,18	81,61	82,03	83,68	0,07	0,07	-17,79836
107,0	387,0	1,2	0,1	7,5	0,0	376,8	76,8	94,7	411,0	450,5	874,8	891,3	408,6	823,8	0,10	77,27	76,85	83,36	0,18	81,60	82,00	84,00	0,07	0,07	-19,71436
108,0	388,0	1,1	0,1	7,6	0,0	375,7	76,7	94,8	407,6	448,3	872,8	940,8	408,7	819,8	0,10	77,27	76,80	83,38	0,18	81,64	82,15	84,24	0,07	0,07	-21,40139
109,0	389,0	1,1	0,1	7,6	0,0	375,1	76,7	94,8	404,4	446,8	870,7	948,7	408,4	817,1	0,10	77,36	76,83	83,40	0,18	81,62	82,23	84,31	0,07	0,06	-23,07881
110,0	390,0	1,0	0,1	7,6	0,0	375,2	76,7	94,6	402,0	445,4	869,0	947,2	408,3	814,3	0,10	77,42	76,84	83,43	0,18	81,62	82,33	83,98	0,07	0,07	-24,62634
111,0	391,0	1,0	0,1	7,7	0,0	375,7	76,7	94,6	399,1	443,8	867,1	946,7	408,1	812,3	0,10	77,38	76,88	83,46	0,18	81,64	82,36	83,86	0,07	0,06	-26,35088
112,0	392,0	1,0	0,1	7,7	0,0	376,2	76,8	95,0	396,8	442,8	865,1	944,8	408,2	810,6	0,10	77,39	76,89	83,52	0,18	81,62	82,37	84,04	0,07	0,06	-27,86716
113,0	393,0	1,0	0,1	7,7	0,0	369,6	76,8	94,9	392,7	440,1	863,5	942,7	408,1	808,6	0,10	77,42	76,71	83,53	0,18	81,61	82,18	84,23	0,07	0,06	-29,06893
114,0	394,0	0,9	0,1	7,6	0,0	368,8	76,7	94,7	390,2	441,3	862,0	940,7	408,0	806,7	0,10	77,39	76,75	83,53	0,18	81,74	82,17	84,26	0,07	0,06	-30,46742
115,0	395,0	0,9	0,1	7,6	0,0	368,2	76,8	95,0	387,2	440,7	860,0	939,1	407,8	805,8	0,10	77,41	76,75	83,55	0,18	81,76	82,30	84,24	0,07	0,06	-31,81713
116,0	396,0	0,9	0,1	7,6	0,0	367,9	76,7	94,7	384,8	440,2	858,4	938,3	407,9	803,2	0,10	77,42	76,78	83,58	0,18	81,81	82,22	84,23	0,07	0,06	-33,04111
117,0	397,0	0,9	0,1	7,6	0,0	367,3	76,8	94,8	381,8	439,8	857,8	936,8	407,8	804,3	0,10	77,38	76,77	83,58	0,18	81,80	82,21	84,04	0,07	0,06	-34,44628
118,0	398,0	0,9	0,1	7,6	0,0	367,0	76,4	94,6	379,4	439,3	856,3	935,7	407,2	803,3	0,10	77,28	76,74	83,57	0,18	81,78	82,19	84,02	0,07	0,06	-35,70818
119,0	399,0	0,8	0,1	7,6	0,0	367,0	76,8	94,6	377,1	438,2	854,8	932,2	406,9	802,7	0,10	77,20	76,78	83,60	0,18	81,74	82,21	84,02	0,07	0,06	-36,8864B
120,0	370,0	0,8	0,1	7,6	0,0	366,8	76,7	94,6	374,7	438,4	853,1	931,7	406,7	800,8	0,10	77,21	76,78	83,60	0,18	81,76	82,24	84,02	0,07	0,06	-37,98818
121,0	371,0	0,8	0,1	7,6	0,0	366,4	76,8	94,6	372,3	438,1	852,0	929,3	406,8	798,8	0,10	77,28	76,82	83,62	0,18	81,74	82,23	83,88	0,07	0,06	-39,24142
122,0	372,0	0,8	0,1	7,6	0,0	365,9	76,8	94,8	370,0	438,8	850,2	927,8	406,4	797,2	0,10	77,38	76,80	83,63	0,18	81,68	82,19	83,86	0,07	0,06	-40,14883
123,0	373,0	0,8	0,1	7,6	0,0	365,0	76,4	94,8	368,2	440,0	849,1	926,7	406,0	797,0	0,10	77,25	76,81	83,59	0,18	81,60	82,18	83,98	0,07	0,06	-41,12468
124,0	374,0	0,7	0,1	7,6	0,0	364,3	76,4	94,3	365,6	440,2	847,2	924,4	405,7	796,2	0,10	77,18	76,79	83,52	0,18	81,48	82,04	83,89	0,07	0,06	-42,21382
125,0	375,0	0,7	0,1	7,6	0,0	363,9	76,8	94,4	363,6	440,7	845,8	923,8	405,8	796,8	0,10	77,12	76,77	83,52	0,18	81,47	82,01	83,88	0,07	0,06	-43,04808
126,0	376,0	0,7	0,2	7,5	0,0	363,8	76,8	94,4	362,1	441,0	843,7	922,1	405,7	797,2	0,10	77,17	76,78	83,55	0,18	81,48	82,05	83,86	0,07	0,06	-43,88137
127,0	377,0	0,6	0,2	7,5	0,0	362,8	76,8	94,5	359,6	441,0	842,6	920,0	405,5	797,3	0,10	77,13	76,78	83,53	0,18	81,44	82,00	83,88	0,07	0,06	-45,15108
128,0	378,0	0,6	0,2	7,5	0,0	362,2	76,3	94,3	358,0	441,5	841,8	918,8	405,2	796,8	0,10	77,07	76,78	83,54	0,18	81,37	81,93	83,86	0,07	0,06	-45,88104
129,0	379,0	0,6	0,2	7,5	0,0	361,6	76,3	94,1	356,3	441,6	840,3	917,3	404,9	795,8	0,10	76,99	76,74	83,47	0,18	81,30	81,86	83,80	0,07	0,06	-46,64322
130,0	380,0	0,6	0,2	7,5	0,0	361,5	76,3	94,2	354,0	441,6	838,8	916,0	404,6	795,8	0,10	77,01	76,76	83,47	0,18	81,28	81,83	83,77	0,07	0,06	-47,80234
131,0	381,0	0,6	0,2	7,5	0,0	360,8	76,4	94,1	352,3	441,6	837,8	915,3	404,4	795,8	0,10	77,03	76,74	83,44	0,18	81,26	81,78	83,70	0,07	0,06	-48,63842
132,0	382,0	0,8	0,2	7,4	0,0	360,7	76,3	94,0	350,7	441,8	836,6	914,1	404,2	794,1	0,10	76,97	76,73	83,44	0,18	81,21	81,76	83,67	0,07	0,06	-49,60234
133,0	383,0	0,8	0,2	7,4	0,0	360,2	76,3	94,1	348,8	441,6	834,4	912,7	403,8	791,8	0,10	76,98	76,73	83,40	0,18	81,18	81,73	83,69	0,07	0,06	-50,89092
134,0	384,0	0,8	0,3	7,4	0,0	360,2	76,3	94,1	347,1	440,0	833,8	912,0	403,8	789,8	0,10	76,99	76,74	83,40	0,18	81,18	81,71	83,68	0,07	0,06	-51,18118
135,0	385,0	0,8	0,3	7,5	0,0	359,9	76,3	94,0	345,8	440,8	832,4	910,7	403,6	789,7	0,10	76,94	76,73	83,39	0,18	81,14	81,68	83,68	0,07	0,06	-52,07738
136,0	386,0	0,4	0,3	7,5	0,0	359,3	76,3	94,3	344,0	440,0	830,6	910,0	403,7	790,3	0,10	76,88	76,72	83,42	0,18	81,08	81,67	83,68	0,07	0,06	-52,79817
137,0	387,0	0,4	0,3	7,5	0,0	358,8	76,1	94,0	342,4	440,0	829,3	909,2	403,4	790,3	0,10	76,88	76,69	83,44	0,18	81,08	81,63	83,72	0,07	0,06	-53,63232
138,0	388,0	0,4	0,3	7,4	0,0	358,2	76,2	94,3	340,8	440,3	828,7	907,8	403,2	788,8	0,10	76,87	76,69	83,41	0,18	81,11	81,64	83,72	0,07	0,06	-54,28418
139,0	389,0	0,4	0,3	7,5	0,0	358,4	76,2	94,1	339,0	440,2	827,2	907,4	403,0	788,2	0,10	76,80	76,70	83,43	0,18	81,13	81,61	83,70	0,07	0,06	-54,78268
140,0	390,0	0,3	0,2	7,3	0,0	358,6	76,1	94,0	337,7	440,2	826,0	906,8	402,8	787,8	0,10	76,87	76,71	83,39	0,18	81,07	81,57	83,68	0,07	0,06	-55,06561
141,0	391,0	0,3	0,2	7,3	0,0	358,6	76,1	93,9	336,6	440,2	824,7	905,6	402,6	787,8	0,10	76,80	76,70	83,39	0,18	81,03	81,57	83,65	0,07	0,06	-56,68581
142,0	392,0	0,2	0,2	7,3	0,0	358,6	76,0	94,2	335,0	440,7	824,0	904,5	402,3	786,4	0,10	76,76	76,68	83,38	0,18	80,98	81,52	83,67	0,07	0,06	-57,17706
143,0	393,0	0,2	0,2	7,2	0,0	359,0	75,9	93,7	333,4	440,7	822,8	903,8	401,8	783,1	0,10	76,71	76,65	83,38	0,18	80,92	81,47	83,61	0,07	0,06	-58,21708
144,0	394,0	0,2	0,2	7,2	0,0	358,8	76,0	93,8	332,3	440,7	820,7	902,7	401,6	786,0	0,10	76,69	76,65	83,28	0,18	80,90	81,43	83,61	0,07	0,06	-58,87773
145,0	395,0	0,2	0,2	7,2	0,0	358,3	76,1	93,8	330,9	440,8	820,1	902,3	401,4	787,3	0,10	76,78	76,65	83,24	0,18	80,96	81,46	83,82	0,07	0,06	-59,38798
146,0	396,0	0,1	0,2	7,1	0,0	358,8	75,9	94,0	329,8	440,0	818,9	901,1	401,2	787,7	0,10	76,74	76,67	83,27	0,18	80,93	81,46	83,86	0,07	0,06	-60,18219
147,0	397,0	0,1	0,2	7,1	0,0	360,1	76,2	94,1	328,3	440,7	817,6	900,7	401,1	788,0	0,10	76,76	76,64	83,28	0,18	80,98	81,49	83,86	0,07	0,06	-60,82182
148,0	398,0	0,1	0,2	7,1	0,0	359,0	76,1	94,0	327,0	440,8	817,2	899,7	400,8	786,1	0,10	76,78	76,67	83,28	0,18	81,00	81,52	83,89	0,07	0,06	-61,41383
149,0	399,0	0,1	0,2	7,1	0,0	359,0	76,1	93,9	325,7	440,8	816,2	898,6	400,6	800,8	0,10	76,75	76,67	83,29	0,18	80,96	81,49	83,84	0,07	0,06	-62,183
150,0	400,0	0,0	0,2	7,1	0,0	358,8	76,1	94,0	324,4	440,8	815,4	897,7	400,3	801,8	0,10	76,72	76,65	83,30	0,18	80,93	81,48	83,82	0,07	0,06	-62,81141

Manufacturer: HEARTHSTONE
Model: 8031

Run: 7
Project #: PI 20270
Test Duration: 150 min

	HHV	LHV
Eff	73,72%	76,68%
Comb Eff	95,64%	95,64%
HT Eff	77,08%	80,21%
Output	30 207	Btu/h
Burn Rate	2,07	kg/h
Grams CO	315	g
Input	40 974	Btu/h
MC wet	16,97	
Average	9,51	10,98

Note: In the "Input data", "Calc. % O_2", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [e], [b], [c], [h], [i], [e], [j], and [k] refer to their respective variables in Clauses

Ultimate CO_2
$CO_{2\,ult}$ 19,64
F_d
1,063

Overall Heating Efficiency: 73,72%
Combustion Efficiency: 95,64%
Heat Transfer Efficiency: 77,08%

Heat Output: 28 654 Btu/h
Heat Input: 38 868 Btu/h

Burn Duration: 2,50 h

Burn Rate: 4,56 lb/h

Stack Temp: 428,5 Deg. F

				0,95	20,18	8,95	220,08	24,28	0,97	0,76	0,74
INPUT DATA				Oxygen Calculation			Input Data		Combust	Heat	Net
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO_2 [d]	Excess Air EA	Meas O_2	Calc. % O_2 [g]	Fuel Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %
0,00	6,23	0,17	2,48	437,6%	20,70	17,13	187,2	24,1	97,4%	68,2%	66,4%
1,00	6,12	0,16	4,58	214,5%	20,63	15,97	184,6	24,1	98,2%	67,2%	66,0%
2,00	6,07	0,13	8,35	131,7%	20,38	11,97	196,2	24,1	99,1%	75,6%	74,9%
3,00	5,98	0,12	9,92	95,6%	20,28	10,30	205,5	24,1	99,3%	76,9%	76,3%
4,00	5,93	0,12	10,76	80,5%	20,22	9,40	211,8	24,0	99,3%	77,3%	76,8%
5,00	5,84	0,12	10,53	86,5%	20,24	9,65	217,0	24,0	99,3%	76,7%	76,2%
6,00	5,80	0,14	11,42	70,0%	20,18	8,69	221,2	23,9	99,2%	77,3%	76,7%
7,00	5,71	0,24	12,52	53,9%	20,10	7,45	227,0	23,8	98,6%	77,8%	76,7%
8,00	5,62	0,29	13,61	41,3%	20,02	6,27	231,8	24,0	98,4%	78,3%	77,0%
9,00	5,53	0,33	14,12	35,9%	19,99	5,70	236,3	23,9	98,2%	78,4%	77,0%
10,00	5,48	0,40	14,14	35,1%	19,98	5,64	239,1	23,8	97,8%	78,2%	76,5%
11,00	5,39	0,46	14,21	34,0%	19,97	5,54	241,6	23,8	97,5%	78,1%	76,2%
12,00	5,30	0,45	14,42	32,1%	19,96	5,31	244,0	23,8	97,5%	78,1%	76,2%
13,00	5,21	0,43	14,55	31,1%	19,95	5,19	245,8	23,8	97,7%	78,1%	76,3%
14,00	5,12	0,50	14,70	29,3%	19,94	4,99	248,1	23,7	97,3%	78,1%	76,0%
15,00	5,03	0,54	14,85	27,6%	19,92	4,80	249,6	23,6	97,1%	78,1%	75,8%
16,00	4,94	0,58	14,95	26,5%	19,91	4,68	251,7	23,5	96,9%	78,0%	75,6%
17,00	4,84	0,61	15,34	22,9%	19,89	4,34	253,9	23,5	96,8%	78,1%	75,6%
18,00	4,75	0,64	15,44	22,1%	19,88	4,12	255,2	23,4	96,7%	78,1%	75,5%
19,00	4,66	0,79	15,67	19,3%	19,85	3,79	256,4	23,5	96,0%	78,1%	75,0%
20,00	4,57	0,93	15,85	17,1%	19,83	3,51	258,1	23,5	95,4%	78,1%	74,5%
21,00	4,48	1,09	16,00	14,9%	19,81	3,27	260,2	23,5	94,7%	78,1%	73,9%
22,00	4,39	1,29	16,08	13,1%	19,79	3,07	260,6	23,5	93,8%	78,0%	73,2%
23,00	4,30	1,41	16,10	12,2%	19,78	2,98	261,3	23,6	93,3%	78,0%	72,8%
24,00	4,21	1,46	16,12	11,8%	19,78	2,93	262,2	23,6	93,1%	77,9%	72,5%
25,00	4,12	1,56	16,10	11,2%	19,77	2,89	262,9	23,6	92,6%	77,9%	72,1%
26,00	4,03	1,65	16,10	10,6%	19,77	2,84	263,6	23,6	92,2%	77,8%	71,8%
27,00	3,94	1,70	16,08	10,5%	19,77	2,84	263,8	23,6	92,0%	77,8%	71,6%
28,00	3,80	1,76	16,07	10,2%	19,76	2,82	263,7	23,6	91,8%	77,8%	71,4%
29,00	3,76	1,90	16,01	9,6%	19,76	2,79	264,0	23,6	91,1%	77,7%	70,8%
30,00	3,66	2,00	16,00	9,1%	19,75	2,75	263,6	23,6	90,7%	77,7%	70,5%
31,00	3,57	2,06	16,00	8,8%	19,75	2,72	263,2	23,6	90,5%	77,7%	70,3%
32,00	3,48	2,07	15,98	8,8%	19,75	2,73	263,1	23,5	90,4%	77,6%	70,2%
33,00	3,39	2,13	15,97	8,6%	19,75	2,71	263,0	23,6	90,2%	77,6%	70,0%
34,00	3,30	2,20	15,94	8,3%	19,74	2,71	262,7	23,6	89,9%	77,6%	69,8%
35,00	3,21	2,26	15,89	8,2%	19,74	2,72	262,1	23,4	89,6%	77,6%	69,5%
36,00	3,12	2,22	15,84	8,8%	19,75	2,80	262,7	23,5	89,8%	77,5%	69,6%
37,00	3,03	2,10	15,82	9,6%	19,76	2,89	263,8	23,4	90,3%	77,6%	70,0%
38,00	2,94	1,91	15,84	10,7%	19,77	2,98	261,1	23,5	91,0%	77,7%	70,7%
39,00	2,89	1,86	15,84	11,0%	19,77	3,00	261,1	23,5	91,2%	77,7%	70,9%
40,00	2,80	1,85	15,80	11,3%	19,77	3,05	260,4	23,7	91,3%	77,7%	70,9%
41,00	2,71	1,97	15,69	11,2%	19,77	3,10	260,3	23,7	90,7%	77,6%	70,4%
42,00	2,62	1,90	15,76	11,3%	19,77	3,07	260,4	23,8	91,0%	77,7%	70,7%
43,00	2,56	1,81	15,77	11,7%	19,78	3,11	259,0	23,9	91,4%	77,8%	71,2%
44,00	2,48	1,84	15,80	11,3%	19,77	3,05	259,1	24,0	91,3%	77,8%	71,1%
45,00	2,39	1,77	15,85	11,5%	19,78	3,04	260,1	24,0	91,6%	77,8%	71,3%
46,00	2,35	1,69	15,88	11,8%	19,78	3,05	260,5	23,9	92,0%	77,8%	71,6%
47,00	2,26	1,65	15,87	12,1%	19,78	3,09	261,0	24,1	92,1%	77,8%	71,7%
48,00	2,17	1,53	15,94	12,5%	19,79	3,09	261,3	24,2	92,7%	77,9%	72,2%
49,00	2,12	1,38	15,96	13,2%	19,79	3,14	261,3	24,2	93,2%	77,9%	72,7%
50,00	2,03	1,27	15,97	14,0%	19,80	3,20	260,6	24,1	93,9%	78,0%	73,2%
51,00	1,98	0,98	15,98	15,8%	19,82	3,35	260,3	24,2	95,2%	78,1%	74,4%
52,00	1,91	0,67	15,92	18,4%	19,84	3,59	260,4	24,3	96,7%	78,2%	75,6%
53,00	1,85	0,50	15,78	20,6%	19,86	3,83	260,4	24,2	97,5%	78,1%	76,1%
54,00	1,80	0,41	15,57	23,0%	19,89	4,11	260,0	24,1	97,9%	78,0%	76,4%
55,00	1,76	0,32	15,29	25,9%	19,91	4,46	259,2	24,0	98,4%	77,9%	76,7%
56,00	1,67	0,26	14,95	29,2%	19,94	4,86	258,1	24,0	98,7%	77,8%	76,7%
57,00	1,62	0,22	14,78	30,9%	19,95	5,06	256,9	24,1	98,8%	77,8%	76,9%
58,00	1,58	0,19	14,65	32,4%	19,96	5,21	256,1	24,0	99,0%	77,7%	77,0%
59,00	1,53	0,18	14,35	35,2%	19,98	5,54	254,7	24,1	99,1%	77,6%	76,9%
60,00	1,49	0,17	13,92	39,4%	20,01	6,00	252,1	24,2	99,1%	77,5%	76,8%
61,00	1,44	0,16	13,64	42,3%	20,03	6,30	249,9	24,4	99,1%	77,4%	76,7%
62,00	1,39	0,14	13,36	45,5%	20,05	6,62	248,0	24,4	99,2%	77,3%	76,7%
63,00	1,35	0,12	13,06	48,9%	20,07	6,94	245,7	24,5	99,4%	77,2%	76,7%
64,00	1,30	0,10	12,74	52,8%	20,09	7,30	243,8	24,5	99,5%	77,1%	76,7%
65,00	1,26	0,10	12,52	55,7%	20,11	7,54	241,6	24,5	99,5%	77,0%	76,7%
66,00	1,26	0,09	12,29	58,6%	20,12	7,78	239,5	24,6	99,6%	77,0%	76,6%
67,00	1,21	0,08	12,09	61,4%	20,14	8,00	237,3	24,5	99,6%	76,9%	76,7%
68,00	1,17	0,08	11,90	64,0%	20,15	8,21	235,6	24,6	99,6%	76,9%	76,6%
69,00	1,12	0,07	11,81	65,3%	20,16	8,31	234,1	24,7	99,7%	76,9%	76,7%
70,00	1,12	0,07	11,66	67,4%	20,17	8,47	232,8	24,6	99,7%	76,8%	76,6%
71,00	1,08	0,07	11,47	70,3%	20,18	8,68	230,8	24,6	99,7%	76,8%	76,6%
72,00	1,03	0,06	11,12	75,7%	20,20	9,05	229,0	24,6	99,8%	76,6%	76,4%
73,00	0,99	0,06	10,89	79,3%	20,22	9,29	227,1	24,6	99,8%	76,5%	76,3%
74,00	0,99	0,06	10,81	80,7%	20,22	9,38	226,0	24,7	99,8%	76,5%	76,3%
75,00	0,99	0,06	10,47	86,5%	20,24	9,75	224,1	24,6	99,8%	76,2%	76,0%
76,00	0,94	0,08	10,02	94,5%	20,27	10,21	221,9	24,6	99,6%	75,9%	75,6%
77,00	0,90	0,09	9,81	98,5%	20,29	10,44	219,7	24,5	99,6%	75,8%	75,4%
78,00	0,90	0,09	9,58	103,2%	20,30	10,68	218,3	24,5	99,5%	75,6%	75,2%
79,00	0,90	0,09	9,34	108,4%	20,32	10,94	216,5	24,5	99,5%	75,4%	75,1%
80,00	0,85	0,09	9,27	109,9%	20,32	11,01	214,9	24,5	99,5%	75,4%	75,1%
81,00	0,85	0,09	9,28	109,6%	20,32	10,99	213,4	24,7	99,6%	75,6%	75,2%
82,00	0,80	0,08	9,08	114,5%	20,34	11,22	211,6	24,7	99,6%	75,5%	75,2%
83,00	0,80	0,08	9,08	114,5%	20,34	11,22	210,0	24,7	99,7%	75,6%	75,3%
84,00	0,80	0,07	9,01	116,2%	20,34	11,29	208,4	24,6	99,7%	75,6%	75,4%
85,00	0,76	0,08	8,72	123,2%	20,36	11,60	207,7	24,5	99,6%	75,2%	74,9%
86,00	0,76	0,10	8,42	130,4%	20,38	11,90	207,0	24,4	99,4%	74,8%	74,4%
87,00	0,76	0,10	8,21	136,4%	20,39	12,13	205,4	24,5	99,4%	74,6%	74,2%
88,00	0,71	0,10	8,17	137,5%	20,39	12,17	204,1	24,4	99,4%	74,7%	74,3%
89,00	0,71	0,10	8,17	137,6%	20,39	12,17	202,6	24,5	99,4%	74,8%	74,4%
90,00	0,71	0,10	8,17	137,6%	20,39	12,18	201,3	24,4	99,4%	74,9%	74,5%
91,00	0,71	0,09	8,17	137,8%	20,39	12,18	200,4	24,4	99,5%	75,0%	74,6%
92,00	0,67	0,09	8,12	139,3%	20,40	12,24	199,4	24,3	99,5%	75,0%	74,6%

93,00	0,67	0,10	8,05	141,0%	20,40	12,30	198,5	24,3	99,4%	75,0%	74,6%
94,00	0,63	0,10	8,04	141,4%	20,40	12,31	197,7	24,3	99,4%	75,0%	74,6%
95,00	0,62	0,10	7,99	143,0%	20,41	12,37	197,1	24,4	99,4%	75,0%	74,6%
96,00	0,62	0,10	7,94	144,5%	20,41	12,42	196,7	24,3	99,4%	75,0%	74,5%
97,00	0,62	0,10	7,96	143,9%	20,41	12,40	196,0	24,4	99,4%	75,1%	74,6%
98,00	0,62	0,10	7,96	143,9%	20,41	12,40	195,7	24,3	99,4%	75,1%	74,7%
99,00	0,58	0,10	7,97	143,4%	20,41	12,38	194,4	24,4	99,4%	75,2%	74,8%
100,00	0,58	0,12	7,63	153,7%	20,43	12,74	193,9	24,6	99,2%	74,7%	74,1%
101,00	0,58	0,13	7,38	161,4%	20,44	13,00	193,3	24,7	99,0%	74,3%	73,6%
102,00	0,58	0,14	7,30	164,2%	20,45	13,08	192,9	24,7	98,9%	74,2%	73,4%
103,00	0,53	0,14	7,27	165,1%	20,45	13,11	192,3	24,8	98,9%	74,2%	73,4%
104,00	0,53	0,15	7,25	165,6%	20,45	13,13	191,9	24,9	98,8%	74,2%	73,3%
105,00	0,53	0,15	7,27	164,7%	20,45	13,10	191,4	24,9	98,8%	74,3%	73,4%
106,00	0,53	0,15	7,37	161,1%	20,44	13,00	191,0	24,8	98,8%	74,5%	73,6%
107,00	0,53	0,14	7,55	155,4%	20,43	12,81	190,4	24,7	98,9%	74,9%	74,1%
108,00	0,49	0,13	7,56	155,3%	20,43	12,80	189,9	24,7	99,0%	75,0%	74,2%
109,00	0,49	0,13	7,60	154,2%	20,43	12,77	189,5	24,8	99,1%	75,1%	74,3%
110,00	0,44	0,13	7,65	152,7%	20,43	12,72	188,4	24,8	99,1%	75,2%	74,6%
111,00	0,44	0,12	7,68	151,8%	20,42	12,68	188,2	24,9	99,1%	75,3%	74,7%
112,00	0,44	0,13	7,70	151,1%	20,42	12,66	187,9	24,9	99,1%	75,4%	74,7%
113,00	0,44	0,13	7,66	152,2%	20,43	12,70	187,4	24,9	99,1%	75,4%	74,7%
114,00	0,40	0,13	7,61	153,7%	20,43	12,75	187,1	24,8	99,1%	75,3%	74,6%
115,00	0,40	0,13	7,60	154,2%	20,43	12,77	186,8	24,9	99,1%	75,3%	74,6%
116,00	0,40	0,13	7,60	154,3%	20,43	12,77	186,6	24,9	99,1%	75,3%	74,6%
117,00	0,40	0,13	7,58	154,9%	20,43	12,79	186,3	24,8	99,1%	75,3%	74,6%
118,00	0,40	0,13	7,58	154,9%	20,43	12,79	186,1	24,7	99,1%	75,3%	74,6%
119,00	0,35	0,13	7,63	153,2%	20,43	12,73	186,1	24,7	99,1%	75,4%	74,7%
120,00	0,35	0,13	7,63	153,1%	20,43	12,73	185,8	24,8	99,1%	75,4%	74,7%
121,00	0,35	0,13	7,61	153,7%	20,43	12,75	185,8	24,8	99,1%	75,4%	74,7%
122,00	0,35	0,13	7,56	155,3%	20,43	12,80	185,5	24,7	99,0%	75,4%	74,6%
123,00	0,35	0,14	7,62	153,4%	20,43	12,75	185,0	24,7	99,0%	75,5%	74,7%
124,00	0,30	0,14	7,58	154,4%	20,43	12,78	184,6	24,6	99,0%	75,5%	74,7%
125,00	0,30	0,14	7,58	154,2%	20,43	12,77	184,4	24,7	98,9%	75,5%	74,7%
126,00	0,30	0,15	7,54	155,5%	20,43	12,82	184,3	24,7	98,8%	75,4%	74,5%
127,00	0,28	0,15	7,54	155,4%	20,43	12,82	183,8	24,7	98,8%	75,5%	74,5%
128,00	0,26	0,16	7,52	155,8%	20,43	12,83	183,4	24,6	98,7%	75,5%	74,5%
129,00	0,26	0,16	7,50	156,4%	20,43	12,85	183,1	24,6	98,7%	75,5%	74,5%
130,00	0,26	0,16	7,47	157,4%	20,44	12,89	183,1	24,6	98,7%	75,4%	74,4%
131,00	0,26	0,16	7,46	157,9%	20,44	12,90	182,5	24,7	98,7%	75,4%	74,5%
132,00	0,22	0,16	7,39	160,2%	20,44	12,97	182,6	24,6	98,7%	75,3%	74,3%
133,00	0,22	0,16	7,42	159,2%	20,44	12,94	182,3	24,6	98,7%	75,4%	74,4%
134,00	0,22	0,15	7,42	159,3%	20,44	12,94	182,3	24,6	98,8%	75,4%	74,5%
135,00	0,21	0,15	7,47	157,7%	20,44	12,89	182,2	24,5	98,8%	75,5%	74,6%
136,00	0,17	0,15	7,49	157,1%	20,44	12,87	181,8	24,6	98,8%	75,5%	74,6%
137,00	0,17	0,15	7,49	157,1%	20,44	12,87	182,0	24,5	98,8%	75,5%	74,6%
138,00	0,17	0,16	7,44	158,6%	20,44	12,92	181,8	24,6	98,7%	75,5%	74,5%
139,00	0,17	0,15	7,31	163,3%	20,45	13,06	181,9	24,5	98,8%	75,2%	74,3%
140,00	0,12	0,15	7,30	163,4%	20,45	13,07	181,5	24,5	98,8%	75,3%	74,3%
141,00	0,12	0,15	7,32	163,0%	20,45	13,05	181,4	24,5	98,8%	75,3%	74,4%
142,00	0,08	0,15	7,29	164,0%	20,45	13,08	181,4	24,4	98,8%	75,2%	74,3%
143,00	0,08	0,16	7,20	166,5%	20,45	13,17	181,7	24,4	98,6%	75,0%	74,0%
144,00	0,08	0,17	7,17	167,5%	20,46	13,20	181,5	24,4	98,6%	75,0%	73,9%
145,00	0,08	0,17	7,17	167,5%	20,46	13,20	181,8	24,5	98,6%	75,0%	73,9%
146,00	0,04	0,17	7,14	168,7%	20,46	13,23	182,1	24,4	98,6%	74,9%	73,8%
147,00	0,03	0,17	7,14	168,7%	20,46	13,23	182,3	24,5	98,5%	74,9%	73,8%
148,00	0,03	0,18	7,08	170,7%	20,46	13,29	182,2	24,5	98,5%	74,8%	73,6%
149,00	0,03	0,18	7,08	170,7%	20,46	13,29	182,2	24,5	98,5%	74,8%	73,6%
150,00	0,00	0,18	7,08	170,5%	20,46	13,29	182,1	24,5	98,4%	74,8%	73,6%

Tempa acquisition minutes	Flue temp °F	Room temp °F	Tunnel dry bulb °F	Catalyst °F	scale lbs	Right °F	Back °F	bottom °F	Top °F	Left °F
1	101,12	70,81	81,06	101,42	3,07	79,77	81,06	81,13	79,80	81,07
2	133,28	70,68	84,15	186,14	2,98	79,74	81,06	81,06	79,82	81,06
3	179,70	70,73	91,23	268,02	2,91	79,89	81,22	81,22	79,87	81,14
4	237,29	70,76	100,25	433,83	2,77	80,44	81,76	81,84	79,88	81,37
5	298,68	70,88	111,30	540,10	2,57	81,70	83,02	82,78	80,29	81,89
6	342,27	70,94	118,72	630,43	2,37	83,93	85,27	84,06	81,06	82,87
7	376,77	71,18	125,71	619,00	2,21	87,53	88,65	85,74	82,32	84,52
8	397,62	71,35	130,26	657,55	1,97	92,39	93,17	87,63	84,00	86,91
9	422,11	71,52	136,43	635,66	1,87	98,44	98,83	89,87	86,21	90,10
10	453,57	71,26	144,43	645,23	1,57	105,44	105,47	92,47	89,02	94,24
11	481,45	70,91	149,84	659,41	1,37	113,04	113,02	95,54	92,35	99,45
12	488,54	70,90	151,83	666,76	1,17	121,24	121,38	99,20	96,17	105,88
13	446,15	70,92	144,68	618,89	14,28	129,79	130,41	103,49	100,36	113,80
14	338,60	70,60	124,51	460,62	14,38	138,99	139,49	108,59	104,90	122,75
15	286,58	70,65	115,39	372,09	14,38	148,07	148,96	113,87	109,34	131,96
16	263,90	70,65	111,34	325,25	14,28	156,16	153,14	118,81	113,50	140,60
17	256,79	70,69	110,37	316,16	14,18	163,47	158,19	123,32	117,26	148,24
18	262,36	70,79	111,06	346,81	14,08	169,87	162,38	127,36	120,60	154,89
19	283,04	70,51	115,97	462,66	13,98	175,66	165,81	130,95	123,54	159,92
20	317,23	70,46	122,55	648,06	13,78	181,01	168,97	134,18	126,17	164,15
21	354,47	70,20	130,52	773,00	13,58	186,50	171,97	137,36	128,57	167,54
22	389,20	70,18	136,37	828,61	13,38	192,39	175,09	140,50	130,88	170,46
23	436,90	70,69	146,25	877,29	13,08	198,78	178,55	143,67	133,13	172,99
24	464,86	70,81	127,61	850,06	12,88	206,55	182,65	147,01	135,71	175,17
25	474,92	71,13	112,55	839,19	12,68	214,49	186,75	150,02	138,74	177,25
26	419,59	71,51	101,96	749,85	12,57	222,99	190,44	152,94	142,25	179,46
27	393,39	71,82	96,84	695,84	12,38	230,66	193,60	156,10	146,29	181,72
28	389,79	71,79	97,94	673,04	12,28	237,46	196,20	159,11	150,68	183,86
29	403,51	71,92	98,79	673,60	12,18	243,20	198,33	161,89	155,27	186,00
30	398,66	71,89	97,55	670,41	12,08	247,96	200,34	164,63	159,96	188,13
31	392,72	71,94	97,41	662,92	11,87	251,80	201,92	167,07	164,78	190,46
32	390,22	71,90	96,86	655,33	11,78	255,14	203,39	169,53	169,66	192,43
33	389,71	71,95	96,58	649,80	11,68	257,50	204,60	171,77	174,44	194,47
34	389,06	72,16	96,76	648,45	11,58	259,92	205,68	174,12	179,30	196,32
35	394,71	72,06	97,02	650,96	11,47	261,73	207,16	176,21	183,76	198,36
36	404,13	72,03	97,80	655,31	11,27	263,52	208,22	178,25	188,66	200,26
37	411,17	72,01	98,10	659,61	11,17	265,13	209,24	180,15	193,34	202,18
38	425,06	71,99	99,22	662,90	10,98	266,76	210,59	181,94	198,21	204,18
39	445,49	71,97	100,55	673,63	10,88	268,32	211,90	183,77	203,09	206,34
40	464,36	71,90	100,59	687,14	10,78	269,84	213,40	185,40	208,06	208,60
41	482,44	71,99	101,04	699,33	10,57	271,77	214,99	187,12	213,65	211,37
42	473,19	71,97	102,19	715,89	10,46	273,86	216,66	188,74	219,45	214,01
43	483,93	71,93	103,42	734,82	10,28	275,56	218,66	190,13	225,56	217,56
44	492,36	71,76	103,71	751,45	10,08	278,49	220,65	191,66	232,28	220,63
45	495,53	71,87	103,67	763,85	9,97	280,96	222,76	192,94	238,78	224,29
46	504,21	71,99	104,66	779,91	9,77	284,02	225,03	194,13	246,93	228,36
47	514,71	72,18	105,92	808,91	9,58	286,99	227,44	195,59	253,16	232,14
48	526,04	72,32	106,26	836,46	9,38	290,27	229,80	197,16	260,64	236,01
49	535,80	72,46	107,40	859,09	9,17	293,73	232,54	198,48	268,32	240,47
50	545,27	72,56	108,06	878,17	9,07	297,39	235,52	200,03	276,22	244,75
51	552,34	72,73	107,95	889,40	8,78	301,21	238,31	201,54	284,47	249,33
52	559,01	72,70	109,13	894,70	8,67	305,15	241,38	203,12	293,19	254,49
53	564,23	72,68	109,54	903,17	8,47	309,29	244,49	204,62	302,11	259,59
54	568,51	72,84	109,87	913,95	8,28	313,66	247,94	206,29	310,71	265,24
55	571,67	72,93	110,36	924,63	8,08	318,16	251,29	208,03	319,88	271,16
56	571,85	72,98	110,20	927,59	7,87	323,04	254,76	209,80	329,20	277,02
57	569,51	72,97	109,90	925,24	7,77	327,71	258,56	211,66	337,89	283,62
58	569,09	73,12	111,05	922,53	7,58	333,28	262,17	214,06	346,98	290,30
59	568,55	73,03	111,30	925,64	7,38	338,17	266,96	216,33	355,42	296,43
60	567,46	73,07	111,29	927,70	7,17	343,54	270,06	218,63	364,07	303,34
61	566,39	72,96	110,09	928,05	7,07	348,57	273,90	220,87	371,98	310,37
62	565,10	72,92	110,47	923,77	6,88	353,82	278,09	223,41	379,58	316,64
63	563,36	72,99	109,85	919,06	6,67	358,56	282,27	225,81	386,56	323,63
64	560,63	73,15	108,50	915,03	6,57	363,99	286,51	228,34	393,74	330,05
65	557,16	73,11	109,16	907,00	6,47	369,61	290,83	231,31	400,67	336,74
66	554,40	73,10	109,59	899,93	6,27	375,24	294,94	234,36	407,01	343,75
67	551,56	73,05	109,19	893,52	6,18	380,67	299,37	237,18	413,07	350,40
68	548,69	73,25	109,41	886,18	5,97	385,95	303,59	240,07	418,96	357,26
69	545,80	73,31	109,06	879,66	5,87	391,27	307,54	243,32	424,43	363,29
70	545,43	73,24	108,87	877,19	5,77	396,42	311,71	246,23	429,84	369,32
71	544,71	73,47	107,82	877,82	5,57	401,03	315,91	249,14	434,19	376,39
72	543,65	73,33	107,97	878,64	5,48	405,89	319,84	252,50	438,11	383,47
73	545,94	73,38	107,94	879,59	5,37	410,96	324,12	255,87	443,14	389,42
74	547,78	73,43	107,91	877,58	5,17	415,91	328,01	259,59	447,14	395,25
75	548,96	73,45	107,64	876,16	5,07	420,73	332,18	263,22	451,44	400,89
76	541,51	73,33	106,50	872,53	4,97	425,44	336,18	267,02	455,03	407,05
77	536,37	73,60	107,59	871,57	4,67	430,50	340,43	270,46	458,77	413,94
78	540,57	73,70	107,65	877,22	4,67	436,26	344,45	274,65	462,41	419,52
79	541,43	73,73	108,09	879,05	4,57	441,81	348,60	278,75	465,70	425,10
80	539,92	73,93	106,66	876,39	4,47	447,33	352,82	282,84	468,66	429,79
81	537,30	73,95	107,09	871,50	4,37	452,85	356,90	287,26	471,57	435,53
82	536,88	73,73	106,95	867,85	4,27	457,85	361,14	291,57	474,36	441,49
83	533,66	73,83	104,64	867,30	4,08	462,79	365,84	295,59	477,27	444,74
84	524,99	73,93	104,47	862,21	4,08	468,51	370,54	300,38	479,52	450,46
85	516,85	74,04	104,66	851,03	3,89	473,02	375,34	304,75	480,67	456,54
86	510,36	74,07	103,42	839,80	3,67	477,95	379,97	308,64	483,03	460,29
87	504,82	74,00	103,80	831,05	3,77	482,73	384,43	313,34	484,97	465,31
88	499,62	73,71	103,14	823,90	3,67	487,90	388,74	317,90	486,51	469,16

89	494,34	73,70	103,75	817,59	3,57	492,22	393,04	322,16	468,11	472,33
90	489,46	73,81	104,00	811,25	3,47	496,40	397,68	326,46	468,34	476,51
91	484,44	73,56	103,47	805,75	3,41	500,37	402,03	330,63	468,96	480,19
92	480,96	73,65	103,12	800,17	3,38	503,74	406,10	334,64	469,04	482,75
93	477,76	73,58	102,64	795,42	3,27	506,71	410,29	338,40	468,87	486,17
94	474,39	73,78	102,43	791,18	3,19	509,39	414,50	342,43	468,46	488,79
95	470,39	73,70	103,34	787,45	3,17	512,39	418,39	346,40	468,27	491,57
96	466,31	73,68	102,65	783,01	3,07	514,81	422,04	350,43	467,71	494,11
97	463,92	73,59	101,45	778,83	2,97	516,99	425,65	354,12	467,20	495,69
98	461,06	73,32	100,68	776,20	2,87	518,45	428,92	357,97	466,15	498,06
99	503,87	73,65	140,14	771,56	2,87	519,78	431,45	362,01	465,52	500,11
100	490,78	73,87	154,17	616,31	15,98	521,92	435,08	366,10	464,17	501,80
101	449,95	73,79	111,94	760,00	15,78	523,67	437,19	369,62	478,17	502,87
102	465,93	73,82	105,30	1002,09	15,68	524,16	438,30	373,61	466,99	504,86
103	463,49	73,66	104,23	1067,35	15,38	524,30	437,11	376,61	460,72	505,01
104	468,69	73,76	104,32	1101,71	15,28	523,89	434,67	379,66	456,06	503,97
105	471,21	73,64	103,62	1107,48	15,08	522,13	431,90	382,76	452,30	502,36
106	474,21	73,67	102,42	1114,63	14,88	520,58	428,24	384,44	449,95	501,40
107	476,13	73,63	102,29	1116,20	14,78	518,63	424,10	386,24	447,53	499,43
108	476,51	73,88	102,43	1118,30	14,58	516,80	419,59	387,86	446,25	496,51
109	476,31	74,07	102,14	1127,52	14,38	515,15	415,47	388,62	444,73	492,60
110	481,60	73,95	102,55	1134,75	14,18	513,37	411,34	389,57	444,61	489,61
111	485,80	73,93	103,66	1146,72	13,98	511,43	406,77	390,18	444,83	487,12
112	489,44	73,89	103,75	1157,11	13,79	509,83	402,79	390,73	445,73	483,97
113	493,06	73,81	104,48	1159,19	13,58	508,55	398,72	391,16	446,98	481,00
114	495,42	73,85	104,06	1163,49	13,38	506,82	395,29	391,83	448,59	479,06
115	496,77	73,83	103,54	1169,14	13,18	506,19	391,82	391,82	451,05	475,95
116	497,65	73,72	104,22	1176,41	13,02	505,83	388,36	391,93	453,23	473,39
117	500,29	73,82	104,01	1178,44	12,78	505,10	385,23	391,94	455,53	469,76
118	503,53	73,94	104,45	1178,52	12,58	504,44	382,48	392,47	458,71	466,28
119	504,96	73,98	105,17	1178,28	12,38	504,77	379,79	392,38	461,67	465,96
120	505,03	73,91	104,57	1178,03	12,18	504,66	377,25	392,47	464,51	464,29
121	505,60	74,04	104,53	1181,29	11,98	504,24	375,20	392,73	467,14	463,66
122	506,97	74,18	104,76	1179,43	11,78	504,65	373,41	392,68	471,10	463,90
123	507,91	73,96	105,01	1180,60	11,58	505,06	371,44	392,89	473,54	462,94
124	507,72	73,96	104,83	1182,67	11,38	505,59	369,99	392,99	476,22	462,26
125	507,54	73,97	104,55	1185,42	11,18	506,36	368,21	393,02	479,22	462,46
126	507,14	74,04	103,93	1178,68	10,98	506,97	367,11	393,20	482,49	463,10
127	506,06	74,18	103,17	1140,33	10,78	508,09	366,63	393,07	486,55	462,80
128	503,33	74,26	103,00	1125,34	10,68	509,07	364,90	393,13	487,84	463,56
129	500,99	74,30	103,06	1136,22	10,48	510,75	364,01	392,81	490,64	463,46
130	500,65	74,41	103,40	1169,45	10,28	511,00	363,36	393,22	493,29	465,89
131	501,86	74,23	103,15	1186,10	10,08	512,49	362,72	392,69	495,89	466,82
132	502,70	74,28	103,92	1186,92	9,88	513,62	362,15	392,55	498,52	467,96
133	503,77	74,26	104,02	1192,16	9,68	514,94	361,94	392,64	500,58	470,36
134	502,95	74,06	104,11	1192,84	9,48	516,42	361,59	392,24	502,80	472,40
135	502,73	74,37	103,27	1190,85	9,28	517,94	361,51	392,36	505,31	474,81
136	503,19	74,50	103,53	1187,75	9,08	519,82	361,72	391,98	507,83	476,30
137	503,25	74,57	103,87	1183,07	8,88	521,56	361,76	392,12	509,93	478,96
138	503,35	74,62	103,53	1178,09	8,78	523,15	362,15	392,36	511,95	482,22
139	503,24	74,72	103,65	1172,83	8,58	525,02	362,56	392,43	514,05	485,02
140	501,86	74,70	103,11	1173,40	8,37	527,07	363,15	392,29	516,41	487,45
141	502,02	74,85	104,03	1172,82	8,18	529,03	364,05	392,26	518,66	490,42
142	502,06	74,87	104,44	1172,16	8,08	530,55	364,90	391,86	521,34	495,17
143	499,56	75,10	104,09	1169,60	7,88	532,96	365,90	392,57	523,27	497,71
144	498,50	74,88	103,05	1170,42	7,67	535,36	366,74	392,66	525,26	499,96
145	496,61	75,17	103,20	1169,34	7,48	538,03	368,08	393,15	527,18	503,65
146	496,39	75,03	103,28	1167,16	7,38	540,38	369,26	393,54	529,17	507,22
147	496,18	74,67	102,06	1163,67	7,17	542,59	370,63	394,05	530,89	510,82
148	495,22	74,42	101,95	1162,57	6,97	544,88	371,95	394,52	532,97	515,52
149	493,24	74,65	101,69	1160,19	6,88	547,39	373,51	395,03	534,92	519,31
150	491,92	74,76	101,99	1157,57	6,68	550,36	375,07	395,35	536,72	521,78
151	490,93	74,92	102,75	1155,06	6,58	553,22	376,66	395,75	538,02	525,26
152	487,82	75,13	101,96	1152,85	6,37	556,21	378,68	396,38	539,46	528,89
153	487,81	75,39	101,69	1150,61	6,18	558,40	381,14	397,39	541,31	533,66
154	487,99	75,20	101,83	1148,04	6,08	560,92	383,22	398,05	542,28	537,07
155	486,51	75,12	101,73	1147,61	5,98	563,75	385,50	398,54	543,60	538,55
156	486,72	75,36	101,32	1152,15	5,77	566,84	388,00	399,02	544,53	541,71
157	486,46	75,76	101,39	1158,19	5,71	569,46	390,68	400,47	546,36	546,17
158	486,31	75,70	101,54	1161,49	5,57	572,34	393,59	401,01	547,11	549,12
159	486,54	75,50	101,65	1167,60	5,48	575,67	396,17	401,73	547,88	550,93
160	484,59	75,55	101,07	1162,90	5,38	578,25	399,09	403,04	548,01	554,29
161	484,47	75,51	100,67	1153,54	5,28	580,82	402,45	403,88	548,65	556,60
162	482,25	75,40	100,56	1142,29	5,17	583,90	405,86	404,76	548,96	558,15
163	480,06	75,19	100,51	1127,65	5,07	587,04	409,37	405,61	549,04	559,99
164	476,82	75,15	100,17	1106,01	4,97	589,64	412,93	406,25	549,05	563,17
165	471,36	75,19	100,55	1077,94	4,87	592,10	416,58	407,81	548,72	565,70
166	465,31	75,22	99,18	1050,10	4,84	595,02	420,86	408,67	547,75	566,74
167	459,94	75,40	99,21	1025,90	4,78	596,82	425,21	410,26	547,01	569,64
168	454,84	75,40	99,12	1012,56	4,68	598,56	429,37	411,29	546,29	572,36
169	450,06	75,44	98,55	998,96	4,68	600,06	433,68	412,46	544,44	574,27
170	444,53	75,09	98,27	982,62	4,58	602,54	437,61	413,62	542,10	574,33
171	440,66	75,23	98,24	967,67	4,58	602,41	441,53	415,00	540,19	576,36
172	436,75	75,32	98,14	953,54	4,47	603,21	445,45	416,55	537,76	578,40
173	432,00	75,22	97,38	937,25	4,47	604,23	449,20	417,56	534,12	578,27
174	427,86	75,10	97,31	925,74	4,37	605,21	452,70	418,77	530,71	578,26
175	424,53	74,92	97,36	916,26	4,37	605,39	456,06	420,19	527,12	578,63
176	421,67	74,90	97,08	907,81	4,27	604,91	459,30	421,56	524,35	579,22
177	419,06	75,24	96,64	901,21	4,27	604,46	462,91	423,04	520,03	580,36
178	414,93	75,10	96,07	893,86	4,27	604,16	466,93	424,01	516,34	578,90
179	412,27	75,29	96,06	886,66	4,21	603,64	469,00	425,59	512,01	579,01

180	409,56	75,41	94,76	878,88	4,17	602,39	472,27	426,86	508,09	578,79
181	406,41	75,44	94,66	871,39	4,08	601,56	475,39	428,33	503,46	578,79
182	404,22	75,61	95,13	865,56	4,08	600,89	478,68	430,17	499,21	579,79
183	402,04	75,41	94,94	860,53	4,08	600,24	481,37	431,42	494,90	578,66
184	399,06	75,42	94,57	855,65	3,98	599,64	483,84	432,77	490,50	578,54
185	397,41	75,35	94,30	851,71	3,98	598,94	486,13	434,33	486,40	578,56
186	396,04	75,20	94,71	848,12	3,98	597,54	488,58	435,79	481,46	579,49
187	393,81	75,48	93,78	844,97	3,89	596,92	490,85	437,46	477,42	579,22
188	391,88	75,55	93,52	842,76	3,87	595,86	492,36	438,75	473,05	577,80
189	390,51	75,36	94,18	841,91	3,87	594,28	493,69	440,25	468,74	577,76
190	389,55	75,31	93,90	840,56	3,77	593,41	495,46	441,74	464,57	577,17
191	387,86	75,14	94,11	837,80	3,77	592,11	496,56	443,39	460,28	577,80
192	386,32	75,22	93,70	835,94	3,77	590,99	497,52	444,90	456,14	576,60
193	385,21	75,13	93,81	834,00	3,73	589,74	498,51	446,16	451,96	576,67
194	383,32	75,29	93,07	831,98	3,67	588,42	498,95	447,53	447,66	576,35
195	382,20	75,21	93,00	829,66	3,67	587,73	499,31	449,07	443,52	574,93
196	380,77	75,42	93,09	827,30	3,57	586,79	499,94	450,64	439,73	574,59
197	378,59	75,50	93,17	824,60	3,57	585,57	500,49	452,19	435,94	574,26
198	377,51	75,52	92,68	823,26	3,57	584,19	500,50	453,68	432,21	574,39
199	376,92	75,74	92,70	822,13	3,48	582,51	501,04	455,43	428,50	574,45
200	376,36	75,65	92,68	821,10	3,47	582,16	500,82	456,61	425,03	572,16
201	374,85	75,59	92,48	817,96	3,47	580,69	501,16	458,14	421,71	571,66
202	374,97	75,60	92,79	816,72	3,47	579,15	501,02	459,57	418,09	572,27
203	374,27	75,50	92,46	816,42	3,38	577,77	501,30	461,21	414,96	571,99
204	373,31	75,28	92,47	815,54	3,38	576,82	500,69	462,30	411,47	571,02
205	372,49	75,25	92,33	814,53	3,38	575,89	500,39	463,94	408,46	570,53
206	371,33	75,17	92,27	812,84	3,27	574,60	500,64	465,12	404,80	569,52
207	371,26	75,31	91,83	812,25	3,28	573,79	500,44	466,70	402,12	569,59
208	370,50	75,31	91,91	811,91	3,27	572,56	500,39	468,03	399,11	568,84
209	369,84	75,41	92,01	810,04	3,17	571,26	500,27	469,55	396,04	567,75
210	369,19	75,22	92,37	807,91	3,17	569,76	500,28	470,90	393,25	567,34
211	369,06	75,25	91,93	807,87	3,17	568,62	500,15	472,61	390,41	567,22
212	368,02	75,66	101,78	685,41	3,17	566,96	500,56	474,31	387,76	567,66

APPENDIX 2: Proportionality results

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	99,12	99,91	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
17,748	535,6	536,2			0,193	0,188	0	0,2744957
17,352	535,6	536,3	100,64	102,19	0,193	0,188	1	0,270766
17,432	535,6	536,5	99,97	101,72	0,193	0,189	2	0,2722447
17,509	535,6	536,6	99,75	101,31	0,193	0,189	3	0,2731841
17,612	535,6	536,8	99,59	101,31	0,193	0,189	4	0,274121
17,515	535,7	536,9	99,55	100,84	0,193	0,188	5	0,2737072
17,148	535,7	537,1	101,39	102,92	0,193	0,188	6	0,2682555
17,702	535,7	537,2	98,20	99,46	0,193	0,188	7	0,2771015
17,786	535,8	537,4	97,63	98,76	0,193	0,188	8	0,2783969
17,367	535,8	537,6	100,14	101,31	0,193	0,188	9	0,2718646
17,368	535,8	537,7	100,08	101,24	0,193	0,188	10	0,2718653
17,614	535,8	537,8	98,46	99,93	0,193	0,188	11	0,2757997
17,616	535,8	538,0	98,54	99,73	0,193	0,188	12	0,2758027
17,554	535,9	538,2	99,00	100,12	0,193	0,188	13	0,2748716
17,497	535,9	538,3	99,33	100,45	0,193	0,188	14	0,273906
17,734	535,9	538,5	97,92	99,18	0,193	0,188	15	0,2776528
17,472	535,8	538,6	99,53	100,45	0,193	0,188	16	0,2735592
17,614	535,8	538,6	98,58	99,73	0,193	0,188	17	0,2758029
17,639	535,7	538,7	98,40	99,72	0,193	0,188	18	0,2761773
17,471	535,8	538,8	99,44	100,52	0,193	0,188	19	0,2735619
17,241	535,8	539,0	100,73	101,85	0,193	0,188	20	0,2699701
17,781	535,8	539,0	97,73	98,78	0,193	0,188	21	0,2783963
17,427	535,8	539,1	99,77	100,72	0,193	0,188	22	0,2728075
17,428	535,9	539,3	99,50	100,82	0,193	0,188	23	0,2728079
17,537	536,0	539,4	99,03	100,24	0,193	0,188	24	0,274497
17,541	536,0	539,5	99,18	100,24	0,193	0,188	25	0,2744978
17,632	536,1	539,6	98,45	99,70	0,193	0,188	26	0,2758036
17,405	536,1	539,7	99,87	101,01	0,193	0,188	27	0,2722393
17,457	536,2	539,8	99,55	100,55	0,193	0,188	28	0,2731369
17,664	536,2	539,9	98,39	99,55	0,193	0,188	29	0,2763602
17,714	536,2	540,0	98,01	98,84	0,193	0,187	30	0,2771028
17,515	536,3	540,1	99,03	100,22	0,193	0,187	31	0,2741224
17,455	536,3	540,2	99,29	100,34	0,193	0,187	32	0,2731837
17,253	536,2	540,2	100,42	101,62	0,192	0,187	33	0,2699773
17,515	536,2	540,2	99,22	100,20	0,193	0,188	34	0,2741219
17,481	536,2	540,3	99,47	100,36	0,193	0,188	35	0,2735605
17,623	536,3	540,4	98,40	99,56	0,193	0,188	36	0,2758669
17,668	536,3	540,5	98,30	99,31	0,193	0,188	37	0,2765391
17,436	536,3	540,5	99,64	100,54	0,193	0,187	38	0,2728087
17,260	536,4	540,6	100,61	101,80	0,193	0,187	39	0,269972
17,611	536,4	540,6	98,71	99,69	0,193	0,188	40	0,2755503
17,321	536,4	540,7	100,39	101,24	0,193	0,187	41	0,2709199
17,444	536,3	540,7	99,51	100,49	0,193	0,187	42	0,2728097
17,675	536,4	540,8	98,37	99,31	0,193	0,187	43	0,2763601
17,760	536,5	540,8	98,00	98,77	0,193	0,187	44	0,2776588
17,334	536,5	540,9	100,28	101,38	0,193	0,187	45	0,2709207
17,533	536,5	540,9	99,24	99,94	0,193	0,187	46	0,2741212
17,503	536,6	541,0	99,68	100,24	0,193	0,187	47	0,2735612
17,332	536,7	541,1	100,38	101,22	0,193	0,187	48	0,2709209
17,585	536,7	541,1	98,98	99,74	0,193	0,187	49	0,2748718
17,518	536,6	541,2	99,20	100,28	0,193	0,187	50	0,2737725
17,707	536,7	541,2	98,20	98,91	0,193	0,187	51	0,276731
17,567	536,7	541,2	99,03	100,09	0,193	0,187	52	0,274498
17,651	536,7	541,3	98,72	99,30	0,193	0,187	53	0,2758054
17,507	536,7	541,3	99,45	100,26	0,193	0,187	54	0,273561
17,339	536,8	541,4	100,44	101,37	0,193	0,187	55	0,2709161

17,362	536,8	541,4	100,36	101,13	0,193	0,187	56	0,2712997
17,645	536,8	541,5	98,63	99,39	0,193	0,187	57	0,2758053
17,551	536,8	541,5	99,16	100,07	0,193	0,187	58	0,274293
17,372	536,8	541,5	100,28	101,24	0,193	0,187	59	0,2714428
17,652	536,8	541,6	98,66	99,33	0,193	0,187	60	0,2758023
17,337	536,9	541,6	100,32	101,25	0,193	0,187	61	0,2709212
17,035	536,9	541,6	102,04	102,97	0,193	0,187	62	0,2663352
17,619	536,7	541,6	98,87	99,54	0,193	0,187	63	0,2753859
17,456	536,7	541,5	99,66	100,39	0,193	0,187	64	0,2728472
17,564	536,6	541,5	98,98	99,68	0,193	0,187	65	0,2745003
17,653	536,6	541,5	98,78	99,30	0,193	0,187	66	0,2758043
17,715	536,7	541,6	98,28	99,14	0,193	0,187	67	0,2767294
17,367	536,8	541,6	100,40	101,16	0,193	0,187	68	0,2712475
17,440	536,8	541,7	99,94	100,76	0,193	0,187	69	0,2722399
17,493	536,9	541,7	99,50	100,43	0,193	0,187	70	0,2731861
17,573	536,9	541,8	99,14	100,04	0,193	0,187	71	0,2744644
17,712	536,9	541,8	98,37	98,97	0,193	0,187	72	0,2766283
17,584	537,0	541,9	99,04	99,86	0,193	0,187	73	0,2744991
17,379	537,1	541,9	100,31	101,28	0,193	0,187	74	0,2712994
17,699	537,1	542,0	98,49	99,20	0,193	0,187	75	0,2763627
17,404	537,2	542,0	100,22	101,01	0,193	0,187	76	0,2716739
17,419	537,2	542,0	100,14	100,90	0,193	0,187	77	0,271869
17,717	537,2	542,1	98,55	99,19	0,193	0,187	78	0,276542
17,813	537,2	542,1	97,89	98,87	0,193	0,187	79	0,278031
17,728	537,2	542,2	98,39	98,90	0,193	0,187	80	0,27665
17,575	537,3	542,2	99,40	100,22	0,193	0,187	81	0,2741249
17,573	537,3	542,2	99,41	100,01	0,193	0,187	82	0,2741252
17,514	537,3	542,2	99,72	100,47	0,193	0,187	83	0,2731867
17,493	537,3	542,3	99,86	100,58	0,193	0,187	84	0,2728111
17,599	537,4	542,3	99,07	99,93	0,192	0,187	85	0,2744998
17,510	537,4	542,4	99,51	100,52	0,192	0,187	86	0,2730885
17,517	537,5	542,5	99,63	100,42	0,192	0,187	87	0,273189
17,689	537,5	542,5	98,56	99,34	0,192	0,187	88	0,2758065
17,517	537,5	542,5	99,60	100,40	0,192	0,187	89	0,2731876
17,434	537,5	542,6	100,18	100,83	0,193	0,187	90	0,2719385
17,880	537,6	542,6	97,66	98,18	0,193	0,187	91	0,2789124
17,537	537,6	542,7	99,48	100,28	0,193	0,187	92	0,2735644
17,709	537,7	542,7	98,38	99,24	0,192	0,187	93	0,2763259
17,569	537,8	542,7	99,29	100,12	0,192	0,187	94	0,2741258
17,621	537,8	542,8	98,92	99,87	0,192	0,187	95	0,2748729
17,575	537,8	542,8	99,27	99,79	0,192	0,187	96	0,2741284
17,535	537,8	542,8	99,51	100,34	0,193	0,187	97	0,2735519
17,194	537,9	542,9	101,65	102,15	0,193	0,187	98	0,2682576
17,540	537,9	542,9	99,45	100,16	0,193	0,187	99	0,2735822
17,428	537,9	542,9	100,23	100,72	0,193	0,187	100	0,2718697
17,576	537,9	542,9	99,35	100,24	0,193	0,187	101	0,2741267
17,574	537,9	542,9	99,19	99,88	0,192	0,187	102	0,2741272
17,479	537,9	543,0	99,79	100,63	0,192	0,187	103	0,2725585
17,455	538,0	543,0	100,12	100,83	0,193	0,187	104	0,2722508
17,715	538,0	543,0	98,49	99,21	0,193	0,187	105	0,2763656
17,508	538,0	543,1	99,61	100,58	0,193	0,187	106	0,2731899
17,571	538,0	543,1	99,38	100,00	0,193	0,187	107	0,2741277
17,533	538,0	543,1	99,66	100,00	0,193	0,187	108	0,2735655
16,960	538,1	543,1	102,75	103,74	0,193	0,187	109	0,2645989
17,440	538,1	543,2	100,09	100,85	0,192	0,187	110	0,2720293
17,479	538,3	543,2	99,78	100,62	0,192	0,187	111	0,2726357
17,567	538,3	543,2	99,11	99,85	0,192	0,187	112	0,2741273
17,497	538,3	543,3	99,95	100,53	0,193	0,187	113	0,2728138
17,686	538,3	543,3	98,57	99,37	0,193	0,187	114	0,2758096
17,520	538,3	543,3	99,65	100,36	0,192	0,187	115	0,2731899
17,585	538,4	543,3	99,35	99,99	0,193	0,187	116	0,2741341

17,546	538,3	543,3	99,47	100,22	0,192	0,187	117	0,2735749
17,286	538,3	543,3	100,88	101,57	0,192	0,187	118	0,2695983
17,227	538,3	543,4	101,22	102,13	0,192	0,187	119	0,2686422
17,288	538,4	543,4	100,95	101,60	0,192	0,187	120	0,2695909
17,491	538,4	543,4	99,69	100,31	0,192	0,186	121	0,2728152
17,686	538,4	543,4	98,61	99,11	0,192	0,186	122	0,2758101
17,570	538,4	543,5	99,19	99,82	0,192	0,186	123	0,274022
17,653	538,4	543,5	98,87	99,44	0,192	0,186	124	0,2754085
17,077	538,5	543,5	101,97	103,04	0,192	0,187	125	0,26634
17,851	538,5	543,6	97,63	98,38	0,192	0,187	126	0,2784065
17,377	538,5	543,6	100,26	101,12	0,192	0,187	127	0,2711669
17,376	538,4	543,6	100,03	100,90	0,192	0,187	128	0,2712392
17,591	538,5	543,7	99,10	99,44	0,192	0,186	129	0,2745194
17,502	538,5	543,7	99,40	100,15	0,192	0,186	130	0,2731931
17,861	538,5	543,7	97,28	98,24	0,192	0,187	131	0,2789429
17,524	538,5	543,7	99,26	100,03	0,192	0,187	132	0,2735473
17,664	538,5	543,7	98,63	99,10	0,192	0,186	133	0,2758112
17,664	538,5	543,7	98,50	98,94	0,192	0,186	134	0,2758108
16,995	538,6	543,7	102,33	103,25	0,192	0,186	135	0,2653951
17,597	538,6	543,7	98,80	99,56	0,192	0,187	136	0,2748441
17,688	538,5	543,7	98,33	98,81	0,192	0,186	137	0,2763652
17,340	538,5	543,7	100,08	100,98	0,192	0,186	138	0,270928
17,604	538,6	543,8	98,87	99,62	0,192	0,187	139	0,274873
17,444	538,6	543,8	99,57	100,15	0,192	0,186	140	0,2724446
17,693	538,6	543,8	98,19	99,04	0,192	0,186	141	0,2763709
17,657	538,5	543,8	98,54	98,91	0,192	0,186	142	0,275811
17,797	538,6	543,8	97,74	98,26	0,193	0,186	143	0,278037
17,751	538,6	543,9	97,82	98,55	0,192	0,186	144	0,2773457
17,737	538,6	543,9	97,99	98,59	0,192	0,186	145	0,2771
17,463	538,7	543,9	99,28	100,17	0,192	0,186	146	0,2728168
17,604	538,7	543,9	98,67	99,28	0,192	0,186	147	0,2750089
17,645	538,7	543,9	98,68	99,26	0,192	0,186	148	0,2756519
17,596	538,7	543,9	98,74	99,28	0,192	0,186	149	0,2748785
17,255	538,7	543,9	100,77	101,41	0,192	0,186	150	0,2695982
17,399	538,7	543,9	99,76	100,45	0,192	0,186	151	0,2718732
17,729	538,8	543,9	98,01	98,39	0,192	0,186	152	0,2771117
17,541	538,8	543,9	98,95	99,83	0,192	0,186	153	0,2741229
17,511	538,8	544,0	99,25	99,76	0,192	0,186	154	0,2735682
17,588	538,8	544,0	98,71	99,22	0,192	0,186	155	0,2748819
17,769	538,8	544,0	97,70	98,25	0,192	0,186	156	0,2776675
17,607	538,9	544,0	98,59	99,32	0,192	0,186	157	0,2751275
17,690	538,9	544,0	98,17	98,76	0,192	0,186	158	0,2763704
17,733	538,9	544,0	97,92	98,78	0,192	0,186	159	0,2771131
17,361	538,9	544,0	100,03	100,61	0,192	0,186	160	0,2713077
17,634	538,9	544,0	98,42	99,31	0,192	0,186	161	0,2755613
17,853	538,9	544,1	97,06	98,23	0,192	0,187	162	0,2789858
17,589	539,0	544,1	98,69	99,08	0,192	0,186	163	0,2748806
17,337	539,0	544,1	99,98	100,83	0,192	0,186	164	0,2709289
17,684	539,0	544,1	98,12	98,87	0,192	0,186	165	0,276371
17,482	539,0	544,2	99,40	100,18	0,192	0,187	166	0,2732102
17,590	539,1	544,2	98,54	99,20	0,192	0,186	167	0,2749092
16,864	539,1	544,2	102,83	103,50	0,192	0,186	168	0,2636405
17,187	539,1	544,2	101,10	101,67	0,192	0,186	169	0,2686466
17,500	539,1	544,2	99,08	99,86	0,192	0,186	170	0,2735695
17,840	539,2	544,3	97,14	97,80	0,192	0,186	171	0,27896
17,534	539,2	544,3	98,90	99,54	0,192	0,186	172	0,2741299
17,497	539,2	544,3	99,03	99,87	0,192	0,186	173	0,2735701
17,390	539,2	544,3	99,67	100,54	0,192	0,187	174	0,2718743
17,698	539,2	544,3	97,89	98,76	0,192	0,186	175	0,2766245
17,501	539,2	544,3	99,17	99,80	0,192	0,186	176	0,2735576
17,536	539,2	544,3	98,82	99,52	0,192	0,186	177	0,2741318

17,582	539,3	544,3	98,61	99,60	0,192	0,186	178	0,2748794
17,511	539,3	544,4	99,16	99,64	0,192	0,186	179	0,2737432
17,510	539,3	544,4	99,05	99,69	0,192	0,186	180	0,2737795
17,494	539,3	544,4	99,05	99,70	0,192	0,186	181	0,273566
17,702	539,3	544,4	97,90	98,78	0,192	0,186	182	0,2767426
17,413	539,3	544,4	99,58	100,31	0,192	0,186	183	0,2722528
17,939	539,3	544,4	96,66	97,40	0,192	0,186	184	0,280549
17,692	539,2	544,4	97,82	98,73	0,192	0,187	185	0,276742
17,859	539,2	544,4	96,99	97,54	0,192	0,186	186	0,2793272
17,699	539,3	544,4	97,96	98,69	0,192	0,186	187	0,2767416
17,506	539,2	544,5	98,98	99,95	0,192	0,187	188	0,273782
17,636	539,2	544,4	98,14	98,84	0,192	0,187	189	0,2758584
17,857	539,2	544,4	96,85	97,63	0,192	0,186	190	0,2793281
17,717	539,1	544,4	97,66	98,27	0,192	0,186	191	0,2771126
17,405	539,0	544,3	99,42	100,09	0,192	0,186	192	0,2722517
17,466	539,1	544,3	99,15	99,79	0,192	0,186	193	0,2731928
17,887	539,1	544,3	96,72	97,56	0,192	0,186	194	0,2798779
17,769	539,1	544,3	97,35	98,13	0,192	0,186	195	0,2780373
17,105	539,1	544,3	101,00	101,95	0,192	0,186	196	0,2676762
17,014	539,0	544,3	101,63	102,46	0,192	0,186	197	0,2662226
17,572	539,0	544,3	98,55	99,15	0,192	0,186	198	0,2748756
17,317	539,0	544,3	100,08	100,72	0,192	0,186	199	0,2709286
17,408	539,1	544,3	99,52	100,24	0,192	0,186	200	0,2723231
17,465	539,2	544,3	99,15	99,91	0,192	0,186	201	0,2732111
17,577	539,2	544,3	98,54	99,29	0,192	0,186	202	0,2748788
17,691	539,2	544,3	97,88	98,84	0,192	0,187	203	0,2767411
17,086	539,2	544,3	101,29	102,18	0,192	0,187	204	0,2673022
17,843	539,2	544,4	97,28	98,05	0,192	0,187	205	0,279116
17,486	539,3	544,4	98,97	99,49	0,192	0,186	206	0,2735688
17,665	539,3	544,4	97,94	98,88	0,192	0,186	207	0,276369
17,172	539,3	544,4	100,89	101,69	0,192	0,187	208	0,2686527
17,315	539,3	544,5	99,95	100,62	0,192	0,186	209	0,2708706
17,687	539,4	544,5	97,83	98,46	0,192	0,186	210	0,2767362
17,172	539,4	544,5	100,82	101,55	0,192	0,186	211	0,2686437
17,256	539,4	544,5	100,38	101,07	0,192	0,186	212	0,2699494
17,531	539,4	544,6	98,70	99,58	0,192	0,186	213	0,2742557
17,773	539,4	544,5	97,31	98,12	0,192	0,186	214	0,2780366
17,692	539,4	544,5	97,96	98,78	0,192	0,186	215	0,2767407
17,547	539,5	544,6	98,61	99,25	0,192	0,186	216	0,2745056
17,569	539,5	544,6	98,70	99,15	0,192	0,186	217	0,2748263
17,775	539,5	544,6	97,41	98,22	0,192	0,186	218	0,2780448
17,440	539,5	544,6	99,36	100,06	0,192	0,186	219	0,272816
17,665	539,5	544,6	97,98	98,70	0,192	0,186	220	0,2763691
17,575	539,5	544,6	98,52	99,10	0,192	0,186	221	0,2749502
17,486	539,5	544,6	98,90	99,73	0,192	0,186	222	0,27357
17,545	539,5	544,6	98,55	99,53	0,192	0,186	223	0,2745048
17,914	539,4	544,6	96,68	97,32	0,192	0,186	224	0,2802453
17,698	539,5	544,6	97,72	98,63	0,192	0,186	225	0,276854
17,525	539,4	544,6	98,86	99,49	0,192	0,186	226	0,2741606
17,545	539,4	544,6	98,62	99,19	0,192	0,186	227	0,2744965
17,341	539,4	544,6	99,75	100,76	0,192	0,186	228	0,2713077
17,628	539,4	544,6	98,23	98,92	0,192	0,187	229	0,2758122
17,573	539,4	544,6	98,67	99,13	0,192	0,186	230	0,2749556
17,543	539,4	544,6	98,71	99,44	0,192	0,186	231	0,2745084
17,228	539,4	544,7	100,43	101,13	0,192	0,186	232	0,2695977
17,768	539,4	544,7	97,44	98,18	0,192	0,186	233	0,2780373
17,330	539,3	544,6	99,83	100,49	0,192	0,186	234	0,2711647
17,398	539,3	544,6	99,43	100,21	0,192	0,186	235	0,2722608
17,626	539,3	544,6	98,11	98,60	0,192	0,186	236	0,2758122
17,377	539,3	544,6	99,71	100,28	0,192	0,186	237	0,2718737
17,215	539,3	544,6	100,54	101,19	0,192	0,186	238	0,2693972

17,339	539,4	544,6	99,83	100,56	0,192	0,186	239	0,2712979
17,664	539,4	544,6	98,11	98,78	0,192	0,186	240	0,2763682
17,828	539,4	544,6	97,08	97,92	0,192	0,187	241	0,2789584
17,662	539,4	544,6	98,06	98,66	0,192	0,186	242	0,27643
17,190	539,4	544,6	100,58	101,49	0,192	0,186	243	0,268978
17,744	539,4	544,6	97,54	98,10	0,192	0,186	244	0,2776667
17,315	539,4	544,6	100,03	100,61	0,192	0,186	245	0,2709283
17,482	539,4	544,6	99,00	99,73	0,192	0,186	246	0,2735688
17,331	539,4	544,6	99,90	100,46	0,192	0,186	247	0,2712573
17,454	539,4	544,6	99,07	99,79	0,192	0,186	248	0,2731926
17,431	539,3	544,6	99,04	99,96	0,192	0,186	249	0,272817
17,886	539,3	544,6	96,78	97,36	0,192	0,186	250	0,279915
17,657	539,3	544,6	98,12	98,48	0,192	0,186	251	0,2763681
17,480	539,3	544,6	98,98	99,93	0,192	0,186	252	0,2735702
17,396	539,4	544,6	99,49	100,25	0,192	0,187	253	0,2722509
17,561	539,4	544,6	98,54	99,04	0,192	0,186	254	0,2748778
17,192	539,3	544,6	100,60	101,26	0,192	0,186	255	0,2690702
17,252	539,3	544,5	100,37	101,14	0,192	0,186	256	0,2699752
17,626	539,3	544,5	98,14	98,93	0,192	0,186	257	0,2758119
17,456	539,4	544,6	99,13	99,95	0,192	0,186	258	0,2731913
17,624	539,3	544,6	98,08	98,99	0,192	0,187	259	0,2758251
17,679	539,3	544,6	97,77	98,37	0,192	0,186	260	0,2767399
17,165	539,4	544,6	100,93	101,64	0,192	0,186	261	0,2686434
17,516	539,3	544,6	98,86	99,45	0,192	0,186	262	0,2741293
17,397	539,3	544,6	99,51	100,14	0,192	0,186	263	0,272262
17,479	539,3	544,5	99,03	99,49	0,192	0,186	264	0,2735776
17,390	539,3	544,5	99,45	100,12	0,192	0,186	265	0,2722522
16,954	539,2	544,5	102,04	102,63	0,192	0,186	266	0,2653749
17,709	539,3	544,5	97,89	98,64	0,192	0,186	267	0,2771106
17,732	539,3	544,5	97,64	98,35	0,192	0,187	268	0,2774268
17,061	539,3	544,5	101,62	102,07	0,192	0,186	269	0,2669247
17,581	539,3	544,5	98,49	99,11	0,192	0,186	270	0,2750287
17,772	539,4	544,5	97,45	98,12	0,192	0,186	271	0,2780356
17,523	539,4	544,5	98,80	99,56	0,192	0,186	272	0,2741299
17,748	539,4	544,5	97,57	98,32	0,192	0,186	273	0,2776666
17,690	539,4	544,5	97,91	98,73	0,192	0,187	274	0,2767416
17,248	539,4	544,4	100,37	101,33	0,192	0,187	275	0,2698287
17,692	539,4	544,4	97,89	98,36	0,192	0,186	276	0,2767616

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	98,99	101,41	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
17,071	537,1	537,6			0,183	0,182	0	0,2622549
17,766	537,1	537,8	97,39	100,43	0,183	0,182	1	0,2754323
17,692	537,2	538,0	97,71	100,52	0,183	0,182	2	0,2744923
17,166	537,2	538,1	100,39	103,51	0,183	0,182	3	0,2663249
16,870	537,2	538,3	102,47	105,61	0,183	0,182	4	0,261668
17,511	537,2	538,4	98,68	101,90	0,183	0,182	5	0,271571
17,147	537,1	538,5	101,02	104,01	0,183	0,182	6	0,2658286
17,354	537,1	538,6	99,86	102,74	0,183	0,182	7	0,2690218
17,418	537,1	538,7	99,45	102,57	0,183	0,182	8	0,2699718
17,544	537,1	538,9	98,84	101,58	0,183	0,182	9	0,2718651
17,601	537,1	539,0	98,72	101,43	0,183	0,182	10	0,272701
17,745	537,1	539,1	97,86	100,73	0,183	0,182	11	0,2747237
17,624	537,1	539,3	98,48	101,32	0,183	0,182	12	0,2728096
17,738	537,1	539,4	98,12	100,87	0,183	0,182	13	0,2744971
17,891	537,1	539,5	97,14	99,78	0,183	0,182	14	0,2768291
17,459	537,0	539,6	99,75	102,30	0,183	0,182	15	0,269971
17,744	537,1	539,8	97,88	100,72	0,183	0,182	16	0,2744964
17,602	537,1	539,8	98,89	101,57	0,183	0,182	17	0,2722431
17,664	537,1	540,0	98,48	101,29	0,183	0,182	18	0,2731955
17,503	537,1	540,1	99,47	102,13	0,183	0,182	19	0,2706506
17,662	537,1	540,2	98,57	101,30	0,183	0,182	20	0,2731851
17,692	537,1	540,3	98,38	101,32	0,183	0,182	21	0,27356
16,931	537,1	540,3	102,90	105,61	0,183	0,182	22	0,2616666
17,353	537,1	540,4	100,40	103,11	0,183	0,182	23	0,2681574
17,127	537,1	540,5	101,85	104,57	0,183	0,182	24	0,2645927
17,217	537,1	540,6	101,34	103,89	0,183	0,182	25	0,2659477
17,374	537,1	540,7	100,58	103,13	0,183	0,182	26	0,2682545
17,366	537,1	540,8	100,52	103,16	0,183	0,182	27	0,2682138
17,397	537,1	540,8	100,27	103,24	0,183	0,182	28	0,2686378
17,760	537,2	540,9	98,34	100,93	0,183	0,182	29	0,2741223
17,339	537,1	540,9	100,86	103,64	0,183	0,182	30	0,2675997
17,683	537,2	541,0	98,98	101,38	0,183	0,182	31	0,2728064
17,303	537,2	541,1	100,90	103,74	0,183	0,182	32	0,2669109
17,826	537,2	541,1	98,19	100,57	0,183	0,181	33	0,2748715
17,503	537,2	541,1	99,97	102,61	0,183	0,181	34	0,2698737
17,546	537,2	541,2	99,91	102,01	0,183	0,181	35	0,2705088
17,662	537,2	541,2	99,30	101,81	0,183	0,181	36	0,2722439
17,402	537,2	541,3	100,67	103,25	0,183	0,182	37	0,2682539
17,724	537,2	541,3	98,96	101,40	0,183	0,182	38	0,2731724
17,728	537,2	541,3	98,81	101,56	0,183	0,182	39	0,2731834
17,788	537,3	541,5	98,57	100,92	0,183	0,182	40	0,2741221
17,724	537,3	541,5	98,89	101,46	0,183	0,181	41	0,2731842
16,932	537,3	541,5	103,73	105,86	0,183	0,181	42	0,2608934
17,560	537,3	541,5	100,03	102,42	0,184	0,181	43	0,2705408
17,611	537,3	541,6	99,70	102,09	0,183	0,181	44	0,2712992
17,082	537,3	541,6	102,66	105,41	0,183	0,182	45	0,2632318
17,726	537,3	541,7	98,92	101,62	0,183	0,182	46	0,2730345
17,385	537,4	541,7	100,91	103,65	0,183	0,182	47	0,2678052
17,378	537,4	541,7	101,10	103,68	0,183	0,182	48	0,2676791
17,417	537,4	541,7	100,71	103,13	0,183	0,181	49	0,2682766
17,442	537,4	541,8	100,61	102,93	0,183	0,181	50	0,2686295
17,648	537,4	541,8	99,56	102,13	0,183	0,181	51	0,2718648
17,565	537,4	541,8	99,87	102,45	0,183	0,182	52	0,2705401
17,614	537,4	541,8	99,73	102,16	0,183	0,182	53	0,2712978
17,763	537,5	541,8	98,90	101,10	0,183	0,181	54	0,2735662
17,463	537,5	541,9	100,38	102,79	0,183	0,181	55	0,2690183

17,456	537,6	542,0	100,49	102,85	0,183	0,181	56	0,2690184
17,658	537,6	542,0	99,08	101,87	0,183	0,182	57	0,272169
17,446	537,6	542,1	100,35	102,87	0,183	0,182	58	0,2690237
17,185	537,7	542,2	101,86	104,25	0,183	0,181	59	0,2649913
17,799	537,8	542,3	98,33	100,68	0,183	0,181	60	0,2744685
17,590	537,8	542,4	99,42	101,69	0,183	0,181	61	0,2713019
17,857	537,8	542,4	97,92	100,35	0,183	0,181	62	0,2754311
17,207	537,8	542,4	101,45	104,22	0,183	0,181	63	0,2653694
17,313	537,8	542,5	101,06	103,68	0,183	0,181	64	0,2669985
17,592	537,8	542,5	99,50	102,04	0,183	0,182	65	0,2712883
17,715	537,9	542,6	98,76	101,08	0,183	0,181	66	0,273185
17,501	537,9	542,6	100,06	102,44	0,183	0,181	67	0,2699718
17,367	537,9	542,7	100,84	102,99	0,183	0,181	68	0,2678357
17,679	538,0	542,8	98,94	101,02	0,183	0,181	69	0,2727601
17,852	538,0	542,9	97,84	100,22	0,183	0,181	70	0,2754323
17,698	538,1	542,9	98,44	101,15	0,183	0,181	71	0,2731311
17,727	538,2	543,0	98,55	100,83	0,183	0,181	72	0,2735664
17,228	538,2	543,0	101,27	103,77	0,183	0,181	73	0,2659559
17,567	538,2	543,1	99,23	101,55	0,183	0,181	74	0,271269
17,665	538,3	543,1	98,57	101,17	0,183	0,181	75	0,2728103
17,713	538,4	543,2	98,35	100,68	0,183	0,181	76	0,2735629
17,680	538,4	543,3	98,63	100,82	0,183	0,181	77	0,2730564
17,798	538,5	543,3	97,83	99,95	0,183	0,181	78	0,2748729
17,935	538,5	543,4	97,15	99,69	0,183	0,181	79	0,2771063
17,560	538,5	543,4	98,98	101,55	0,183	0,181	80	0,2713019
17,445	538,6	543,5	99,72	101,67	0,183	0,181	81	0,2696173
17,497	538,6	543,5	99,35	101,81	0,183	0,180	82	0,2703899
17,508	538,6	543,6	99,53	101,93	0,183	0,181	83	0,2705439
17,593	538,7	543,6	98,61	101,31	0,183	0,181	84	0,2718691
17,736	538,7	543,7	97,98	100,25	0,183	0,181	85	0,274125
17,381	538,8	543,7	99,96	102,39	0,183	0,181	86	0,2686441
17,378	538,8	543,8	100,15	102,44	0,183	0,181	87	0,2686393
17,377	538,8	543,9	99,92	102,39	0,183	0,181	88	0,2686406
17,899	538,8	543,9	97,11	99,46	0,183	0,181	89	0,27671
17,753	538,8	543,9	97,75	100,11	0,183	0,181	90	0,2744803
17,371	538,9	543,9	99,89	102,44	0,183	0,181	91	0,26864
17,536	538,9	544,0	98,88	101,52	0,183	0,181	92	0,271303
17,302	538,9	544,0	100,13	102,67	0,183	0,181	93	0,2676837
17,104	538,9	544,0	101,56	103,82	0,183	0,181	94	0,2645976
17,769	538,9	544,1	97,88	100,00	0,183	0,181	95	0,2748626
17,337	539,0	544,1	100,06	102,39	0,183	0,181	96	0,2682588
17,315	539,0	544,1	100,34	102,53	0,183	0,181	97	0,2678653
17,103	539,0	544,1	101,38	103,80	0,183	0,181	98	0,2646069
16,863	539,1	544,2	102,98	105,24	0,183	0,181	99	0,2608864
17,742	539,1	544,2	97,76	100,15	0,183	0,181	100	0,2745037
17,284	539,1	544,2	100,21	102,71	0,183	0,181	101	0,2675048
17,623	539,1	544,2	98,44	100,71	0,183	0,181	102	0,2728141
17,053	539,2	544,3	101,64	103,90	0,183	0,181	103	0,2640163
17,147	539,2	544,3	101,20	103,53	0,183	0,181	104	0,2653734
17,722	539,2	544,4	97,92	99,93	0,183	0,181	105	0,2743003
17,794	539,2	544,4	97,38	99,77	0,183	0,181	106	0,2754485
17,117	539,2	544,4	101,28	103,51	0,183	0,181	107	0,264987
17,703	539,2	544,4	97,77	100,13	0,183	0,181	108	0,274069
17,376	539,3	544,5	99,50	101,81	0,183	0,180	109	0,269027
17,433	539,5	544,6	99,32	101,59	0,183	0,180	110	0,2699777
17,624	539,6	544,7	98,00	100,51	0,183	0,181	111	0,2730202
17,753	539,6	544,7	97,57	100,26	0,183	0,181	112	0,2748768
17,982	539,6	544,7	96,22	98,72	0,183	0,181	113	0,2784053
17,702	539,6	544,7	97,79	99,91	0,183	0,181	114	0,2741291
17,643	539,5	544,7	98,04	100,40	0,183	0,180	115	0,2731918
17,668	539,5	544,7	97,99	100,05	0,183	0,180	116	0,2735068

17,896	539,5	544,7	96,75	98,84	0,183	0,180	117	0,2771098
17,930	539,5	544,7	96,54	98,82	0,183	0,181	118	0,2776656
17,581	539,5	544,8	98,41	100,62	0,183	0,181	119	0,2722563
17,022	539,6	544,8	101,64	103,75	0,183	0,180	120	0,2635859
17,559	539,6	544,8	98,57	100,95	0,183	0,180	121	0,2718722
17,866	539,6	544,8	96,78	99,04	0,183	0,181	122	0,2767409
16,932	539,6	544,8	102,15	104,51	0,183	0,181	123	0,262249
17,783	539,7	544,9	97,28	99,47	0,183	0,180	124	0,2754466
17,640	539,7	544,9	98,12	100,12	0,183	0,180	125	0,273194
17,867	539,6	544,9	96,91	98,95	0,183	0,180	126	0,2767405
17,464	539,6	544,9	98,93	101,24	0,183	0,180	127	0,2705206
17,661	539,6	544,9	97,65	100,05	0,182	0,180	128	0,2735687
17,926	539,5	544,9	96,51	98,63	0,182	0,180	129	0,277668
17,721	539,6	544,9	97,50	99,86	0,183	0,180	130	0,2745054
17,847	539,5	544,9	96,96	99,34	0,183	0,181	131	0,2764467
17,838	539,6	544,9	96,89	99,11	0,183	0,181	132	0,2763408
17,511	539,7	545,0	98,72	100,84	0,183	0,180	133	0,2713072
17,697	539,7	545,0	97,69	99,86	0,183	0,180	134	0,2741322
17,426	539,6	545,0	99,23	101,27	0,183	0,180	135	0,2699878
17,467	539,7	545,0	98,78	101,35	0,182	0,180	136	0,2705787
17,918	539,7	544,9	96,46	98,65	0,182	0,181	137	0,2776683
17,689	539,7	544,9	97,78	100,18	0,183	0,181	138	0,2741319
17,359	539,7	544,9	99,67	102,00	0,183	0,181	139	0,2690282
17,673	539,7	545,0	97,73	100,17	0,183	0,181	140	0,27387
17,575	539,7	545,0	98,41	100,62	0,183	0,181	141	0,272254
17,575	539,7	545,0	98,30	100,49	0,183	0,180	142	0,272253
17,697	539,7	545,0	97,76	99,92	0,183	0,180	143	0,2741315
17,318	539,7	545,0	99,76	102,24	0,183	0,181	144	0,2682641
17,230	539,7	545,0	100,21	102,84	0,182	0,181	145	0,2669207
17,700	539,7	545,0	97,85	99,96	0,183	0,181	146	0,2741323
17,563	539,7	545,0	98,47	100,62	0,183	0,180	147	0,2720666
17,732	539,7	545,0	97,62	99,59	0,183	0,180	148	0,2747007
17,626	539,7	545,0	98,11	100,20	0,183	0,180	149	0,2731928
17,938	539,7	545,0	96,19	98,64	0,183	0,181	150	0,2780387
17,503	539,8	545,0	98,65	100,89	0,183	0,181	151	0,2713096
17,742	539,8	545,1	97,39	99,48	0,183	0,180	152	0,275009
17,508	539,8	545,1	98,64	100,82	0,183	0,180	153	0,2713311
17,543	539,8	545,1	98,43	100,43	0,183	0,180	154	0,271874
17,656	539,8	545,1	97,94	100,13	0,183	0,180	155	0,2735696
17,630	539,7	545,1	97,97	100,03	0,183	0,180	156	0,2731752
17,512	539,7	545,1	98,74	101,13	0,183	0,180	157	0,2713087
17,713	539,7	545,1	97,54	99,82	0,183	0,181	158	0,274508
17,740	539,7	545,1	97,55	99,91	0,183	0,181	159	0,2748811
17,509	539,7	545,1	98,71	100,86	0,183	0,181	160	0,2712775
17,193	539,7	545,1	100,68	102,96	0,183	0,180	161	0,2663424
18,006	539,7	545,1	95,93	98,35	0,183	0,181	162	0,2789609
17,743	539,7	545,1	97,59	99,62	0,183	0,181	163	0,2748805
17,745	539,7	545,1	97,41	99,74	0,183	0,180	164	0,2748807
17,358	539,8	545,1	99,52	101,85	0,183	0,181	165	0,269029
17,717	539,8	545,1	97,83	100,04	0,183	0,181	166	0,2745142
17,708	539,8	545,1	97,48	100,05	0,183	0,181	167	0,2745089
17,515	539,9	545,1	98,63	100,93	0,183	0,181	168	0,2715092
17,669	539,8	545,1	97,85	100,04	0,183	0,181	169	0,2738838
17,831	539,7	545,1	96,82	99,46	0,183	0,181	170	0,2763712
17,674	539,7	545,0	97,67	100,01	0,183	0,181	171	0,2739268
17,876	539,7	545,0	96,55	98,88	0,183	0,181	172	0,2770852
17,160	539,7	545,0	100,70	102,95	0,183	0,180	173	0,2659471
17,688	539,7	545,0	97,67	99,79	0,183	0,180	174	0,2741317
18,016	539,7	545,0	95,70	97,91	0,183	0,180	175	0,2793289
17,404	539,8	545,1	99,35	101,66	0,183	0,181	176	0,2698815
17,822	539,8	545,0	96,73	99,22	0,183	0,181	177	0,2763207

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	100,49	101,61	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
17,383	530,6	531,8			0,184	0,179	0	0,2676693
17,542	530,7	532,0	102,04	103,67	0,184	0,179	1	0,2732026
17,691	530,8	532,2	101,27	102,96	0,184	0,179	2	0,2754327
17,857	530,8	532,3	100,42	101,97	0,184	0,179	3	0,278018
17,887	530,9	532,5	100,28	102,06	0,184	0,179	4	0,2783863
17,902	530,9	532,6	99,56	101,25	0,184	0,179	5	0,2793274
17,738	531,0	532,9	100,13	101,96	0,183	0,179	6	0,2770956
17,636	531,1	533,1	100,97	102,40	0,184	0,179	7	0,2754193
17,691	531,2	533,3	100,48	102,46	0,184	0,179	8	0,2763504
17,692	531,2	533,4	100,50	102,30	0,183	0,179	9	0,2763501
17,811	531,3	533,6	99,90	101,55	0,184	0,179	10	0,2783047
17,684	531,3	533,7	100,52	102,16	0,184	0,179	11	0,2763492
17,843	531,2	533,8	99,57	101,04	0,184	0,179	12	0,2789392
17,496	531,1	533,9	101,56	103,04	0,184	0,178	13	0,273549
17,622	531,2	534,0	100,87	102,51	0,184	0,179	14	0,2755302
17,780	531,2	534,1	99,93	101,46	0,184	0,179	15	0,2780101
17,721	531,2	534,2	100,32	102,04	0,184	0,179	16	0,2770888
17,618	531,3	534,4	100,78	102,27	0,184	0,179	17	0,2754189
17,479	531,5	534,7	101,71	103,30	0,184	0,178	18	0,2731784
16,990	531,6	534,9	104,75	106,55	0,184	0,179	19	0,2653644
17,694	531,8	535,1	100,58	102,23	0,184	0,179	20	0,2763496
17,551	531,9	535,4	101,40	102,83	0,184	0,179	21	0,2741115
17,758	532,0	535,6	100,12	101,66	0,183	0,178	22	0,2773185
17,635	532,2	535,8	100,92	102,25	0,183	0,178	23	0,2754199
17,694	532,3	536,0	100,50	101,93	0,184	0,178	24	0,2763392
17,602	532,4	536,2	101,05	102,28	0,183	0,178	25	0,2748592
17,726	532,5	536,4	100,37	101,85	0,183	0,178	26	0,2767217
17,967	532,7	536,6	99,03	100,25	0,183	0,178	27	0,2805909
17,476	532,8	536,7	101,94	102,76	0,184	0,178	28	0,2728226
17,836	532,7	536,7	99,85	101,04	0,184	0,178	29	0,2783865
17,285	532,8	536,9	102,62	104,06	0,183	0,178	30	0,2699596
17,813	532,9	537,1	100,02	100,84	0,183	0,177	31	0,2780179
17,145	533,0	537,2	103,72	105,10	0,183	0,178	32	0,26759
17,643	533,1	537,4	100,66	101,73	0,183	0,177	33	0,2754316
17,615	533,1	537,4	101,03	102,26	0,183	0,177	34	0,2748612
17,709	533,2	537,6	100,63	101,90	0,183	0,178	35	0,276351
17,129	533,2	537,6	103,73	105,07	0,183	0,178	36	0,2672854
17,746	533,3	537,7	100,13	101,43	0,183	0,178	37	0,276898
17,757	533,3	537,8	100,12	101,59	0,183	0,178	38	0,2770939
17,300	533,4	537,9	102,64	103,82	0,183	0,178	39	0,269962
17,814	533,4	538,0	99,95	101,28	0,183	0,178	40	0,2780187
17,717	533,4	538,1	100,25	101,57	0,183	0,178	41	0,2764727
17,650	533,5	538,1	100,76	101,84	0,183	0,177	42	0,2754217
17,754	533,5	538,2	100,15	101,33	0,183	0,177	43	0,2770949
17,817	533,6	538,3	99,84	100,82	0,183	0,177	44	0,2780194
17,730	533,6	538,4	100,29	101,50	0,183	0,177	45	0,276611
17,715	533,7	538,5	100,55	101,76	0,183	0,178	46	0,2763535
17,853	533,7	538,5	99,86	100,96	0,183	0,178	47	0,2783885
17,790	533,7	538,5	100,07	101,36	0,183	0,178	48	0,2773518
17,619	533,8	538,6	101,05	102,35	0,183	0,178	49	0,2746266
17,839	533,8	538,6	100,05	101,12	0,183	0,177	50	0,2780238
17,891	533,8	538,7	99,57	100,64	0,183	0,177	51	0,2789428
17,533	533,8	538,7	101,49	102,70	0,183	0,177	52	0,2735527
17,291	533,6	538,5	102,89	104,08	0,183	0,178	53	0,2698985
17,460	533,6	538,5	101,99	102,96	0,183	0,177	54	0,2723399
17,625	533,6	538,6	100,90	102,21	0,183	0,177	55	0,2748632

17,811	533,7	538,6	99,94	101,13	0,183	0,177	56	0,2776502
17,505	533,8	538,7	101,68	103,02	0,183	0,177	57	0,2728576
17,179	533,8	538,8	103,82	105,16	0,183	0,178	58	0,2676349
17,786	533,9	538,8	100,15	101,44	0,183	0,178	59	0,2770935
17,601	533,9	538,9	101,28	102,72	0,183	0,178	60	0,2741141
17,633	534,0	538,9	101,30	102,35	0,183	0,177	61	0,2744894
17,608	534,0	539,0	101,36	102,67	0,183	0,177	62	0,2740794
17,849	534,0	539,0	100,12	101,35	0,183	0,177	63	0,2777277
18,069	534,0	539,0	98,91	100,05	0,183	0,177	64	0,2811412
17,647	534,0	539,1	101,34	102,50	0,183	0,177	65	0,2744891
17,785	534,0	539,1	100,69	101,63	0,183	0,177	66	0,2764916
17,773	534,1	539,1	100,47	101,64	0,183	0,177	67	0,2763555
17,552	534,1	539,2	102,14	103,36	0,183	0,177	68	0,2728217
17,655	534,2	539,2	101,28	102,59	0,183	0,177	69	0,2744903
17,777	534,2	539,3	100,72	101,78	0,183	0,177	70	0,2763559
17,578	534,2	539,3	101,67	103,16	0,183	0,177	71	0,2731805
17,663	534,3	539,3	101,23	102,38	0,183	0,177	72	0,2744851
17,861	534,3	539,3	100,19	101,49	0,183	0,177	73	0,2776522
17,805	534,3	539,4	100,53	101,64	0,183	0,177	74	0,2767265
17,859	534,3	539,4	100,16	101,29	0,183	0,177	75	0,2775539
17,779	534,3	539,4	100,59	101,64	0,183	0,177	76	0,276352
17,637	534,3	539,4	101,39	102,56	0,183	0,177	77	0,274116
17,892	534,4	539,5	100,10	101,09	0,183	0,177	78	0,2780231
17,603	534,5	539,6	101,65	102,83	0,183	0,177	79	0,273554
17,846	534,5	539,6	100,21	101,42	0,183	0,177	80	0,2773559
17,788	534,6	539,7	100,66	101,66	0,183	0,177	81	0,2763558
17,981	534,7	539,7	99,46	100,29	0,183	0,177	82	0,2793126
17,891	534,7	539,8	100,08	101,13	0,183	0,177	83	0,2780235
17,963	534,7	539,8	99,59	100,86	0,183	0,177	84	0,2791402
17,840	534,8	539,9	100,45	101,41	0,183	0,177	85	0,2770975
17,471	534,9	540,0	102,53	103,68	0,183	0,177	86	0,2712941
17,736	534,9	540,0	100,84	102,25	0,183	0,177	87	0,2754252
17,707	534,8	540,0	101,20	102,22	0,183	0,177	88	0,274915
17,797	534,8	540,0	100,74	101,84	0,183	0,177	89	0,276356
17,927	534,8	540,0	100,03	100,96	0,183	0,177	90	0,2783841
17,848	534,9	540,1	100,55	101,59	0,183	0,177	91	0,2770988
17,930	534,8	540,1	99,67	101,00	0,183	0,177	92	0,2783938
17,869	534,9	540,1	100,22	101,45	0,182	0,177	93	0,2774289
17,847	534,8	540,1	100,56	101,30	0,183	0,177	94	0,2771001
17,620	534,8	540,1	101,78	102,77	0,183	0,177	95	0,2735562
17,685	534,8	540,1	101,39	102,24	0,183	0,177	96	0,2744926
17,995	534,8	540,1	99,67	100,81	0,183	0,177	97	0,279314
17,394	534,9	540,2	103,09	104,14	0,183	0,177	98	0,2700047
17,811	535,0	540,2	100,82	102,06	0,183	0,177	99	0,2763568
17,695	535,0	540,2	101,30	102,64	0,183	0,177	100	0,2744932
17,236	535,0	540,3	104,13	105,30	0,183	0,177	101	0,2672913
17,413	535,0	540,3	103,30	104,25	0,183	0,177	102	0,2699719
17,678	535,0	540,3	101,48	102,65	0,183	0,177	103	0,2741196
17,613	535,0	540,3	101,93	103,10	0,183	0,177	104	0,2731819
17,924	535,1	540,3	100,17	101,28	0,183	0,177	105	0,278001
17,736	535,1	540,4	101,15	102,04	0,183	0,177	106	0,275143
17,950	535,1	540,4	99,82	101,29	0,182	0,177	107	0,2783946
17,668	535,1	540,4	101,63	102,53	0,183	0,177	108	0,2741204
17,937	535,2	540,5	99,86	101,21	0,183	0,177	109	0,2783382
17,836	535,2	540,5	100,55	101,56	0,183	0,177	110	0,2767301
17,863	535,2	540,5	100,27	101,32	0,182	0,177	111	0,2771048
17,632	535,2	540,6	101,72	102,60	0,182	0,176	112	0,2735586
17,549	535,2	540,6	102,20	103,43	0,183	0,177	113	0,2722417
17,960	535,2	540,6	99,98	101,05	0,183	0,177	114	0,2785296
17,728	535,2	540,6	101,20	102,18	0,183	0,177	115	0,2748689
18,012	535,3	540,6	99,49	100,88	0,182	0,177	116	0,2793153

17,681	535,3	540,6	101,60	102,76	0,182	0,177	117	0,2741212
17,848	535,3	540,7	100,59	101,72	0,183	0,177	118	0,27673
17,919	535,4	540,7	100,18	101,30	0,182	0,177	119	0,2776576
17,913	535,4	540,8	100,26	101,26	0,182	0,177	120	0,2776753
18,000	535,5	540,8	99,76	101,14	0,182	0,177	121	0,2789483
17,768	535,5	540,9	101,13	102,14	0,183	0,177	122	0,2754264
17,700	535,5	540,9	101,51	102,73	0,183	0,177	123	0,2743212
17,776	535,5	540,9	101,06	102,19	0,182	0,177	124	0,2754029
17,885	535,6	541,0	100,55	101,69	0,182	0,177	125	0,2771025
17,810	535,6	540,9	101,02	102,21	0,183	0,177	126	0,275837
17,744	535,6	541,0	101,27	102,42	0,182	0,177	127	0,2748699
18,012	535,7	541,1	99,91	100,96	0,182	0,177	128	0,2789499
17,739	535,7	541,1	101,29	102,21	0,183	0,177	129	0,27487
17,338	535,7	541,1	103,59	104,78	0,182	0,177	130	0,2686346
17,840	535,7	541,2	100,65	101,77	0,182	0,177	131	0,2763604
17,748	535,7	541,2	101,05	101,98	0,182	0,176	132	0,2749824
17,659	535,8	541,3	101,74	102,72	0,182	0,176	133	0,2735596
17,779	535,8	541,3	100,91	102,21	0,182	0,176	134	0,2754304
17,910	535,9	541,4	100,34	101,20	0,182	0,177	135	0,2775838
17,673	535,9	541,4	101,65	102,70	0,183	0,176	136	0,2738888
17,886	535,9	541,4	100,45	101,38	0,182	0,176	137	0,2771005
17,781	535,9	541,4	100,99	101,82	0,182	0,176	138	0,2754306
17,866	535,9	541,4	100,50	101,63	0,182	0,176	139	0,2767326
17,714	535,9	541,5	101,40	102,61	0,182	0,177	140	0,2744718
17,772	536,0	541,6	101,09	101,81	0,182	0,176	141	0,2753892
17,839	536,0	541,6	100,47	101,83	0,182	0,176	142	0,276361
18,025	536,0	541,6	99,71	100,68	0,182	0,177	143	0,2793178
17,835	536,0	541,6	100,76	101,45	0,183	0,176	144	0,2763481
17,343	536,1	541,7	103,41	104,78	0,182	0,176	145	0,268636
17,647	536,1	541,7	101,57	102,67	0,182	0,177	146	0,273559
17,746	536,1	541,7	100,95	102,18	0,182	0,176	147	0,275074
17,640	536,2	541,8	101,66	102,79	0,182	0,176	148	0,2733888
17,622	536,2	541,8	101,95	102,80	0,182	0,176	149	0,2731861
17,494	536,3	541,8	102,50	103,31	0,183	0,176	150	0,2713004
17,981	536,4	541,9	99,61	100,55	0,182	0,176	151	0,2789518
17,959	536,4	541,9	99,97	100,77	0,182	0,176	152	0,2783984
17,625	536,3	541,9	101,53	102,70	0,182	0,176	153	0,2732
17,964	536,3	541,9	99,85	100,84	0,182	0,176	154	0,2783978
18,073	536,3	541,9	99,24	100,35	0,182	0,176	155	0,280238
18,017	536,4	542,0	99,48	100,57	0,182	0,177	156	0,2793605
17,582	536,4	542,0	101,94	103,04	0,182	0,176	157	0,2725026
17,881	536,5	542,1	100,24	101,02	0,182	0,176	158	0,2774052
17,643	536,4	542,1	101,66	102,71	0,182	0,176	159	0,2735591
17,848	536,4	542,1	100,38	101,45	0,182	0,176	160	0,2767344
17,766	536,5	542,1	100,84	101,77	0,182	0,176	161	0,2754852
17,948	536,5	542,2	99,54	100,82	0,182	0,176	162	0,2783992
17,923	536,5	542,2	99,95	101,15	0,182	0,177	163	0,2780306
17,898	536,5	542,1	99,85	100,97	0,182	0,176	164	0,2776609
17,935	536,4	542,2	99,85	100,95	0,182	0,176	165	0,2782745
17,622	536,4	542,2	101,41	102,71	0,182	0,177	166	0,2735613
17,754	536,5	542,2	100,61	101,67	0,182	0,176	167	0,2754305
17,900	536,5	542,2	99,87	101,16	0,182	0,176	168	0,2776614
17,900	536,5	542,2	99,89	100,99	0,182	0,176	169	0,2777383
17,667	536,5	542,2	101,42	102,34	0,182	0,176	170	0,274126
17,939	536,5	542,2	99,75	100,73	0,182	0,176	171	0,2784002
17,737	536,4	542,2	100,83	101,89	0,182	0,176	172	0,2752803
17,904	536,5	542,3	99,83	101,07	0,182	0,176	173	0,277827
17,916	536,5	542,2	100,13	100,99	0,182	0,177	174	0,2780302
17,681	536,5	542,3	101,09	102,23	0,182	0,177	175	0,274501
17,926	536,5	542,3	99,66	100,64	0,182	0,176	176	0,2784002
17,935	536,5	542,2	99,50	100,51	0,182	0,176	177	0,2784249

18,079	536,5	542,2	98,97	100,19	0,182	0,176	178	0,2806051
17,888	536,5	542,3	99,96	101,11	0,182	0,177	179	0,2776622
17,969	536,5	542,3	99,42	100,87	0,182	0,177	180	0,2789538
17,749	536,5	542,3	100,61	101,73	0,182	0,177	181	0,2755394
17,489	536,5	542,3	102,20	103,05	0,182	0,176	182	0,2714877
17,971	536,5	542,4	99,52	100,59	0,182	0,176	183	0,2789541
17,974	536,6	542,4	99,52	100,77	0,182	0,177	184	0,2789544
17,743	536,5	542,4	101,06	101,59	0,183	0,176	185	0,2754344
17,886	536,5	542,3	100,00	100,96	0,183	0,176	186	0,2776628
17,993	536,6	542,3	99,37	100,44	0,182	0,176	187	0,2793246
17,801	536,6	542,4	100,53	101,43	0,182	0,176	188	0,2763653
18,110	536,6	542,4	98,69	99,88	0,182	0,176	189	0,2812125
18,076	536,6	542,4	98,98	99,70	0,182	0,176	190	0,2806077
17,292	536,6	542,4	103,24	104,21	0,182	0,176	191	0,2686369
17,984	536,7	542,4	99,43	100,53	0,182	0,176	192	0,279322
17,817	536,7	542,4	100,20	101,40	0,182	0,177	193	0,2767366
18,045	536,8	542,5	98,98	99,76	0,182	0,176	194	0,2802392
18,048	536,8	542,5	99,12	100,00	0,182	0,176	195	0,2802362
17,963	536,7	542,5	99,50	100,65	0,182	0,176	196	0,2789553
17,915	536,7	542,5	99,72	100,99	0,182	0,177	197	0,2782295
17,795	536,7	542,5	100,57	101,51	0,182	0,177	198	0,2763651
17,790	536,7	542,5	100,49	101,12	0,183	0,176	199	0,2763663
17,985	536,7	542,5	99,35	100,45	0,182	0,176	200	0,2793226
17,924	536,7	542,5	99,72	101,10	0,182	0,177	201	0,2784017
17,820	536,8	542,5	100,37	101,52	0,182	0,177	202	0,2767387
18,064	536,7	542,5	98,85	99,70	0,182	0,176	203	0,2806054
17,815	536,8	542,6	100,05	101,02	0,182	0,176	204	0,2767383
17,929	536,8	542,6	99,61	100,89	0,182	0,176	205	0,2784023
17,730	536,8	542,6	100,94	102,04	0,182	0,177	206	0,2753445
17,878	536,8	542,6	99,95	100,86	0,182	0,176	207	0,277664
17,987	536,8	542,6	99,45	100,28	0,182	0,176	208	0,2793218
17,792	536,8	542,6	100,23	101,38	0,182	0,176	209	0,2763659
17,925	536,8	542,6	99,67	100,70	0,182	0,176	210	0,2784018
17,898	536,8	542,6	99,68	100,92	0,182	0,176	211	0,2780346
17,982	536,8	542,6	99,40	100,40	0,182	0,177	212	0,2793227
17,924	536,8	542,6	99,55	100,26	0,182	0,176	213	0,2784288
17,984	536,8	542,6	99,37	100,11	0,182	0,176	214	0,2793226
17,956	536,9	542,6	99,34	100,51	0,182	0,176	215	0,2789563
17,960	537,0	542,7	99,41	100,53	0,182	0,176	216	0,278956
17,722	537,0	542,7	100,28	101,46	0,182	0,176	217	0,2754543
17,984	537,0	542,7	99,24	100,03	0,182	0,176	218	0,2793238
17,879	536,9	542,7	99,75	100,89	0,182	0,176	219	0,2776639
18,017	536,9	542,7	99,08	99,92	0,182	0,176	220	0,2798743
17,865	537,0	542,7	99,67	100,85	0,182	0,176	221	0,2776278
17,916	537,1	542,8	99,22	100,50	0,182	0,176	222	0,2784247
17,786	537,1	542,8	100,31	101,24	0,182	0,176	223	0,2763633
17,732	537,1	542,8	100,56	101,53	0,182	0,176	224	0,2754363
17,800	537,0	542,8	99,99	101,38	0,182	0,176	225	0,2767394
17,782	537,1	542,8	100,11	101,42	0,182	0,177	226	0,2763667
17,674	537,1	542,8	100,84	102,27	0,182	0,177	227	0,2745029
17,503	537,1	542,8	102,04	102,99	0,182	0,176	228	0,2718706
17,881	537,1	542,8	99,99	100,58	0,182	0,176	229	0,2777299
17,924	537,1	542,8	99,58	100,61	0,182	0,176	230	0,2784142
17,730	537,1	542,9	100,62	101,75	0,182	0,176	231	0,2754346
17,979	537,2	542,9	99,47	100,41	0,182	0,176	232	0,2793242
17,958	537,2	542,9	99,28	100,40	0,182	0,176	233	0,2789558
17,792	537,1	542,9	99,91	101,08	0,182	0,176	234	0,2763463
17,956	537,2	542,9	99,35	100,42	0,182	0,176	235	0,278955
17,956	537,2	542,9	99,54	100,66	0,182	0,177	236	0,2789553
17,790	537,2	542,9	100,41	101,38	0,182	0,177	237	0,2763664
17,836	537,2	542,9	100,07	101,19	0,182	0,176	238	0,2771185

17,646	537,2	542,9	101,21	102,14	0,182	0,176	239	0,2741275
17,377	537,2	542,9	102,70	103,70	0,182	0,176	240	0,2699752
17,922	537,3	542,9	99,53	100,39	0,182	0,176	241	0,2784025
17,867	537,3	543,0	99,79	100,83	0,182	0,176	242	0,2775736
17,647	537,4	543,0	101,17	102,03	0,182	0,176	243	0,2741493
17,787	537,5	543,0	100,20	101,42	0,182	0,176	244	0,2763664
17,762	537,4	543,0	100,40	101,30	0,182	0,176	245	0,2758844
17,554	537,4	543,1	101,70	102,70	0,182	0,176	246	0,272587
17,980	537,4	543,1	99,09	100,09	0,182	0,176	247	0,2793233
17,919	537,4	543,1	99,45	100,41	0,182	0,176	248	0,2784027
17,976	537,4	543,1	99,19	100,13	0,182	0,176	249	0,2793233
18,053	537,4	543,0	98,87	99,78	0,182	0,176	250	0,2804934
17,875	537,3	543,0	99,86	100,92	0,182	0,176	251	0,2776639
17,818	537,3	543,1	100,23	101,07	0,182	0,176	252	0,2767386
17,922	537,3	543,1	99,43	100,73	0,182	0,176	253	0,2784024
17,874	537,3	543,1	99,71	100,74	0,182	0,176	254	0,2777029
18,014	537,3	543,1	98,90	99,94	0,182	0,176	255	0,279871
17,872	537,3	543,1	99,80	100,84	0,182	0,176	256	0,2776638
17,838	537,4	543,1	100,07	101,33	0,182	0,176	257	0,2771087
17,925	537,4	543,2	99,45	100,81	0,182	0,177	258	0,2784036
17,737	537,4	543,2	100,63	101,75	0,182	0,176	259	0,275432
17,879	537,4	543,2	99,89	100,85	0,182	0,176	260	0,2776638
17,985	537,5	543,2	99,10	100,20	0,182	0,176	261	0,2793236
17,875	537,5	543,2	99,82	100,82	0,182	0,176	262	0,2776639
17,926	537,6	543,2	99,61	100,45	0,182	0,176	263	0,2783831
17,842	537,6	543,2	99,98	101,11	0,182	0,176	264	0,2771088
17,988	537,6	543,2	99,25	100,33	0,182	0,176	265	0,2793237
17,426	537,5	543,2	102,44	103,64	0,182	0,176	266	0,2705712
17,957	537,5	543,2	99,26	100,32	0,182	0,176	267	0,2789567
17,646	537,6	543,2	100,97	101,91	0,182	0,176	268	0,2741284
17,988	537,6	543,2	99,06	100,28	0,182	0,176	269	0,2793244
17,928	537,6	543,2	99,54	100,47	0,182	0,176	270	0,2784341
17,739	537,6	543,2	100,33	101,60	0,182	0,176	271	0,2754384
17,821	537,6	543,2	100,03	101,22	0,182	0,176	272	0,2767395
17,888	537,6	543,2	99,67	100,70	0,182	0,176	273	0,2777591
17,905	537,6	543,2	99,48	100,68	0,182	0,176	274	0,2781148
17,981	537,6	543,2	99,36	100,22	0,182	0,176	275	0,2793225
17,841	537,7	543,2	100,02	101,30	0,182	0,176	276	0,2771091
17,738	537,7	543,2	100,60	102,03	0,182	0,177	277	0,2754359
17,608	537,6	543,2	101,37	102,17	0,182	0,176	278	0,2734543
17,890	537,6	543,2	99,69	100,67	0,182	0,176	279	0,2778424
17,905	537,7	543,3	99,73	100,46	0,182	0,176	280	0,2780607
17,671	537,8	543,3	100,95	101,79	0,182	0,176	281	0,2745047
17,760	537,8	543,4	100,46	101,68	0,182	0,176	282	0,2758092
17,590	537,8	543,4	101,34	102,57	0,182	0,176	283	0,2732103
17,701	537,8	543,4	100,67	101,77	0,182	0,176	284	0,2748783
17,876	537,8	543,4	99,78	100,75	0,182	0,176	285	0,2776658
17,820	537,8	543,4	100,07	100,90	0,182	0,176	286	0,2767776
17,188	537,8	543,4	103,89	104,87	0,182	0,176	287	0,2669221
17,740	537,8	543,4	100,53	101,60	0,182	0,176	288	0,2754373
17,648	537,8	543,4	101,10	102,15	0,182	0,176	289	0,2741297
17,700	537,9	543,4	100,89	101,88	0,182	0,176	290	0,274877
17,718	537,9	543,4	100,74	101,93	0,182	0,176	291	0,2751098
17,932	537,9	543,4	99,62	100,67	0,182	0,176	292	0,2784038
17,741	537,9	543,4	100,61	101,51	0,182	0,176	293	0,2754366
17,885	537,9	543,4	99,83	100,97	0,182	0,176	294	0,2776655
17,693	537,9	543,5	100,83	101,83	0,182	0,176	295	0,2746698
17,825	537,9	543,4	100,14	101,05	0,182	0,176	296	0,2767387
17,703	537,8	543,5	100,89	102,03	0,182	0,176	297	0,2748787
17,962	537,8	543,4	99,38	100,24	0,182	0,176	298	0,2789553
17,844	537,8	543,4	100,06	101,11	0,182	0,176	299	0,2771099

18,066	537,8	543,4	98,70	99,76	0,182	0,176	300	0,2806095
17,905	537,8	543,4	99,72	100,85	0,182	0,176	301	0,2780364
18,045	537,8	543,3	98,80	99,93	0,182	0,176	302	0,2802437
17,926	537,8	543,4	99,48	100,72	0,182	0,176	303	0,2784034
17,894	537,8	543,4	99,63	100,73	0,182	0,176	304	0,2778849
17,793	537,8	543,4	100,14	100,80	0,182	0,176	305	0,276368
17,984	537,8	543,4	99,09	100,44	0,182	0,176	306	0,2792623
17,701	537,8	543,4	100,80	101,71	0,182	0,176	307	0,2748796
17,904	537,8	543,4	99,76	100,80	0,182	0,176	308	0,2780271
17,507	537,9	543,4	101,89	102,89	0,182	0,176	309	0,2718722
17,983	537,9	543,4	99,17	100,49	0,182	0,176	310	0,2793253
17,494	537,9	543,4	101,97	103,19	0,182	0,176	311	0,2716534
17,795	537,9	543,4	100,31	101,49	0,182	0,176	312	0,2763683
17,844	538,0	543,4	99,90	101,09	0,182	0,176	313	0,2771096
17,679	538,0	543,4	101,01	102,12	0,182	0,176	314	0,2745046
17,817	538,0	543,4	100,08	101,27	0,182	0,176	315	0,2766608
17,648	538,1	543,4	100,91	102,23	0,182	0,176	316	0,2741444
17,671	538,2	543,5	100,82	101,94	0,182	0,176	317	0,2745047
17,241	538,2	543,5	103,33	104,54	0,182	0,176	318	0,2676845
17,801	538,2	543,5	100,24	101,41	0,182	0,176	319	0,2763677
18,044	538,2	543,5	98,69	99,96	0,182	0,176	320	0,2802076
17,966	538,2	543,6	98,81	100,05	0,181	0,176	321	0,2789567
17,531	538,2	543,6	101,63	102,57	0,181	0,176	322	0,2722586
17,665	538,2	543,6	100,75	101,78	0,182	0,176	323	0,2743912
17,961	538,2	543,6	99,17	100,34	0,182	0,176	324	0,2789569
17,795	538,3	543,6	100,19	101,21	0,182	0,176	325	0,2763694
18,068	538,3	543,6	98,51	99,83	0,182	0,176	326	0,2806096
18,024	538,2	543,6	98,77	99,88	0,182	0,176	327	0,2798856
17,617	538,2	543,6	101,25	102,19	0,182	0,176	328	0,273567
17,905	538,1	543,6	100,01	100,76	0,182	0,176	329	0,2780357
17,905	538,2	543,6	99,54	100,77	0,182	0,176	330	0,2780361
17,614	538,2	543,6	101,36	102,42	0,182	0,176	331	0,2735671
17,673	538,2	543,6	100,80	101,93	0,182	0,176	332	0,2744738
17,905	538,2	543,6	99,90	101,01	0,182	0,176	333	0,2780368
17,649	538,2	543,6	100,91	101,92	0,182	0,176	334	0,2741303
17,896	538,2	543,6	99,69	100,63	0,182	0,176	335	0,2779544
17,741	538,2	543,6	100,48	101,47	0,182	0,176	336	0,2755522
17,699	538,2	543,6	100,80	101,98	0,182	0,176	337	0,2748782
17,530	538,2	543,7	101,70	102,89	0,182	0,176	338	0,2722506
17,795	538,3	543,7	100,31	101,28	0,182	0,176	339	0,2763684
17,790	538,3	543,7	99,67	101,07	0,181	0,176	340	0,2762507
17,902	538,2	543,7	99,33	100,57	0,181	0,176	341	0,2780376
17,795	538,3	543,7	100,06	101,31	0,182	0,176	342	0,2763688
17,779	538,2	543,7	100,55	101,32	0,182	0,176	343	0,2761264
18,040	538,3	543,7	98,94	99,76	0,182	0,176	344	0,280162
17,844	538,2	543,7	99,93	101,09	0,182	0,176	345	0,2771134
17,591	538,3	543,7	101,28	102,48	0,182	0,176	346	0,2731918
17,794	538,3	543,7	99,69	100,84	0,181	0,176	347	0,2763681
17,697	538,3	543,8	100,69	101,77	0,181	0,176	348	0,2748777
17,793	538,3	543,8	100,15	101,17	0,182	0,176	349	0,2763692
17,383	538,3	543,8	102,58	103,64	0,182	0,176	350	0,2699777
17,402	538,3	543,8	102,39	103,12	0,182	0,176	351	0,2702646
17,126	538,3	543,8	104,50	105,37	0,182	0,176	352	0,2659599
17,843	538,3	543,8	99,85	100,82	0,182	0,176	353	0,2771108
17,843	538,3	543,8	99,85	100,92	0,182	0,176	354	0,2771107
17,986	538,3	543,8	99,20	99,88	0,182	0,176	355	0,2793252
17,842	538,3	543,8	99,69	101,05	0,182	0,176	356	0,2771095
17,698	538,3	543,8	100,67	101,77	0,182	0,176	357	0,2748777
17,792	538,3	543,8	100,12	101,43	0,182	0,176	358	0,2763653
17,803	538,3	543,8	100,11	101,28	0,182	0,176	359	0,2765125
17,700	538,3	543,8	100,60	101,79	0,182	0,176	360	0,2748843

17,346	538,3	543,8	102,82	103,75	0,182	0,176	361	0,2693643
17,298	538,3	543,7	103,03	104,21	0,182	0,176	362	0,2686433
17,790	538,3	543,8	100,05	101,42	0,182	0,176	363	0,2763212
17,926	538,3	543,8	99,55	100,52	0,182	0,176	364	0,2783854
17,880	538,3	543,8	99,65	100,77	0,182	0,176	365	0,2776657
17,702	538,3	543,8	100,64	101,90	0,182	0,176	366	0,274878
17,652	538,3	543,8	100,91	102,03	0,182	0,176	367	0,2741295
17,843	538,3	543,8	99,71	100,99	0,182	0,176	368	0,277111
17,798	538,3	543,8	100,23	101,08	0,182	0,176	369	0,2763666
17,562	538,3	543,8	101,57	102,46	0,182	0,176	370	0,2727562
17,677	538,4	543,8	100,95	101,69	0,182	0,176	371	0,2745252
17,926	538,4	543,9	99,41	100,75	0,182	0,176	372	0,278393
17,593	538,3	543,9	101,27	102,45	0,182	0,176	373	0,273192
17,989	538,4	543,9	99,05	100,04	0,182	0,176	374	0,2793254
17,534	538,4	543,8	101,55	102,80	0,182	0,176	375	0,2722504

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	99,59	100,84	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
18,360	535,9	537,1			0,182	0,177	0	0,278958
17,338	535,9	537,3	102,82	104,70	0,182	0,177	1	0,266873
16,713	535,9	537,5	106,44	108,51	0,181	0,177	2	0,2575223
18,107	535,9	537,6	98,03	100,00	0,181	0,177	3	0,2793255
18,112	535,9	537,7	98,23	99,98	0,182	0,177	4	0,2793261
18,305	535,9	537,9	96,75	98,53	0,182	0,177	5	0,2827965
16,933	536,0	538,1	104,58	106,57	0,182	0,177	6	0,2616732
16,979	536,0	538,2	104,34	106,40	0,182	0,177	7	0,262261
18,026	536,0	538,4	98,34	100,12	0,182	0,177	8	0,2784036
18,024	536,1	538,6	98,38	99,91	0,182	0,177	9	0,2784757
18,118	536,1	538,7	97,75	99,35	0,182	0,177	10	0,2799376
18,079	536,1	538,8	98,13	99,67	0,182	0,177	11	0,2793245
18,021	536,1	539,0	98,41	100,18	0,182	0,177	12	0,2784046
17,954	536,1	539,1	98,75	100,39	0,182	0,177	13	0,2774365
17,909	536,1	539,3	99,08	100,66	0,182	0,177	14	0,2766795
17,911	536,1	539,4	98,87	100,49	0,182	0,177	15	0,2767401
18,026	536,1	539,5	98,41	100,09	0,182	0,177	16	0,2784036
17,036	536,1	539,7	104,16	105,46	0,182	0,177	17	0,2632368
17,969	536,2	539,8	98,68	100,23	0,182	0,176	18	0,2775934
18,024	536,2	539,9	98,46	99,78	0,182	0,176	19	0,2784034
17,895	536,2	540,0	99,19	100,73	0,182	0,176	20	0,2763672
18,125	536,2	540,1	97,96	99,46	0,182	0,177	21	0,2798748
18,123	536,3	540,2	97,87	99,54	0,182	0,177	22	0,2798757
17,949	536,3	540,3	98,91	100,18	0,182	0,176	23	0,2771093
18,297	536,2	540,4	97,06	98,56	0,182	0,176	24	0,2823909
18,350	536,3	540,5	96,74	98,25	0,182	0,176	25	0,283175
18,081	536,3	540,6	98,35	99,92	0,182	0,177	26	0,2789566
17,003	536,3	540,6	104,67	106,19	0,182	0,177	27	0,262261
17,934	536,4	540,8	99,16	100,39	0,182	0,176	28	0,2765945
17,971	536,4	540,9	98,98	100,19	0,182	0,176	29	0,2771689
18,001	536,4	540,9	98,83	99,94	0,182	0,176	30	0,2776647
18,026	536,4	541,0	98,61	100,01	0,182	0,176	31	0,2780358
17,741	536,4	541,0	100,11	101,75	0,182	0,176	32	0,2735655
18,033	536,4	541,1	98,68	100,07	0,182	0,176	33	0,2780343
18,117	536,4	541,1	98,39	99,52	0,182	0,176	34	0,2793213
17,950	536,4	541,2	99,16	100,27	0,182	0,176	35	0,2767396
17,403	536,4	541,2	102,14	103,56	0,182	0,176	36	0,2682108
18,162	536,5	541,2	97,97	99,49	0,181	0,176	37	0,2798754
17,817	536,5	541,3	100,11	101,41	0,182	0,176	38	0,274505
17,318	536,5	541,3	102,96	104,50	0,182	0,176	39	0,2668061
17,124	536,5	541,3	104,20	105,66	0,182	0,176	40	0,263697
18,136	536,5	541,4	98,14	99,36	0,182	0,176	41	0,2793175
18,034	536,5	541,4	98,83	100,18	0,181	0,176	42	0,2776652
17,335	536,5	541,5	102,83	104,32	0,182	0,176	43	0,2669176
17,962	536,6	541,5	99,23	100,55	0,182	0,176	44	0,2765019
18,039	536,6	541,6	98,81	100,16	0,181	0,176	45	0,2776659
17,805	536,6	541,6	100,16	101,43	0,182	0,176	46	0,2741291
18,035	536,6	541,6	98,91	100,10	0,182	0,176	47	0,277665
17,848	536,6	541,6	99,97	101,13	0,182	0,176	48	0,2747934
18,205	536,6	541,7	98,10	99,43	0,182	0,176	49	0,2802383
17,198	536,6	541,7	103,91	105,15	0,182	0,176	50	0,2646004
17,488	536,6	541,7	102,01	103,25	0,182	0,176	51	0,2690235
17,235	536,6	541,8	103,74	104,70	0,182	0,176	52	0,2651252
18,097	536,6	541,8	98,81	99,88	0,182	0,176	53	0,2783994
18,045	536,7	541,9	98,98	100,32	0,182	0,176	54	0,2776655
17,891	536,7	541,9	99,96	101,03	0,182	0,176	55	0,2752526

18,357	536,7	541,9	97,47	98,55	0,182	0,176	56	0,2824169
18,156	536,7	542,0	98,36	99,68	0,182	0,176	57	0,2793247
17,168	536,7	542,0	104,11	105,27	0,182	0,176	58	0,2640159
17,783	536,7	542,0	100,49	102,12	0,182	0,176	59	0,2734953
18,050	536,7	542,1	98,87	100,21	0,182	0,176	60	0,2776634
17,869	536,8	542,1	99,97	101,39	0,182	0,176	61	0,2748786
17,738	536,8	542,1	100,85	101,98	0,182	0,176	62	0,2728167
17,198	536,8	542,1	103,82	105,43	0,182	0,176	63	0,2645993
16,979	536,9	542,2	105,16	106,45	0,182	0,176	64	0,2612963
17,868	536,9	542,3	100,15	101,35	0,182	0,176	65	0,2748815
18,071	536,9	542,3	98,85	100,04	0,182	0,176	66	0,2780354
17,959	536,9	542,3	99,39	100,70	0,182	0,176	67	0,2763683
18,083	536,9	542,3	98,78	99,94	0,182	0,176	68	0,278378
17,997	536,9	542,3	99,19	100,39	0,182	0,176	69	0,2771094
17,336	536,9	542,3	102,85	104,03	0,182	0,176	70	0,2669167
17,937	536,9	542,3	99,29	100,40	0,182	0,176	71	0,2763676
18,199	536,9	542,3	97,91	99,02	0,182	0,176	72	0,2803989
17,702	536,9	542,4	100,68	101,59	0,182	0,176	73	0,272812
17,869	536,9	542,4	99,70	100,70	0,182	0,176	74	0,2754389
17,955	536,9	542,4	99,12	100,47	0,182	0,176	75	0,27674
17,580	536,9	542,4	101,14	102,45	0,182	0,176	76	0,2710995
17,129	537,0	542,4	103,87	105,35	0,182	0,176	77	0,2640165
17,957	537,1	542,5	98,98	100,40	0,181	0,176	78	0,2767399
18,199	537,1	542,6	97,96	99,17	0,182	0,176	79	0,2803978
17,952	537,1	542,6	99,14	100,11	0,182	0,176	80	0,2767189
17,133	537,1	542,6	103,81	105,30	0,182	0,176	81	0,2640163
18,160	537,1	542,6	98,07	99,09	0,182	0,176	82	0,2798763
17,864	537,1	542,6	99,65	100,90	0,182	0,176	83	0,2753511
18,195	537,0	542,6	97,70	98,75	0,182	0,176	84	0,2806074
18,020	537,1	542,6	98,59	99,90	0,182	0,176	85	0,2780354
18,082	537,1	542,7	98,33	99,48	0,182	0,176	86	0,2789574
18,095	537,1	542,7	98,34	99,50	0,182	0,176	87	0,2789495
18,262	537,1	542,7	97,42	98,86	0,182	0,176	88	0,2815439
18,048	537,2	542,7	98,49	99,61	0,182	0,176	89	0,2784049
18,025	537,2	542,7	98,58	99,74	0,182	0,176	90	0,2780361
17,822	537,2	542,7	99,65	101,01	0,182	0,176	91	0,2748281
17,360	537,2	542,7	102,47	103,70	0,182	0,176	92	0,267686
17,207	537,2	542,8	103,41	104,64	0,182	0,176	93	0,2653759
17,936	537,2	542,8	99,13	100,16	0,182	0,176	94	0,276676
17,146	537,1	542,7	103,53	104,82	0,182	0,176	95	0,2645993
17,202	537,1	542,7	103,37	104,73	0,182	0,176	96	0,265375
17,764	537,1	542,7	99,79	101,07	0,182	0,176	97	0,2741293
17,975	537,1	542,8	98,67	99,85	0,181	0,176	98	0,2774439
17,721	537,1	542,8	100,11	101,04	0,182	0,176	99	0,2735791
18,085	537,1	542,8	98,08	99,18	0,182	0,176	100	0,2793254
16,783	537,1	542,8	105,57	106,85	0,182	0,176	101	0,2591821
17,286	537,1	542,8	102,79	103,96	0,182	0,176	102	0,2669186
17,751	537,2	542,8	100,01	101,03	0,182	0,176	103	0,2741296
17,939	537,3	542,9	98,74	99,86	0,182	0,176	104	0,2771122
17,756	537,3	542,9	99,86	100,95	0,182	0,176	105	0,2741953
18,061	537,3	542,9	98,19	99,35	0,182	0,176	106	0,2789575
18,081	537,3	542,9	97,98	99,20	0,182	0,176	107	0,2793259
17,975	537,3	542,9	98,48	99,70	0,182	0,176	108	0,2776669
17,890	537,3	542,9	98,99	100,10	0,182	0,176	109	0,2763693
18,035	537,3	542,9	98,20	99,22	0,182	0,176	110	0,2786449
17,152	537,3	542,9	103,30	104,68	0,182	0,176	111	0,2649892
17,173	537,3	542,9	103,10	104,39	0,182	0,176	112	0,2653758
18,052	537,3	542,9	97,98	98,96	0,182	0,176	113	0,2790341
17,969	537,3	542,9	98,62	99,68	0,182	0,176	114	0,2776667
17,987	537,3	542,9	98,50	99,58	0,182	0,176	115	0,2780374
18,128	537,3	543,0	97,54	98,60	0,182	0,176	116	0,280259

17,923	537,4	543,0	98,61	99,70	0,182	0,176	117	0,2771173
18,127	537,4	543,1	97,61	98,89	0,182	0,176	118	0,2802438
18,105	537,4	543,1	97,56	98,76	0,182	0,176	119	0,2798769
18,066	537,4	543,1	97,95	99,25	0,182	0,176	120	0,2793267
18,080	537,4	543,1	97,73	99,00	0,182	0,176	121	0,2796862
17,070	537,4	543,1	103,33	104,67	0,181	0,176	122	0,2640172
18,099	537,4	543,1	97,61	99,00	0,181	0,176	123	0,2798775
17,739	537,4	543,1	99,61	100,76	0,182	0,176	124	0,274315
18,024	537,4	543,1	98,07	99,10	0,182	0,176	125	0,2787536
18,032	537,4	543,1	97,97	99,25	0,182	0,176	126	0,2789591
17,865	537,4	543,0	98,95	100,27	0,182	0,176	127	0,2763695
17,913	537,4	543,0	98,73	99,66	0,182	0,176	128	0,2771115
17,392	537,4	543,1	101,58	102,89	0,182	0,176	129	0,2690201
17,253	537,4	543,1	102,28	103,53	0,182	0,176	130	0,2669192
17,744	537,5	543,1	99,50	100,58	0,181	0,176	131	0,2745058
18,054	537,6	543,2	97,86	99,04	0,182	0,176	132	0,2793269
17,070	537,7	543,3	103,40	104,47	0,182	0,176	133	0,2640704
17,885	537,6	543,3	98,80	99,82	0,182	0,175	134	0,2767417
18,134	537,6	543,3	97,23	98,38	0,182	0,176	135	0,2806995
18,105	537,5	543,2	97,57	98,55	0,182	0,176	136	0,2802453
17,964	537,5	543,2	98,13	99,36	0,182	0,176	137	0,2780391
17,753	537,5	543,2	99,19	100,46	0,181	0,176	138	0,2748388
17,858	537,5	543,2	98,73	99,73	0,182	0,176	139	0,2765772
17,966	537,6	543,3	98,15	99,20	0,182	0,176	140	0,2782075
17,120	537,6	543,3	102,99	104,32	0,182	0,176	141	0,264988
17,592	537,6	543,3	100,24	101,51	0,181	0,176	142	0,2722512
17,529	537,6	543,3	100,81	101,78	0,182	0,176	143	0,2713061
17,901	537,6	543,3	98,43	99,72	0,182	0,176	144	0,2771135
17,854	537,5	543,3	98,81	99,81	0,182	0,176	145	0,2763663
18,295	537,5	543,3	96,36	97,44	0,182	0,176	146	0,2832517
17,892	537,5	543,3	98,60	99,99	0,182	0,176	147	0,2770587
17,842	537,5	543,2	98,61	99,96	0,182	0,176	148	0,276369
18,032	537,5	543,3	97,66	98,83	0,181	0,176	149	0,2793265
16,874	537,6	543,3	104,45	105,61	0,182	0,176	150	0,2612818
17,089	537,6	543,3	103,24	104,54	0,182	0,176	151	0,2645549
18,177	537,6	543,3	96,75	98,11	0,181	0,176	152	0,2815239
18,164	537,6	543,4	96,86	98,04	0,181	0,176	153	0,2815244
17,927	537,6	543,4	98,35	99,38	0,182	0,176	154	0,2776667
17,872	537,6	543,4	98,90	99,76	0,182	0,176	155	0,2767443
18,039	537,6	543,4	97,67	98,85	0,182	0,176	156	0,2793264
17,860	537,6	543,4	98,63	99,92	0,182	0,176	157	0,2767414
17,082	537,6	543,4	103,16	104,37	0,182	0,176	158	0,2646005
18,093	537,6	543,4	97,52	98,40	0,182	0,176	159	0,2802075
17,136	537,6	543,4	102,64	103,81	0,182	0,175	160	0,2653758
17,150	537,6	543,4	102,70	103,70	0,181	0,175	161	0,2655638
18,178	537,6	543,4	96,95	97,98	0,182	0,175	162	0,28152
18,176	537,6	543,4	96,97	97,91	0,182	0,175	163	0,2815146
17,924	537,5	543,4	98,23	99,05	0,182	0,175	164	0,277667
17,037	537,5	543,3	103,39	104,71	0,182	0,176	165	0,2640174
17,181	537,5	543,4	102,49	103,63	0,182	0,176	166	0,2662513
17,257	537,5	543,3	102,08	103,41	0,182	0,176	167	0,2673016
17,225	537,5	543,3	102,25	103,41	0,182	0,176	168	0,2669171
18,000	537,5	543,3	98,04	99,02	0,182	0,176	169	0,2788753
17,192	537,6	543,3	103,09	103,87	0,182	0,176	170	0,2663392
17,864	537,6	543,3	98,47	99,73	0,182	0,176	171	0,2767417
18,024	537,6	543,3	97,50	98,73	0,181	0,176	172	0,2793263
16,888	537,6	543,3	104,23	105,33	0,181	0,176	173	0,261673
17,965	537,6	543,4	98,05	99,09	0,182	0,176	174	0,2784082
18,086	537,6	543,4	97,29	98,57	0,182	0,176	175	0,2802439
17,895	537,6	543,4	98,24	99,39	0,181	0,176	176	0,2773493
17,882	537,7	543,4	98,23	99,31	0,181	0,175	177	0,2771107

17,165	537,7	543,4	102,55	103,51	0,181	0,175	178	0,2659541
18,110	537,7	543,4	97,06	98,42	0,181	0,176	179	0,2806098
18,003	537,7	543,4	97,73	98,76	0,181	0,176	180	0,2789201
18,226	537,7	543,4	96,50	97,71	0,181	0,176	181	0,2824284
17,942	537,7	543,4	97,95	99,21	0,181	0,176	182	0,2780353
17,858	537,7	543,4	98,58	99,74	0,181	0,176	183	0,2767406
18,026	537,7	543,5	97,59	98,57	0,182	0,176	184	0,2793682
18,001	537,7	543,5	97,63	99,21	0,181	0,176	185	0,2789586
17,736	537,7	543,5	99,24	100,32	0,181	0,176	186	0,2748796
17,876	537,7	543,5	98,41	99,56	0,182	0,176	187	0,2771119
18,138	537,8	543,5	96,84	98,18	0,181	0,176	188	0,2811584
17,872	537,8	543,5	98,27	99,62	0,181	0,176	189	0,2770275
17,459	537,8	543,5	100,78	102,11	0,181	0,176	190	0,2705463
17,872	537,5	543,3	98,41	99,30	0,182	0,176	191	0,2771105
18,155	537,4	543,2	96,87	98,02	0,182	0,176	192	0,2815224
17,952	537,4	543,2	97,85	99,00	0,182	0,176	193	0,2784032
17,859	537,2	543,0	98,36	99,52	0,182	0,176	194	0,2771099
18,070	537,0	542,9	97,17	98,43	0,182	0,176	195	0,2802432
17,922	537,0	542,9	98,02	99,13	0,182	0,176	196	0,2780372
17,447	537,0	542,9	100,93	101,95	0,182	0,176	197	0,2705448
18,162	537,1	542,9	96,97	98,04	0,182	0,176	198	0,281524
17,933	537,2	542,9	98,06	99,32	0,182	0,176	199	0,2780366
18,000	537,2	542,9	97,73	98,94	0,182	0,176	200	0,2790679
17,963	537,3	543,0	97,96	99,14	0,182	0,176	201	0,2784043
17,829	537,3	543,0	98,81	99,72	0,182	0,176	202	0,276414
17,310	537,4	543,1	101,61	102,71	0,182	0,176	203	0,2683465
18,077	537,5	543,1	97,10	98,23	0,181	0,175	204	0,2802379
18,360	537,5	543,1	95,77	96,74	0,181	0,175	205	0,2846065
17,963	537,4	543,1	98,09	99,16	0,182	0,176	206	0,278404
18,020	537,4	543,1	97,74	98,84	0,182	0,176	207	0,2793245
17,093	537,5	543,1	102,96	104,16	0,182	0,176	208	0,2649836
17,304	537,5	543,1	101,64	102,80	0,182	0,176	209	0,2682589
17,332	537,4	543,1	101,60	102,74	0,182	0,176	210	0,2686417
17,039	537,4	543,1	103,19	104,56	0,182	0,176	211	0,2640871

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	100,89	100,42	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
18,106	534,2	535,3			0,182	0,176	0	0,2798668
17,642	534,2	535,4	102,23	102,44	0,182	0,176	1	0,2767348
17,602	534,3	535,5	102,12	102,48	0,182	0,176	2	0,276482
17,773	534,3	535,6	101,30	100,84	0,182	0,176	3	0,2793153
18,075	534,3	535,8	99,22	99,35	0,182	0,175	4	0,2840622
17,709	534,4	536,0	100,85	101,17	0,182	0,176	5	0,2789514
17,935	534,4	536,1	99,54	99,86	0,182	0,176	6	0,2827887
17,747	534,5	536,3	100,48	100,68	0,182	0,176	7	0,2798928
17,455	534,6	536,5	102,02	102,30	0,182	0,176	8	0,2754349
17,763	534,5	536,6	100,40	100,52	0,182	0,176	9	0,2802374
17,520	534,5	536,7	101,82	101,79	0,182	0,176	10	0,2762823
17,932	534,5	536,9	99,49	99,43	0,182	0,175	11	0,2827911
17,854	534,5	537,0	100,02	100,08	0,182	0,176	12	0,2815183
17,770	534,5	537,2	100,48	100,56	0,182	0,176	13	0,2802386
17,832	534,6	537,3	100,12	100,09	0,182	0,176	14	0,2812611
17,633	534,7	537,5	101,22	101,19	0,182	0,176	15	0,2780343
17,849	534,7	537,6	99,99	99,99	0,182	0,176	16	0,2815163
17,817	534,7	537,8	99,86	100,11	0,182	0,176	17	0,2811531
17,771	534,7	537,9	100,29	100,19	0,182	0,176	18	0,280635
17,769	534,6	538,0	100,23	100,09	0,182	0,176	19	0,2806043
17,682	534,6	538,1	100,55	100,59	0,182	0,175	20	0,2793198
17,717	534,7	538,2	100,50	100,53	0,182	0,176	21	0,2796457
17,616	534,7	538,3	101,11	100,70	0,182	0,175	22	0,278132
17,742	534,6	538,3	100,37	100,27	0,182	0,175	23	0,2802325
17,689	534,7	538,4	100,50	100,62	0,182	0,176	24	0,2793195
17,897	534,7	538,5	99,63	99,46	0,182	0,175	25	0,2824031
17,703	534,7	538,6	100,88	100,32	0,182	0,175	26	0,2793167
17,964	534,8	538,7	99,27	99,21	0,182	0,175	27	0,2833365
17,805	534,9	538,8	100,16	99,87	0,182	0,175	28	0,2807751
17,578	534,9	538,9	101,62	101,15	0,182	0,175	29	0,27717
17,748	534,9	539,0	100,58	100,36	0,182	0,175	30	0,2798718
17,720	534,9	539,1	100,78	100,76	0,182	0,175	31	0,2793194
17,785	534,9	539,2	100,52	100,07	0,182	0,175	32	0,280238
17,599	535,1	539,3	101,50	101,17	0,182	0,175	33	0,277338
17,762	535,1	539,4	100,63	100,45	0,182	0,175	34	0,2798686
17,720	535,1	539,5	100,83	100,52	0,182	0,175	35	0,2793202
16,993	535,1	539,5	105,25	104,63	0,182	0,175	36	0,2676608
16,761	535,1	539,6	106,89	106,37	0,182	0,175	37	0,2637598
17,768	535,1	539,6	100,66	100,11	0,182	0,175	38	0,2798708
18,064	535,2	539,7	99,05	98,74	0,182	0,175	39	0,2845835
17,780	535,2	539,8	100,79	100,57	0,182	0,175	40	0,2798713
17,825	535,2	539,9	100,34	100,06	0,182	0,175	41	0,2806052
18,065	535,3	540,0	99,11	98,95	0,182	0,175	42	0,2840584
16,866	535,3	540,1	106,12	105,87	0,182	0,175	43	0,2653699
17,038	535,4	540,2	105,00	104,76	0,182	0,175	44	0,268255
17,761	535,5	540,3	100,90	100,60	0,182	0,175	45	0,2793114
17,691	535,5	540,3	101,33	100,62	0,182	0,175	46	0,2783987
17,024	535,5	540,3	105,24	104,88	0,182	0,174	47	0,2676803
18,147	535,4	540,3	98,81	98,57	0,182	0,175	48	0,2852914
17,787	535,3	540,3	100,64	100,16	0,182	0,175	49	0,279871
17,814	535,3	540,3	100,59	100,14	0,182	0,175	50	0,2802392
17,984	535,3	540,4	99,72	99,37	0,182	0,175	51	0,2827915
17,104	535,4	540,4	104,70	104,27	0,182	0,175	52	0,269037
17,908	535,5	540,6	100,24	99,64	0,182	0,174	53	0,2815177
17,787	535,5	540,6	100,71	99,94	0,182	0,174	54	0,2798721
17,438	535,5	540,6	102,63	102,17	0,182	0,174	55	0,2743802

17,686	535,5	540,6	101,18	101,00	0,182	0,175	56	0,2781585
17,869	535,5	540,7	100,11	99,85	0,182	0,175	57	0,2811553
17,318	535,5	540,7	103,33	103,40	0,182	0,175	58	0,2722457
17,935	535,5	540,7	99,69	99,19	0,182	0,175	59	0,2821645
17,664	535,5	540,6	101,37	100,93	0,182	0,174	60	0,2781048
17,867	535,4	540,6	100,14	99,53	0,182	0,174	61	0,281154
17,870	535,3	540,5	100,13	99,67	0,182	0,174	62	0,281155
17,929	535,3	540,5	100,18	99,73	0,182	0,175	63	0,2818596
17,880	535,4	540,6	100,18	99,58	0,182	0,174	64	0,281153
17,529	535,4	540,6	102,49	102,02	0,182	0,174	65	0,2754347
18,104	535,4	540,6	99,00	98,53	0,182	0,174	66	0,2846042
17,992	535,4	540,6	99,34	98,89	0,182	0,174	67	0,2831305
17,742	535,3	540,6	100,94	100,50	0,182	0,175	68	0,2793415
17,502	535,3	540,6	102,25	101,61	0,182	0,175	69	0,2754328
17,675	535,2	540,6	101,41	100,79	0,182	0,174	70	0,2780926
17,867	535,3	540,6	100,27	99,76	0,182	0,174	71	0,2810931
18,045	535,3	540,6	99,38	99,34	0,182	0,175	72	0,2836995
17,741	535,3	540,7	101,13	100,71	0,182	0,175	73	0,2789541
17,816	535,3	540,7	100,92	100,45	0,182	0,175	74	0,27989
17,610	535,3	540,7	102,00	101,72	0,182	0,175	75	0,2767412
16,625	535,3	540,7	107,94	107,26	0,182	0,175	76	0,2612792
17,775	535,4	540,8	100,96	100,52	0,182	0,174	77	0,2794772
17,744	535,4	540,8	100,82	100,16	0,182	0,174	78	0,2793215
17,860	535,4	540,8	100,31	99,78	0,182	0,174	79	0,280921
17,763	535,4	540,8	101,01	100,30	0,182	0,174	80	0,2793193
17,848	535,5	540,9	100,61	100,04	0,182	0,174	81	0,2806052
17,604	535,5	540,9	101,96	101,63	0,182	0,175	82	0,2767543
17,773	535,6	541,0	100,97	100,65	0,182	0,175	83	0,2793206
17,913	535,6	541,0	100,16	99,69	0,182	0,175	84	0,2815183
17,018	535,6	541,0	105,50	105,02	0,182	0,174	85	0,2673196
17,900	535,7	541,1	100,49	99,60	0,182	0,174	86	0,2811531
17,837	535,7	541,1	100,67	100,40	0,182	0,174	87	0,2802376
17,973	535,8	541,2	99,96	99,46	0,182	0,175	88	0,2824289
17,322	535,9	541,3	103,67	102,96	0,182	0,174	89	0,2722462
17,758	535,9	541,3	101,16	100,65	0,182	0,174	90	0,2789624
18,048	535,9	541,3	99,23	98,54	0,182	0,174	91	0,2840616
17,753	535,8	541,2	100,90	100,27	0,182	0,174	92	0,2793209
18,163	535,8	541,2	98,93	98,40	0,182	0,174	93	0,2854203
17,771	535,7	541,2	100,85	100,53	0,182	0,175	94	0,2793202
18,033	535,7	541,2	99,81	99,25	0,182	0,175	95	0,2833377
17,525	535,7	541,2	102,41	101,85	0,182	0,175	96	0,2754135
17,783	535,7	541,2	101,17	100,41	0,182	0,174	97	0,2792967
17,671	535,6	541,2	101,54	101,10	0,182	0,174	98	0,2776619
17,853	535,6	541,2	100,83	100,24	0,182	0,174	99	0,2802389
17,971	535,6	541,2	99,94	99,20	0,182	0,174	100	0,2824298
17,888	535,6	541,1	100,43	99,78	0,182	0,174	101	0,2811543
17,620	535,6	541,1	101,86	101,08	0,182	0,174	102	0,2771077
17,620	535,5	541,1	101,76	101,13	0,182	0,174	103	0,277106
17,864	535,5	541,0	100,58	100,11	0,182	0,174	104	0,280605
17,995	535,5	541,0	100,04	99,64	0,182	0,175	105	0,2824299
17,620	535,5	541,1	102,34	101,69	0,182	0,175	106	0,2763626
17,825	535,5	541,2	101,11	100,33	0,182	0,174	107	0,279626
17,138	535,6	541,2	105,33	104,57	0,182	0,174	108	0,2686389
17,850	535,6	541,2	101,13	100,54	0,182	0,174	109	0,2798696
17,823	535,6	541,2	100,77	100,46	0,182	0,175	110	0,2798731
17,780	535,6	541,1	100,92	100,52	0,182	0,175	111	0,2793215
17,724	535,6	541,1	101,31	100,94	0,182	0,175	112	0,2783977
17,938	535,6	541,1	100,11	99,77	0,182	0,174	113	0,2815179
17,939	535,6	541,1	100,43	100,05	0,182	0,175	114	0,28152
17,828	535,6	541,2	101,16	100,32	0,182	0,174	115	0,2796378
17,651	535,6	541,2	101,88	101,37	0,182	0,174	116	0,2772093

17,766	535,6	541,2	101,16	100,70	0,182	0,174	117	0,2789555
17,947	535,7	541,3	100,30	99,88	0,182	0,174	118	0,2815204
18,221	535,7	541,3	98,75	98,40	0,182	0,174	119	0,2856634
17,623	535,7	541,3	102,18	101,84	0,182	0,174	120	0,2763691
18,090	535,7	541,3	99,42	98,96	0,182	0,174	121	0,2836997
17,423	535,7	541,3	103,37	103,01	0,182	0,174	122	0,2731873
17,889	535,7	541,4	100,60	100,14	0,182	0,174	123	0,2806833
17,945	535,7	541,4	100,29	99,63	0,182	0,174	124	0,2816106
17,288	535,8	541,4	103,97	103,33	0,182	0,174	125	0,2713136
17,990	535,8	541,4	100,01	99,49	0,182	0,174	126	0,2824312
17,893	535,8	541,4	100,52	99,75	0,182	0,174	127	0,2809568
17,317	535,8	541,3	103,46	103,04	0,182	0,174	128	0,2722487
17,593	535,8	541,4	102,07	101,51	0,182	0,174	129	0,2763659
17,674	535,7	541,3	101,56	100,84	0,182	0,174	130	0,2776792
17,828	535,7	541,3	100,71	100,04	0,182	0,174	131	0,2802074
17,768	535,7	541,3	100,98	100,44	0,182	0,174	132	0,2793228
17,972	535,7	541,3	99,68	99,10	0,182	0,174	133	0,2827954
18,014	535,8	541,4	99,55	99,17	0,182	0,175	134	0,2833396
17,931	535,8	541,4	100,16	99,54	0,182	0,175	135	0,2817981
17,728	535,9	541,5	101,03	100,22	0,182	0,174	136	0,2789561
17,969	536,0	541,6	99,75	99,16	0,182	0,174	137	0,2824319
17,716	536,1	541,6	101,20	100,73	0,182	0,174	138	0,2784021
17,886	536,1	541,6	99,87	99,63	0,182	0,174	139	0,2815206
16,658	536,1	541,6	107,40	106,76	0,182	0,174	140	0,2622595
17,761	536,1	541,6	100,48	100,00	0,182	0,174	141	0,2798735
17,914	536,0	541,5	99,37	98,70	0,182	0,174	142	0,2826844
17,608	536,0	541,5	101,21	100,88	0,182	0,174	143	0,2776777
17,801	536,0	541,6	100,46	99,87	0,182	0,174	144	0,2802409
17,674	536,0	541,5	101,19	100,74	0,182	0,174	145	0,2784012
18,046	536,0	541,5	99,04	98,49	0,182	0,174	146	0,2839998
17,685	536,0	541,5	101,48	100,77	0,182	0,174	147	0,2780329
17,976	536,0	541,5	99,60	98,71	0,182	0,174	148	0,2827936
17,851	535,9	541,5	100,10	99,58	0,182	0,174	149	0,2811554
17,815	535,9	541,4	100,33	99,71	0,182	0,174	150	0,2806061
18,030	535,9	541,3	99,24	98,49	0,182	0,174	151	0,2837011
17,650	535,9	541,3	101,37	100,84	0,182	0,174	152	0,2776631
17,591	535,9	541,3	101,77	101,28	0,182	0,174	153	0,2767439
18,028	535,9	541,3	99,23	98,75	0,182	0,174	154	0,2837003
17,144	535,9	541,3	104,27	103,91	0,182	0,175	155	0,269978
17,656	535,8	541,3	101,02	100,73	0,182	0,175	156	0,2780331
17,723	535,8	541,3	100,75	100,26	0,182	0,174	157	0,2793227
17,724	535,8	541,2	100,11	100,19	0,182	0,175	158	0,2798705
17,670	535,8	541,2	100,84	100,31	0,182	0,175	159	0,2789551
17,717	535,7	541,1	100,58	100,27	0,182	0,175	160	0,2793228
17,948	535,7	541,1	99,67	99,32	0,182	0,175	161	0,2824495
17,972	535,7	541,2	99,52	98,90	0,182	0,174	162	0,2827929
17,865	535,7	541,2	100,24	99,63	0,182	0,174	163	0,2811565
17,832	535,8	541,3	100,30	99,87	0,182	0,175	164	0,2808456
17,579	535,8	541,3	101,63	101,19	0,182	0,175	165	0,2767298
17,826	535,9	541,4	100,40	99,65	0,182	0,174	166	0,2806055
17,697	536,0	541,5	100,98	100,47	0,182	0,174	167	0,2789554
17,933	536,0	541,5	99,66	99,05	0,182	0,174	168	0,2824426
17,783	536,1	541,6	100,63	100,42	0,182	0,175	169	0,2798726
17,677	536,1	541,6	101,08	100,44	0,182	0,175	170	0,2784025
17,964	536,1	541,6	99,21	98,93	0,182	0,175	171	0,283352
18,015	536,1	541,6	99,28	98,78	0,182	0,175	172	0,2836994
17,938	536,1	541,6	99,59	98,93	0,182	0,174	173	0,2824304
16,771	536,1	541,6	106,07	105,69	0,182	0,174	174	0,264596
17,656	536,1	541,6	101,04	100,65	0,182	0,174	175	0,2780334
17,985	536,1	541,6	99,12	98,90	0,182	0,174	176	0,283338
17,633	536,1	541,6	101,15	100,63	0,182	0,174	177	0,2776636

17,934	536,1	541,6	99,40	98,91	0,182	0,174	178	0,282432
17,736	536,1	541,6	100,59	99,99	0,182	0,174	179	0,279363
17,739	536,1	541,7	100,56	100,21	0,182	0,174	180	0,2794082
17,591	536,1	541,6	101,54	101,10	0,182	0,174	181	0,2771089
17,815	536,1	541,7	100,19	99,84	0,182	0,175	182	0,2806071
17,751	536,1	541,6	100,45	99,90	0,182	0,174	183	0,2797291
18,103	536,1	541,6	98,37	97,82	0,182	0,174	184	0,2855067
17,734	536,1	541,6	100,31	99,55	0,182	0,174	185	0,2798749
17,591	536,1	541,6	101,36	100,62	0,182	0,174	186	0,2776636
17,925	536,1	541,6	99,18	98,75	0,182	0,174	187	0,2827949
18,050	536,1	541,6	98,65	98,09	0,182	0,174	188	0,2846007
17,667	536,1	541,6	100,91	100,33	0,182	0,174	189	0,2784022
18,187	536,2	541,7	98,02	97,66	0,182	0,174	190	0,2867623
17,732	536,2	541,8	100,41	99,79	0,182	0,174	191	0,2798276
17,847	536,2	541,9	99,78	99,27	0,182	0,174	192	0,2815211
17,845	536,2	541,9	100,19	99,44	0,182	0,174	193	0,2811566
17,802	536,1	541,9	100,17	99,75	0,182	0,174	194	0,2806077
17,776	536,2	541,9	100,22	99,68	0,182	0,174	195	0,2802491
17,631	536,2	541,9	100,88	100,16	0,182	0,174	196	0,2784029
17,708	536,2	541,9	100,58	99,98	0,182	0,174	197	0,2793226
18,015	536,2	541,9	98,90	98,23	0,182	0,174	198	0,2840576
17,846	536,3	541,9	99,85	99,55	0,182	0,174	199	0,281156
17,750	536,3	541,9	100,13	99,59	0,182	0,174	200	0,2802409
17,850	536,4	542,0	99,81	98,96	0,182	0,174	201	0,2815213
17,714	536,4	542,0	100,46	100,27	0,182	0,174	202	0,2793232
17,799	536,4	542,0	100,27	99,55	0,182	0,174	203	0,2806064
17,798	536,5	542,1	99,89	99,38	0,182	0,174	204	0,280607
17,529	536,5	542,1	101,67	100,77	0,182	0,174	205	0,2766409
17,723	536,5	542,1	100,38	99,76	0,182	0,174	206	0,2797089
17,900	536,5	542,1	99,33	98,73	0,182	0,174	207	0,2824319
17,938	536,5	542,1	99,40	98,87	0,182	0,174	208	0,282795
17,704	536,5	542,1	100,92	100,29	0,182	0,174	209	0,2789001
17,792	536,6	542,1	99,97	99,65	0,182	0,174	210	0,2806067
17,766	536,6	542,2	100,41	99,87	0,182	0,174	211	0,2798673
17,549	536,6	542,2	101,48	100,98	0,182	0,174	212	0,2767368
17,682	536,6	542,2	100,84	100,00	0,182	0,174	213	0,2789559
17,808	536,6	542,2	100,02	99,90	0,182	0,174	214	0,2806069
16,948	536,6	542,2	105,32	105,03	0,182	0,175	215	0,2669148
17,741	536,6	542,2	100,71	100,05	0,182	0,174	216	0,2793231
17,761	536,6	542,2	100,20	99,60	0,182	0,174	217	0,2802414
17,735	536,6	542,2	100,26	99,52	0,182	0,174	218	0,2798733
17,626	536,6	542,1	100,77	100,05	0,182	0,174	219	0,2784028
18,176	536,6	542,1	97,66	97,09	0,182	0,174	220	0,2871202
17,685	536,5	542,1	100,33	99,81	0,182	0,174	221	0,2793214
17,824	536,6	542,1	99,48	98,94	0,182	0,174	222	0,2815155
17,501	536,6	542,1	101,59	100,90	0,182	0,174	223	0,2763663
17,555	536,6	542,1	101,09	100,28	0,182	0,174	224	0,2772372
17,555	536,6	542,1	101,10	100,89	0,182	0,174	225	0,2771078
16,854	536,6	542,1	105,49	104,90	0,182	0,174	226	0,2659533
17,579	536,6	542,1	101,33	100,99	0,182	0,174	227	0,277108
17,924	536,7	542,1	99,32	98,78	0,182	0,174	228	0,2825784
17,580	536,7	542,2	101,52	100,78	0,182	0,174	229	0,2771243
17,445	536,8	542,2	102,45	101,68	0,182	0,174	230	0,2748738
17,627	536,8	542,3	101,28	100,69	0,182	0,174	231	0,2776633
17,930	536,8	542,3	99,38	99,02	0,182	0,174	232	0,282425
18,036	536,8	542,3	98,89	98,26	0,182	0,174	233	0,2840581
17,681	536,8	542,4	100,42	99,91	0,182	0,174	234	0,2789554
16,569	536,9	542,4	107,10	106,33	0,182	0,174	235	0,2616717
17,688	536,9	542,4	100,44	99,86	0,182	0,174	236	0,2793339
17,690	537,0	542,5	100,67	100,11	0,182	0,174	237	0,2789611
17,754	537,0	542,5	100,22	99,60	0,182	0,174	238	0,2798728

17,522	537,0	542,5	101,50	100,94	0,182	0,174	239	0,2763639
17,314	537,0	542,5	102,76	102,22	0,182	0,174	240	0,2728797
17,574	536,9	542,5	101,30	100,81	0,182	0,174	241	0,2771237
17,554	536,9	542,5	101,47	101,14	0,182	0,174	242	0,2767359
16,904	536,9	542,5	105,52	104,68	0,182	0,174	243	0,266337
17,736	536,9	542,6	100,59	99,93	0,182	0,174	244	0,2793224
17,929	536,9	542,6	99,50	99,23	0,182	0,174	245	0,2824315
17,935	536,9	542,6	99,61	98,94	0,182	0,174	246	0,2824317
17,321	536,8	542,6	103,11	102,17	0,182	0,174	247	0,2728136
17,595	536,9	542,6	101,45	100,78	0,182	0,174	248	0,277108
16,961	536,9	542,5	104,89	104,06	0,182	0,174	249	0,2676897
17,816	536,9	542,5	99,38	99,25	0,182	0,174	250	0,2814522
17,802	536,9	542,4	99,58	99,25	0,181	0,174	251	0,2811558
17,808	536,9	542,4	99,80	99,29	0,182	0,174	252	0,2810665
17,704	536,9	542,5	100,56	99,80	0,182	0,174	253	0,2793225
17,759	536,9	542,4	100,19	99,54	0,182	0,174	254	0,2802412
17,767	536,9	542,4	100,06	99,55	0,182	0,174	255	0,2802427
17,900	536,8	542,4	99,25	98,62	0,182	0,174	256	0,2824207
17,634	536,8	542,4	100,97	100,39	0,182	0,174	257	0,2780334
17,769	536,8	542,4	100,23	99,72	0,182	0,174	258	0,2802407
17,723	536,8	542,4	100,25	99,83	0,182	0,174	259	0,2794434
17,729	536,9	542,4	100,68	99,77	0,182	0,174	260	0,2793189
17,915	536,9	542,4	99,56	98,90	0,182	0,174	261	0,2824313
17,987	537,0	542,5	98,84	98,20	0,182	0,174	262	0,2837008
17,798	537,1	542,6	99,86	99,14	0,181	0,174	263	0,2806068
17,788	537,1	542,6	99,96	99,69	0,182	0,174	264	0,2806083
17,644	537,2	542,6	100,90	100,43	0,182	0,174	265	0,2780334
17,935	537,3	542,7	99,47	99,09	0,182	0,174	266	0,2824316
17,653	537,3	542,7	100,91	100,34	0,181	0,174	267	0,2779946
17,628	537,2	542,7	101,12	100,56	0,181	0,174	268	0,2776645
17,242	537,2	542,7	103,35	102,85	0,182	0,174	269	0,2718689
17,725	537,2	542,7	100,39	100,02	0,182	0,174	270	0,2793231
17,698	537,3	542,8	100,83	100,39	0,181	0,174	271	0,2785876
17,505	537,3	542,8	101,96	101,52	0,181	0,174	272	0,2754404
17,647	537,4	542,8	101,19	100,77	0,181	0,174	273	0,2776638
17,757	537,4	542,8	100,49	100,34	0,181	0,174	274	0,2793235
17,701	537,5	542,9	100,99	100,35	0,181	0,174	275	0,2784036
18,036	537,5	542,9	99,21	98,64	0,182	0,174	276	0,2837011
17,760	537,6	542,9	100,40	100,16	0,181	0,174	277	0,2793241
17,770	537,6	543,0	100,46	100,11	0,181	0,174	278	0,2793992
17,875	537,6	543,0	100,05	99,37	0,181	0,174	279	0,2811553
17,973	537,7	543,0	99,62	99,19	0,182	0,174	280	0,2824331
17,776	537,7	543,0	100,78	100,15	0,182	0,174	281	0,2793255
16,950	537,7	543,0	105,28	105,01	0,181	0,174	282	0,2663581
18,038	537,7	543,0	99,19	98,63	0,181	0,174	283	0,283342
17,836	537,7	543,0	100,33	99,73	0,181	0,174	284	0,2802435
17,725	537,7	543,0	100,98	100,65	0,181	0,174	285	0,2784055
17,816	537,8	543,1	100,47	99,83	0,181	0,174	286	0,2798773
17,837	537,8	543,1	100,17	99,74	0,181	0,174	287	0,2802458
17,894	537,8	543,1	100,01	99,65	0,181	0,174	288	0,2811664
17,789	537,8	543,1	100,58	100,03	0,181	0,174	289	0,2794889
17,902	537,9	543,2	100,11	99,63	0,181	0,174	290	0,2811601
17,504	537,9	543,2	102,33	101,92	0,181	0,174	291	0,2748806
17,786	537,9	543,3	100,70	100,24	0,181	0,174	292	0,2793279
18,009	538,0	543,3	99,64	98,90	0,182	0,174	293	0,2828517
17,375	538,0	543,3	103,19	102,56	0,182	0,174	294	0,2728377
17,762	538,0	543,4	100,96	100,19	0,182	0,174	295	0,2789603
17,768	538,0	543,3	100,69	99,84	0,182	0,173	296	0,2792366
17,822	538,0	543,4	100,57	99,90	0,182	0,174	297	0,2799695
18,078	538,0	543,4	99,06	98,41	0,182	0,174	298	0,2840684
17,776	538,0	543,4	100,54	99,91	0,181	0,174	299	0,2793282

18,011	538,1	543,5	99,71	98,94	0,182	0,174	300	0,2828615
17,811	538,1	543,5	100,50	99,99	0,182	0,174	301	0,2798797
17,268	538,1	543,5	103,54	103,00	0,181	0,174	302	0,2713061
17,785	538,1	543,5	100,64	99,93	0,181	0,174	303	0,279329
17,011	538,1	543,5	105,15	104,71	0,181	0,174	304	0,2673041
17,662	538,1	543,5	101,31	100,75	0,181	0,174	305	0,2775197
17,970	538,1	543,5	99,67	98,91	0,182	0,174	306	0,2824374
17,650	538,1	543,5	101,30	100,83	0,181	0,174	307	0,2773165
17,995	538,1	543,5	99,39	98,80	0,181	0,174	308	0,2828009
17,767	538,1	543,5	100,56	99,91	0,181	0,174	309	0,2793294
17,773	538,1	543,5	100,62	99,93	0,181	0,174	310	0,2793291
17,119	538,1	543,5	104,80	104,11	0,182	0,174	311	0,2690005
17,609	538,2	543,5	101,54	101,00	0,182	0,174	312	0,276745
17,853	538,1	543,5	100,34	99,72	0,182	0,174	313	0,2806137

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	99,32	99,96	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
17,446	535,3	536,0			0,183	0,179	0	0,2685901
17,983	535,4	536,2	100,47	101,88	0,183	0,179	1	0,2789662
17,892	535,5	536,4	99,27	100,55	0,183	0,179	2	0,2798738
17,596	535,5	536,5	100,75	102,13	0,183	0,179	3	0,2754365
17,760	535,5	536,6	99,87	101,12	0,183	0,179	4	0,2780494
17,712	535,5	536,8	99,90	101,31	0,183	0,179	5	0,2777284
17,674	535,6	537,0	99,74	100,92	0,183	0,179	6	0,2776649
17,667	535,6	537,1	99,72	100,78	0,183	0,179	7	0,2776638
17,401	535,7	537,3	101,16	102,47	0,183	0,179	8	0,2734646
17,660	535,7	537,5	99,65	100,73	0,183	0,179	9	0,2776554
17,794	535,8	537,7	98,89	99,94	0,183	0,178	10	0,2798755
17,683	535,9	537,9	99,55	100,64	0,183	0,179	11	0,2780278
17,628	535,9	538,0	99,74	100,87	0,183	0,178	12	0,2772242
16,969	535,9	538,2	103,45	104,65	0,183	0,178	13	0,2668994
17,875	536,0	538,4	98,20	99,28	0,183	0,178	14	0,2811577
17,082	536,0	538,5	102,92	103,97	0,183	0,178	15	0,2686437
17,743	535,9	538,6	99,08	100,28	0,183	0,178	16	0,2791283
17,363	536,0	538,7	101,16	102,19	0,183	0,178	17	0,2731868
17,697	536,1	538,9	99,33	100,26	0,183	0,178	18	0,2784049
17,472	536,2	539,1	100,57	101,71	0,183	0,178	19	0,2748774
17,714	536,2	539,2	99,11	100,14	0,183	0,178	20	0,2787168
17,075	536,2	539,3	102,91	103,92	0,183	0,178	21	0,2686453
16,991	536,2	539,5	103,29	104,23	0,183	0,178	22	0,2672973
17,398	536,3	539,6	100,89	101,92	0,183	0,178	23	0,2737436
17,728	536,2	539,6	99,19	100,14	0,183	0,178	24	0,2789559
17,280	536,3	539,7	101,74	102,58	0,183	0,178	25	0,2718732
17,428	536,3	539,8	100,66	101,49	0,183	0,178	26	0,2741303
17,931	536,3	539,9	97,94	98,69	0,183	0,178	27	0,2821308
17,610	536,3	539,9	99,41	100,59	0,183	0,178	28	0,2771086
17,607	536,4	540,0	99,63	100,58	0,183	0,178	29	0,277108
17,592	536,5	540,1	99,74	100,97	0,183	0,178	30	0,2767388
17,673	536,6	540,3	99,36	100,09	0,183	0,178	31	0,2780349
17,831	536,6	540,4	98,47	99,32	0,183	0,178	32	0,2805105
17,103	536,6	540,5	102,64	103,40	0,183	0,178	33	0,2690263
17,735	536,6	540,5	99,02	99,97	0,183	0,178	34	0,2789556
17,881	536,6	540,6	98,15	98,83	0,183	0,178	35	0,2812734
18,012	536,6	540,6	97,48	98,21	0,183	0,178	36	0,2833085
17,760	536,6	540,7	98,84	99,63	0,183	0,178	37	0,2793244
17,679	536,7	540,8	99,31	100,14	0,183	0,178	38	0,2780349
18,038	536,8	540,9	97,36	98,17	0,183	0,178	39	0,2836349
17,581	536,8	540,9	100,09	100,62	0,183	0,178	40	0,2763673
17,811	536,8	541,0	98,82	99,42	0,183	0,177	41	0,2798749
16,841	536,8	541,1	104,57	105,25	0,183	0,177	42	0,2645983
17,771	536,8	541,1	98,99	99,78	0,183	0,178	43	0,2791446
17,513	536,8	541,2	100,48	101,31	0,183	0,178	44	0,275073
17,499	536,8	541,2	100,58	101,58	0,183	0,178	45	0,2748824
17,497	536,9	541,3	100,65	100,99	0,183	0,177	46	0,2748759
17,117	537,0	541,4	102,67	103,47	0,183	0,177	47	0,2688878
17,503	537,0	541,4	100,57	101,40	0,183	0,178	48	0,2748788
17,605	537,0	541,5	100,21	100,70	0,183	0,177	49	0,2763674
17,374	537,1	541,5	101,37	102,41	0,183	0,178	50	0,2728157
17,512	537,1	541,6	100,85	101,01	0,183	0,177	51	0,2748783
17,734	537,1	541,6	99,22	100,03	0,183	0,177	52	0,2784041
17,511	537,0	541,6	100,68	101,76	0,183	0,178	53	0,2748778
17,138	537,0	541,6	102,85	103,47	0,183	0,178	54	0,2690259
17,688	537,0	541,6	99,55	100,48	0,183	0,178	55	0,2776242

17,450	537,0	541,7	101,13	102,38	0,183	0,178	56	0,2738191
17,205	537,0	541,6	102,45	103,28	0,183	0,178	57	0,2699782
17,288	537,0	541,7	101,97	102,58	0,183	0,177	58	0,2713079
17,237	537,1	541,7	102,40	102,86	0,183	0,177	59	0,2705483
17,567	537,1	541,8	100,28	100,95	0,183	0,177	60	0,2757368
18,089	537,1	541,8	97,38	97,88	0,183	0,177	61	0,2840621
17,853	537,2	541,8	98,71	99,53	0,183	0,177	62	0,2802441
17,944	537,3	541,9	98,36	98,68	0,183	0,177	63	0,2816635
16,770	537,3	542,0	105,03	105,69	0,183	0,177	64	0,2632413
17,691	537,4	542,0	99,51	100,20	0,183	0,177	65	0,2776665
17,722	537,4	542,1	99,52	100,26	0,183	0,177	66	0,2780359
17,698	537,4	542,1	99,79	100,30	0,183	0,177	67	0,2776657
16,831	537,5	542,2	104,70	105,33	0,183	0,177	68	0,264018
17,425	537,5	542,3	101,14	101,92	0,183	0,177	69	0,2731926
17,422	537,6	542,3	101,20	102,09	0,183	0,177	70	0,2731918
17,359	537,6	542,4	101,61	102,09	0,183	0,177	71	0,2722229
17,754	537,7	542,4	99,27	100,13	0,183	0,177	72	0,2784093
17,510	537,7	542,4	100,84	101,56	0,183	0,177	73	0,2745072
17,719	537,8	542,5	99,53	100,41	0,183	0,177	74	0,2776665
17,822	537,8	542,5	99,09	99,75	0,183	0,177	75	0,2793267
17,717	537,9	542,6	99,53	100,16	0,183	0,177	76	0,2776672
17,795	537,9	542,7	99,13	99,77	0,183	0,177	77	0,2789553
17,878	538,0	542,7	98,78	99,38	0,183	0,177	78	0,2802456
17,798	538,0	542,8	99,09	99,85	0,183	0,177	79	0,2789603
17,833	538,0	542,8	99,04	99,70	0,183	0,177	80	0,2793271
17,689	538,0	542,9	99,80	100,52	0,183	0,177	81	0,2771127
17,730	538,0	542,8	99,68	100,21	0,183	0,177	82	0,2776639
17,841	537,9	542,8	99,22	99,93	0,183	0,177	83	0,2793275
17,735	537,9	542,9	99,79	100,32	0,183	0,177	84	0,2776438
17,426	538,0	542,9	101,45	102,01	0,183	0,177	85	0,2728194
17,919	538,0	543,0	98,55	99,26	0,183	0,177	86	0,2806085
17,790	538,0	542,9	99,47	99,99	0,183	0,177	87	0,2784066
18,085	538,1	543,0	97,86	98,71	0,183	0,177	88	0,2830978
17,602	538,1	543,0	100,32	101,15	0,183	0,177	89	0,2755118
17,424	538,2	543,1	101,59	102,26	0,183	0,177	90	0,2728197
17,907	538,2	543,1	98,68	99,44	0,183	0,177	91	0,2802456
17,532	538,2	543,2	100,72	101,41	0,182	0,177	92	0,2745063
17,741	538,3	543,2	99,57	100,46	0,182	0,177	93	0,2776692
17,827	538,3	543,3	99,52	99,98	0,183	0,177	94	0,278961
17,691	538,3	543,3	100,05	100,82	0,183	0,177	95	0,2767417
17,714	538,4	543,3	100,04	100,55	0,183	0,177	96	0,2770832
17,498	538,4	543,4	100,80	101,46	0,183	0,177	97	0,2741332
17,906	538,4	543,4	98,56	98,88	0,183	0,177	98	0,2806113
17,686	538,4	543,4	99,83	100,36	0,183	0,177	99	0,2771149
17,966	538,4	543,3	98,14	98,92	0,183	0,177	100	0,2815225
17,738	538,4	543,3	99,69	100,28	0,183	0,177	101	0,2776682
17,959	538,4	543,4	98,59	98,96	0,183	0,177	102	0,2811618
17,852	538,4	543,4	99,28	99,79	0,183	0,177	103	0,2793287
17,481	538,4	543,4	101,18	101,98	0,183	0,177	104	0,2735711
17,848	538,3	543,4	99,33	99,75	0,183	0,177	105	0,2793285
18,084	538,4	543,4	98,13	98,44	0,183	0,177	106	0,282799
17,884	538,4	543,5	98,90	99,70	0,183	0,177	107	0,2798794
17,746	538,5	543,5	99,70	100,34	0,183	0,177	108	0,2776701
17,722	538,6	543,6	99,98	100,71	0,183	0,177	109	0,2771155
17,668	538,7	543,7	100,03	100,50	0,182	0,177	110	0,2763721
17,073	538,8	543,7	103,65	104,15	0,182	0,176	111	0,2669218
17,555	538,8	543,8	100,90	101,45	0,182	0,177	112	0,2745344
17,296	538,8	543,8	102,25	102,87	0,182	0,177	113	0,2705511
17,536	538,9	543,9	101,03	101,53	0,182	0,177	114	0,2741337
17,659	538,9	543,9	100,08	101,00	0,182	0,177	115	0,2763726
17,878	538,9	543,9	98,80	99,46	0,182	0,177	116	0,2798802

17,858	539,0	544,0	98,61	99,36	0,182	0,177	117	0,2798795
17,947	539,0	544,0	98,12	98,76	0,182	0,177	118	0,2811609
17,672	539,0	544,0	99,79	100,48	0,182	0,177	119	0,2767435
17,701	539,0	544,0	99,99	100,34	0,182	0,177	120	0,2771066
17,975	538,9	544,0	98,20	98,83	0,183	0,177	121	0,2815271
17,829	539,0	544,0	98,77	99,32	0,182	0,177	122	0,2793292
17,964	539,0	544,1	98,25	98,87	0,182	0,177	123	0,2813189
18,044	539,1	544,1	97,93	98,18	0,182	0,176	124	0,2824827
17,959	539,2	544,2	98,36	98,88	0,182	0,176	125	0,2811631
17,859	539,1	544,2	98,53	99,25	0,182	0,177	126	0,2798817
17,509	539,1	544,1	100,54	101,15	0,182	0,177	127	0,2745089
17,704	539,1	544,2	99,47	100,19	0,182	0,177	128	0,2776499
17,853	539,1	544,2	98,69	99,17	0,182	0,177	129	0,2798811
17,159	539,1	544,2	102,69	103,33	0,182	0,177	130	0,2690274
17,229	539,0	544,2	102,14	103,07	0,182	0,177	131	0,2699826
17,754	539,0	544,1	99,14	99,71	0,182	0,177	132	0,2783894
17,580	539,0	544,1	100,33	100,98	0,182	0,177	133	0,2754434
16,995	539,1	544,2	103,89	104,13	0,183	0,177	134	0,266346
17,466	539,2	544,2	101,08	101,33	0,183	0,176	135	0,2736751
17,747	539,2	544,2	99,44	99,94	0,183	0,176	136	0,2780413
18,040	539,1	544,2	97,54	98,20	0,182	0,177	137	0,2828018
17,762	539,1	544,3	99,30	99,75	0,182	0,177	138	0,2784097
18,025	539,2	544,3	97,52	98,15	0,182	0,177	139	0,2828026
17,729	539,2	544,3	99,16	99,70	0,182	0,177	140	0,2782738
17,639	539,1	544,3	99,67	100,24	0,182	0,177	141	0,2767441
17,809	539,2	544,4	99,05	99,32	0,183	0,177	142	0,2793314
17,992	539,1	544,3	97,83	98,30	0,183	0,177	143	0,2822258
17,782	539,2	544,3	98,96	99,69	0,182	0,177	144	0,2789627
17,736	539,1	544,3	99,07	99,62	0,182	0,177	145	0,2784084
17,900	539,2	544,4	98,52	98,88	0,183	0,177	146	0,2806156
17,666	539,3	544,4	99,79	100,39	0,183	0,177	147	0,2768661
17,717	539,3	544,4	99,36	99,99	0,182	0,177	148	0,2776716
17,941	539,3	544,4	98,18	98,85	0,182	0,177	149	0,2811649
17,962	539,3	544,4	98,24	98,65	0,182	0,177	150	0,2815305
17,682	539,3	544,4	99,68	100,35	0,183	0,177	151	0,277117
17,716	539,4	544,5	99,57	100,02	0,182	0,177	152	0,2776326
17,800	539,5	544,5	99,07	99,73	0,183	0,177	153	0,2789662
18,132	539,5	544,5	97,23	97,90	0,182	0,177	154	0,2840731
17,895	539,5	544,6	98,57	99,24	0,182	0,177	155	0,2804191
17,464	539,6	544,6	101,00	101,54	0,183	0,177	156	0,273689
17,883	539,6	544,7	98,61	99,31	0,183	0,177	157	0,2802515
18,027	539,6	544,7	97,91	98,32	0,183	0,177	158	0,2824418
17,576	539,6	544,7	100,28	101,10	0,182	0,177	159	0,2753957
17,943	539,7	544,7	98,07	98,82	0,182	0,177	160	0,2811667
18,220	539,8	544,8	96,70	97,04	0,182	0,176	161	0,2855162
17,885	539,8	544,8	98,32	99,03	0,182	0,176	162	0,2802535
17,823	539,8	544,8	98,77	99,26	0,182	0,176	163	0,2793388
17,881	539,8	544,9	98,49	99,24	0,182	0,177	164	0,2802465
17,457	539,8	544,9	100,98	101,41	0,182	0,177	165	0,2735784
17,653	539,9	544,9	99,79	100,37	0,182	0,176	166	0,2766045
17,264	539,9	544,9	101,93	102,54	0,182	0,176	167	0,2705577
17,721	539,9	544,9	99,28	100,26	0,182	0,177	168	0,2776787
18,217	539,9	545,0	96,61	97,37	0,182	0,177	169	0,2854949
17,853	539,9	545,0	98,70	99,06	0,182	0,177	170	0,2798378
17,540	539,9	545,0	100,43	100,97	0,182	0,176	171	0,2749222
17,717	539,9	545,0	99,39	100,04	0,182	0,177	172	0,2776768
18,099	540,0	545,0	97,18	97,92	0,182	0,177	173	0,2837152
17,932	540,0	545,0	98,21	98,84	0,182	0,177	174	0,2810985
17,681	540,0	545,0	99,49	100,29	0,182	0,177	175	0,2771389
17,535	539,9	545,0	100,46	101,12	0,182	0,177	176	0,2748893
17,854	540,0	545,1	98,49	99,27	0,182	0,177	177	0,2798883

17,804	540,0	545,1	98,76	99,59	0,182	0,177	178	0,2790313
17,824	540,1	545,1	99,36	99,69	0,183	0,177	179	0,2793363
18,237	540,1	545,1	96,45	97,24	0,183	0,177	180	0,28588
17,935	540,1	545,2	98,10	98,68	0,182	0,177	181	0,2811525
17,819	540,1	545,1	98,80	99,40	0,182	0,177	182	0,2793396
17,794	540,0	545,1	98,77	99,49	0,182	0,177	183	0,2789698
17,832	540,0	545,1	98,86	99,27	0,182	0,177	184	0,2795685
17,762	540,1	545,2	99,01	99,64	0,182	0,177	185	0,2784433
17,680	540,1	545,2	99,49	100,38	0,182	0,177	186	0,2771217
17,736	540,2	545,2	99,10	99,78	0,182	0,177	187	0,2780485
17,885	540,1	545,2	98,32	99,21	0,182	0,177	188	0,2803707
17,159	540,1	545,2	102,50	103,11	0,182	0,177	189	0,2690324
17,709	540,1	545,2	99,23	99,99	0,182	0,177	190	0,2776802
17,533	540,1	545,2	100,30	100,91	0,182	0,177	191	0,2748912
17,820	540,1	545,3	98,70	99,06	0,182	0,176	192	0,2793364
17,761	540,1	545,3	99,03	99,38	0,182	0,176	193	0,2784138
17,676	540,2	545,3	99,36	100,17	0,182	0,176	194	0,277125
17,752	540,2	545,3	99,06	99,47	0,182	0,176	195	0,2783448
18,148	540,2	545,3	96,83	97,36	0,182	0,176	196	0,284615
17,875	540,1	545,3	98,47	98,87	0,182	0,176	197	0,280258
17,625	540,1	545,2	99,68	100,49	0,182	0,177	198	0,2763817
17,792	540,1	545,3	98,85	99,55	0,182	0,177	199	0,2789708
17,957	540,1	545,3	98,08	98,36	0,182	0,176	200	0,2815435
17,631	540,2	545,3	99,90	100,43	0,182	0,176	201	0,2763817
17,815	540,2	545,3	98,74	99,39	0,182	0,177	202	0,2793392
18,021	540,2	545,3	97,71	98,08	0,182	0,177	203	0,2826098
17,709	540,1	545,3	99,32	99,96	0,182	0,177	204	0,2776798
17,852	540,1	545,3	98,42	99,07	0,182	0,177	205	0,2798901
17,954	540,1	545,3	97,92	98,19	0,182	0,176	206	0,281537
17,808	540,1	545,3	98,71	99,01	0,182	0,176	207	0,2792262
17,813	540,1	545,3	98,65	99,28	0,182	0,176	208	0,2793391
17,808	540,2	545,4	98,82	99,22	0,182	0,176	209	0,2792205
17,569	540,2	545,4	100,20	100,65	0,182	0,176	210	0,2754515
17,811	540,2	545,4	98,61	99,45	0,182	0,177	211	0,2793269
18,071	540,2	545,4	97,21	97,95	0,182	0,177	212	0,2833554
17,626	540,2	545,4	99,74	100,34	0,182	0,177	213	0,2763824
18,117	540,2	545,4	96,81	97,78	0,182	0,177	214	0,2840823
17,756	540,1	545,3	99,00	99,52	0,182	0,177	215	0,2784189
17,757	540,1	545,3	99,14	99,57	0,182	0,176	216	0,278418
17,983	540,1	545,3	97,87	98,36	0,182	0,176	217	0,2819899
17,541	540,1	545,4	100,17	100,68	0,182	0,176	218	0,2750653
17,873	540,1	545,4	98,34	98,93	0,182	0,176	219	0,2802561
17,672	540,2	545,4	99,39	100,23	0,182	0,177	220	0,2771248
17,082	540,2	545,4	102,85	103,39	0,182	0,177	221	0,2678952
17,504	540,2	545,4	100,33	100,93	0,182	0,176	222	0,2745143
18,114	540,1	545,4	97,01	97,46	0,182	0,176	223	0,2840803
17,898	540,1	545,4	98,11	98,62	0,182	0,176	224	0,280718
17,815	540,1	545,4	98,73	99,31	0,182	0,176	225	0,2794162
17,892	540,1	545,3	98,16	98,86	0,182	0,177	226	0,2806232
17,928	540,1	545,3	98,07	98,48	0,182	0,176	227	0,2811724
17,893	540,1	545,4	98,16	98,75	0,182	0,176	228	0,2806228
17,870	540,2	545,4	98,37	98,90	0,182	0,176	229	0,2801939
17,850	540,2	545,5	98,44	99,00	0,182	0,176	230	0,2798906
17,729	540,2	545,4	99,09	99,55	0,182	0,176	231	0,2780497
17,836	540,1	545,4	98,56	98,83	0,182	0,176	232	0,2797365
17,809	540,1	545,4	98,72	99,14	0,182	0,176	233	0,2793402
18,068	540,1	545,5	97,26	97,90	0,182	0,176	234	0,2833558
17,954	540,1	545,5	97,96	98,66	0,182	0,177	235	0,2815447
17,810	540,1	545,4	98,71	99,16	0,182	0,177	236	0,2793386
17,726	540,1	545,4	99,22	99,71	0,182	0,176	237	0,2780528
17,105	540,1	545,4	102,74	103,39	0,182	0,177	238	0,2682735

18,076	540,1	545,4	97,21	97,81	0,182	0,177	239	0,2834858
17,926	540,1	545,5	98,13	98,71	0,182	0,177	240	0,2811718
18,089	540,1	545,5	97,15	97,66	0,182	0,177	241	0,2837179
17,680	540,1	545,5	99,32	100,10	0,182	0,177	242	0,2772743
17,872	540,2	545,5	98,55	98,77	0,182	0,176	243	0,2802602
17,848	540,2	545,5	98,59	99,23	0,182	0,176	244	0,2798898
18,089	540,2	545,5	97,07	97,39	0,182	0,176	245	0,2837171
17,488	540,2	545,5	100,53	100,86	0,182	0,176	246	0,2742914
17,842	540,2	545,5	98,44	98,76	0,182	0,176	247	0,2798854
17,807	540,2	545,5	98,67	99,25	0,182	0,176	248	0,2793397
17,843	540,2	545,5	98,41	99,18	0,182	0,177	249	0,2798894
17,828	540,2	545,5	98,76	99,06	0,182	0,177	250	0,279627
17,701	540,1	545,5	99,20	99,72	0,182	0,176	251	0,2776904
17,841	540,1	545,5	98,37	99,17	0,182	0,177	252	0,2798898
18,013	540,1	545,5	97,50	98,15	0,182	0,177	253	0,2825705
18,106	540,1	545,5	97,11	97,60	0,182	0,177	254	0,2840327
17,865	540,1	545,5	98,39	98,79	0,182	0,176	255	0,2802561
18,206	540,1	545,5	96,44	96,96	0,182	0,176	256	0,2856093
18,087	540,1	545,5	97,09	97,55	0,182	0,176	257	0,2837172
18,061	540,1	545,5	97,27	97,87	0,182	0,176	258	0,2833544
17,748	540,1	545,5	99,06	99,69	0,182	0,177	259	0,2784172
17,595	540,1	545,5	99,91	100,55	0,182	0,177	260	0,2760125
17,148	540,1	545,5	102,47	102,99	0,182	0,177	261	0,2690314
17,865	540,2	545,5	98,46	99,08	0,182	0,177	262	0,2802566
18,221	540,1	545,5	96,22	96,84	0,182	0,177	263	0,285881
17,340	540,1	545,5	101,30	101,65	0,182	0,176	264	0,2720319
17,887	540,2	545,5	98,22	98,81	0,182	0,176	265	0,2806212
18,223	540,2	545,5	96,37	97,01	0,182	0,177	266	0,2858809
17,897	540,1	545,5	98,22	98,86	0,182	0,177	267	0,2807775
17,745	540,1	545,5	98,91	99,39	0,182	0,176	268	0,2784177
18,061	540,1	545,5	97,26	97,72	0,182	0,176	269	0,2833545
18,108	540,1	545,5	97,03	97,49	0,182	0,176	270	0,284079
18,005	540,1	545,5	97,54	98,24	0,182	0,177	271	0,282483
17,805	540,1	545,5	98,59	99,11	0,182	0,176	272	0,2793388
17,064	540,1	545,5	102,89	103,53	0,182	0,176	273	0,2676985
17,803	540,1	545,5	98,53	99,04	0,182	0,176	274	0,2793268
18,165	540,1	545,5	96,67	97,24	0,182	0,176	275	0,2849814
17,805	540,1	545,6	98,49	99,20	0,182	0,176	276	0,2793388
17,246	540,1	545,6	101,80	102,25	0,182	0,176	277	0,2705597
17,919	540,2	545,6	98,03	98,53	0,182	0,176	278	0,2811237
17,923	540,1	545,5	98,04	98,28	0,182	0,176	279	0,2811709
17,946	540,2	545,5	98,15	98,39	0,182	0,176	280	0,2815362
17,818	540,1	545,5	98,56	99,11	0,182	0,176	281	0,2795267
18,026	540,2	545,6	97,47	98,14	0,182	0,177	282	0,2828106
17,616	540,2	545,5	99,70	100,24	0,182	0,177	283	0,2763817
18,113	540,1	545,5	97,04	97,39	0,182	0,176	284	0,2841513
17,748	540,1	545,5	99,09	99,55	0,182	0,176	285	0,2784171
17,922	540,1	545,5	98,12	98,67	0,182	0,177	286	0,2811707
18,141	540,2	545,5	96,81	97,34	0,182	0,177	287	0,2846213
17,439	540,2	545,6	100,61	101,61	0,182	0,177	288	0,2735798
17,946	540,2	545,5	97,88	98,48	0,182	0,177	289	0,2815352
17,126	540,2	545,5	102,69	103,45	0,182	0,177	290	0,2686568
18,002	540,2	545,5	97,59	98,05	0,182	0,177	291	0,2824467
17,804	540,1	545,5	98,75	99,24	0,182	0,176	292	0,2793365
17,723	540,1	545,5	99,02	99,59	0,182	0,176	293	0,2780383
17,654	540,2	545,5	99,45	99,97	0,182	0,176	294	0,2769749
17,935	540,2	545,5	97,95	98,45	0,182	0,176	295	0,2814222
17,436	540,1	545,5	100,74	101,34	0,182	0,176	296	0,27358
17,473	540,2	545,5	100,51	100,94	0,182	0,176	297	0,2741375
17,779	540,2	545,5	98,70	99,46	0,182	0,176	298	0,2789607
17,496	540,1	545,5	100,28	100,86	0,182	0,176	299	0,2745095

18,140	540,2	545,5	96,66	97,28	0,182	0,176	300	0,2846208
17,639	540,2	545,5	99,37	100,01	0,182	0,176	301	0,2767522
17,919	540,2	545,5	97,90	98,70	0,182	0,176	302	0,2811707
17,719	540,2	545,5	99,11	99,75	0,182	0,177	303	0,2780184
17,779	540,2	545,5	98,88	99,25	0,182	0,176	304	0,2789686
17,801	540,1	545,5	98,80	99,40	0,182	0,177	305	0,2793383
18,074	540,2	545,5	97,17	97,65	0,182	0,177	306	0,2835961
18,002	540,2	545,5	97,67	97,99	0,182	0,176	307	0,2824466
17,942	540,1	545,5	97,93	98,52	0,182	0,176	308	0,2815385
17,787	540,2	545,5	98,78	99,43	0,182	0,177	309	0,27911
17,554	540,1	545,4	100,15	100,52	0,182	0,177	310	0,2754497
17,800	540,1	545,4	98,66	99,17	0,182	0,176	311	0,2793386
17,636	540,2	545,5	99,56	100,07	0,182	0,176	312	0,2767529
17,778	540,2	545,4	98,81	99,39	0,182	0,176	313	0,278979
17,983	540,2	545,5	97,75	98,27	0,182	0,177	314	0,2821771
17,411	540,2	545,4	100,98	101,33	0,182	0,176	315	0,2732014
17,350	540,2	545,5	101,31	101,80	0,182	0,176	316	0,2722624
17,777	540,1	545,4	98,88	99,51	0,182	0,177	317	0,2789693
17,325	540,1	545,4	101,41	101,92	0,182	0,177	318	0,2718886
17,655	540,1	545,4	99,31	99,97	0,182	0,176	319	0,2771225
17,853	540,1	545,4	98,37	98,89	0,182	0,176	320	0,2802035
17,916	540,1	545,4	97,90	98,50	0,182	0,176	321	0,2811789
17,858	540,1	545,4	98,32	98,94	0,182	0,177	322	0,2802577
17,714	540,1	545,4	99,06	99,65	0,182	0,177	323	0,2780479
17,466	540,1	545,4	100,58	101,07	0,182	0,177	324	0,2741497
18,075	540,1	545,4	96,95	97,67	0,182	0,177	325	0,2837159
17,937	540,1	545,4	97,81	98,44	0,182	0,177	326	0,2815353
17,440	540,1	545,4	100,60	101,20	0,182	0,176	327	0,2737277
17,375	540,1	545,4	101,20	101,58	0,182	0,176	328	0,2727445
17,488	540,1	545,4	100,44	100,89	0,182	0,176	329	0,2745166
17,714	540,1	545,4	99,05	99,64	0,182	0,176	330	0,2780478
17,488	540,1	545,4	100,46	101,05	0,182	0,177	331	0,2745071
16,943	540,1	545,4	103,53	104,37	0,182	0,177	332	0,2659637
18,072	540,1	545,4	97,05	97,47	0,182	0,177	333	0,2837157
17,828	540,1	545,4	98,48	98,86	0,182	0,176	334	0,2798893
17,790	540,1	545,4	98,70	99,10	0,182	0,176	335	0,2793144
17,709	540,1	545,4	99,16	99,82	0,182	0,177	336	0,2780504
17,929	540,1	545,4	97,82	98,53	0,182	0,177	337	0,2815359
17,804	540,1	545,4	98,51	98,93	0,182	0,177	338	0,2795683
17,731	540,1	545,4	98,90	99,51	0,182	0,176	339	0,2784087
17,848	540,1	545,4	98,19	98,84	0,182	0,177	340	0,2802557
17,788	540,1	545,4	98,52	99,17	0,182	0,177	341	0,2793379

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	99,64	100,68	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
16,559	535,0	536,0			0,184	0,179	0	0,2555186
17,409	535,1	536,2	97,02	98,77	0,183	0,179	1	0,2713105
17,171	535,1	536,3	98,43	100,05	0,183	0,179	2	0,2676853
17,407	535,0	536,4	97,20	98,66	0,184	0,179	3	0,2713042
16,446	535,0	536,5	102,92	104,72	0,184	0,179	4	0,2563129
16,652	535,0	536,6	101,87	103,52	0,184	0,179	5	0,2593121
16,938	534,9	536,6	100,46	101,62	0,184	0,179	6	0,2636226
17,560	534,9	536,7	96,79	98,06	0,184	0,179	7	0,2731891
17,355	534,9	536,9	97,87	99,68	0,184	0,179	8	0,2699769
16,437	535,0	537,0	103,74	104,78	0,184	0,179	9	0,2555189
16,796	534,9	537,1	101,68	103,10	0,184	0,179	10	0,2608829
16,766	534,9	537,2	101,93	103,26	0,184	0,179	11	0,2602865
17,274	534,8	537,3	98,69	100,14	0,184	0,179	12	0,268263
17,419	534,9	537,4	97,94	99,44	0,184	0,179	13	0,2705456
17,041	534,9	537,5	100,31	101,51	0,184	0,179	14	0,2645986
17,211	534,8	537,6	99,28	100,46	0,184	0,179	15	0,2672997
17,480	534,7	537,6	97,84	98,98	0,184	0,179	16	0,271306
16,593	534,7	537,6	103,09	104,50	0,184	0,179	17	0,2575208
17,523	534,6	537,7	97,69	99,17	0,184	0,179	18	0,2718709
17,492	534,6	537,7	97,95	99,33	0,184	0,179	19	0,2713044
17,087	534,6	537,7	100,25	101,53	0,184	0,179	20	0,2649922
17,353	534,6	537,8	98,79	99,89	0,184	0,179	21	0,2690238
17,425	534,6	537,9	98,49	99,70	0,184	0,179	22	0,2699759
17,340	534,6	538,0	98,92	100,44	0,184	0,179	23	0,2686239
16,989	534,6	538,0	101,08	102,08	0,184	0,179	24	0,2632376
16,912	534,7	538,1	101,45	102,52	0,184	0,179	25	0,2621083
17,432	534,7	538,2	98,46	99,57	0,184	0,179	26	0,2701486
17,363	534,7	538,3	98,81	99,87	0,184	0,179	27	0,2690254
17,128	534,7	538,3	100,22	101,37	0,184	0,179	28	0,2653751
17,313	534,7	538,4	99,17	100,34	0,184	0,179	29	0,2682593
17,221	534,7	538,5	99,55	100,63	0,184	0,179	30	0,2668847
17,339	534,8	538,5	99,06	100,30	0,184	0,179	31	0,2686398
17,423	534,7	538,6	98,60	99,66	0,184	0,179	32	0,2699766
17,315	534,7	538,6	99,01	100,34	0,184	0,179	33	0,2683298
17,511	534,7	538,6	98,11	99,01	0,184	0,179	34	0,2713043
17,077	534,7	538,6	100,48	101,79	0,184	0,179	35	0,2645991
16,378	534,7	538,7	104,97	106,16	0,184	0,179	36	0,253706
16,891	534,7	538,8	101,71	102,66	0,184	0,179	37	0,2617278
17,135	534,6	538,7	100,40	101,35	0,184	0,179	38	0,2653739
17,357	534,6	538,7	98,84	99,97	0,184	0,179	39	0,2690241
17,071	534,7	538,8	100,62	101,54	0,184	0,179	40	0,2645992
17,241	534,8	538,9	99,38	100,35	0,184	0,179	41	0,2673006
17,076	534,9	539,0	100,43	101,62	0,184	0,179	42	0,2645995
16,706	535,0	539,1	102,78	104,02	0,184	0,179	43	0,2589119
16,820	535,0	539,2	101,87	103,04	0,184	0,179	44	0,2608319
16,980	535,1	539,3	101,02	102,18	0,184	0,179	45	0,2632372
16,061	535,2	539,4	106,91	108,13	0,184	0,179	46	0,2488045
16,928	535,2	539,4	101,22	102,53	0,184	0,179	47	0,2622609
16,880	535,3	539,5	101,54	102,52	0,184	0,179	48	0,2616749
17,030	535,3	539,5	100,42	101,66	0,184	0,178	49	0,2640165
16,856	535,4	539,6	101,77	102,91	0,184	0,179	50	0,2611752
16,246	535,4	539,6	105,67	106,76	0,184	0,179	51	0,251679
17,217	535,5	539,7	99,47	100,16	0,184	0,178	52	0,2669163
17,210	535,5	539,7	99,47	100,23	0,184	0,178	53	0,2669175
17,294	535,4	539,8	99,05	99,94	0,184	0,178	54	0,2682208
17,212	535,4	539,8	99,53	100,30	0,184	0,178	55	0,2669194

16,794	535,3	539,7	101,85	102,66	0,184	0,178	56	0,260471
16,984	535,3	539,8	100,65	102,13	0,184	0,179	57	0,2634981
16,485	535,3	539,8	103,80	105,11	0,184	0,179	58	0,2555197
16,331	535,4	539,9	104,87	105,94	0,184	0,179	59	0,2533011
16,421	535,5	540,0	104,02	105,37	0,184	0,179	60	0,2547144
17,313	535,6	540,1	98,62	99,63	0,184	0,178	61	0,2686429
17,052	535,7	540,1	100,15	101,31	0,184	0,178	62	0,2646049
17,045	535,8	540,2	100,06	101,23	0,184	0,178	63	0,2646006
16,891	535,9	540,3	100,99	102,08	0,184	0,178	64	0,2622605
17,038	536,0	540,4	100,09	100,97	0,184	0,178	65	0,2646007
16,884	536,0	540,5	101,00	101,85	0,184	0,178	66	0,2622618
17,223	536,1	540,5	98,69	99,80	0,184	0,178	67	0,2676609
17,224	536,1	540,6	98,86	99,85	0,184	0,178	68	0,2676845
17,135	536,1	540,7	99,28	100,21	0,184	0,178	69	0,2663414
17,022	536,2	540,8	99,98	100,96	0,184	0,178	70	0,2646006
17,185	536,2	540,8	99,05	99,70	0,184	0,178	71	0,2672546
17,035	536,2	540,9	99,99	100,67	0,184	0,178	72	0,2649881
17,030	536,2	540,9	99,69	100,78	0,184	0,178	73	0,2649869
16,372	536,2	540,9	103,73	104,74	0,184	0,178	74	0,2547182
16,938	536,2	541,0	100,15	101,19	0,184	0,178	75	0,2636259
17,118	536,2	541,1	99,25	100,32	0,184	0,178	76	0,2663406
17,233	536,2	541,1	98,48	99,44	0,184	0,178	77	0,2682624
16,816	536,3	541,1	101,10	101,88	0,184	0,178	78	0,261822
16,807	536,3	541,1	100,98	101,79	0,184	0,178	79	0,2616752
17,228	536,3	541,1	98,43	99,55	0,184	0,178	80	0,2682623
17,041	536,3	541,2	99,44	100,39	0,184	0,178	81	0,2653759
17,010	536,4	541,2	99,57	100,43	0,184	0,178	82	0,264992
17,321	536,4	541,3	97,45	98,76	0,183	0,178	83	0,2699781
16,935	536,4	541,4	100,06	100,93	0,184	0,178	84	0,2638666
16,553	536,3	541,3	102,09	103,42	0,184	0,178	85	0,2579223
17,215	536,3	541,3	98,32	99,12	0,183	0,178	86	0,2682634
17,317	536,3	541,4	97,80	98,59	0,184	0,178	87	0,2699789
17,042	536,3	541,4	99,12	100,17	0,184	0,178	88	0,2657475
16,334	536,3	541,4	103,64	104,34	0,184	0,178	89	0,2547179
16,932	536,3	541,4	99,79	100,75	0,184	0,178	90	0,2640182
17,126	536,3	541,4	98,54	99,63	0,183	0,178	91	0,2671146
17,121	536,3	541,3	98,56	99,42	0,183	0,178	92	0,2670504
17,455	536,3	541,2	96,69	97,58	0,183	0,178	93	0,2722524
17,201	536,2	541,2	98,23	98,92	0,184	0,178	94	0,2682631
16,180	536,2	541,2	104,60	105,93	0,184	0,178	95	0,2522879
16,729	536,2	541,1	101,19	102,19	0,184	0,179	96	0,2608896
17,456	536,2	541,1	96,81	97,59	0,184	0,178	97	0,2722526
17,295	536,2	541,1	97,89	98,45	0,184	0,178	98	0,2697707
17,389	536,2	541,2	97,07	97,97	0,184	0,178	99	0,2712949
16,916	536,3	541,3	99,75	100,87	0,184	0,178	100	0,2640184
17,042	536,4	541,4	99,00	99,86	0,184	0,178	101	0,2659573
17,216	536,5	541,5	98,11	98,93	0,184	0,178	102	0,2686643
17,240	536,6	541,6	97,84	98,67	0,184	0,178	103	0,2690288
16,956	536,8	541,8	99,67	100,30	0,184	0,178	104	0,2646032
17,059	536,9	541,9	98,94	99,79	0,184	0,178	105	0,2662209
16,889	536,9	541,9	99,98	100,77	0,184	0,178	106	0,2635389
17,044	536,9	541,9	98,94	99,73	0,184	0,178	107	0,2659582
17,108	536,9	542,0	98,62	99,75	0,183	0,178	108	0,2669222
17,214	537,0	542,1	97,79	99,05	0,183	0,178	109	0,2686466
17,302	537,0	542,1	97,52	98,27	0,183	0,178	110	0,2699879
17,047	537,0	542,0	99,14	99,99	0,184	0,178	111	0,2659585
17,160	537,0	542,0	98,16	99,26	0,183	0,178	112	0,2676898
17,046	537,1	542,0	98,92	99,80	0,183	0,178	113	0,2659509
17,423	537,1	542,0	96,85	97,54	0,183	0,178	114	0,2718769
16,962	537,1	542,0	99,42	100,44	0,183	0,178	115	0,2646035
16,808	537,1	542,0	100,41	101,29	0,183	0,178	116	0,2622694

17,008	537,1	542,0	99,12	99,91	0,183	0,178	117	0,2653791
17,301	537,0	542,0	97,68	98,47	0,184	0,178	118	0,2699838
17,130	537,0	542,0	98,48	99,31	0,184	0,178	119	0,2673542
17,447	537,0	542,0	96,65	97,57	0,184	0,178	120	0,2722553
16,982	537,1	542,0	99,21	100,37	0,183	0,178	121	0,264992
17,067	537,1	541,9	98,85	99,67	0,183	0,178	122	0,2663448
17,124	537,0	541,9	98,48	99,52	0,184	0,178	123	0,2672507
17,063	537,0	541,8	98,76	99,79	0,183	0,178	124	0,2663466
16,741	536,9	541,7	100,78	101,73	0,184	0,178	125	0,2612844
17,369	537,0	541,8	97,18	97,92	0,184	0,178	126	0,2710829
17,103	537,0	541,7	98,53	99,26	0,184	0,178	127	0,2669236
17,002	536,9	541,7	99,10	99,97	0,183	0,178	128	0,2653785
16,948	536,9	541,6	99,41	100,34	0,183	0,178	129	0,2646043
17,328	536,9	541,6	97,43	98,27	0,184	0,178	130	0,2705142
17,293	536,9	541,5	97,49	98,52	0,184	0,178	131	0,2699807
17,206	536,8	541,5	97,91	98,89	0,184	0,178	132	0,2686473
17,146	536,9	541,5	98,39	99,39	0,184	0,178	133	0,2676892
17,123	536,9	541,4	98,63	99,24	0,184	0,178	134	0,2673337
17,473	536,8	541,4	96,52	97,46	0,184	0,178	135	0,272819
16,713	536,8	541,4	100,88	102,17	0,184	0,178	136	0,2608902
17,111	536,8	541,4	98,53	99,71	0,184	0,178	137	0,2670444
17,234	536,8	541,4	98,06	98,83	0,184	0,178	138	0,2690279
16,998	536,8	541,4	99,15	100,35	0,184	0,178	139	0,2653774
16,954	536,8	541,3	99,50	100,31	0,184	0,178	140	0,2646996
17,181	536,7	541,3	98,09	98,92	0,184	0,178	141	0,2682796
16,433	536,7	541,3	102,59	103,56	0,184	0,178	142	0,2565244
17,139	536,7	541,2	98,24	99,12	0,184	0,178	143	0,2676881
16,767	536,7	541,2	100,61	101,46	0,184	0,178	144	0,2619104
17,368	536,7	541,2	97,05	98,18	0,184	0,178	145	0,2712949
16,735	536,7	541,2	100,63	101,97	0,184	0,178	146	0,2612806
17,121	536,7	541,2	98,49	99,55	0,184	0,178	147	0,2673051
17,120	536,7	541,3	98,57	99,55	0,184	0,178	148	0,2673029
16,970	536,7	541,2	99,31	100,24	0,184	0,178	149	0,2649913
17,377	536,7	541,2	97,11	98,26	0,184	0,178	150	0,2713083

APPENDIX 3: Calibration data

Instrumentation
Saint•Laurent Inc.
Certified ISO 17025

CLAS
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CLAS 2010-02

SCC Accredited Lab
Accredité SCC
N°669

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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-006 2022-05-10

CLIENT	
Company:	Services Polytests Inc
Address:	695 B rue Gaudette
	St-Jean-sur-Richelieu, Québec, J3B 7S7

CALIBRATION SPECIFICATION	
Service Procedure:	4IN9106
Required Accuracy:	+\-0.25"H2O
Calibration Frequency:(days)	365

INSTRUMENT SPECIFICATION			
Instrument Type:	Indicator	Input Type:	Pression
Manufacturer:	Dwyer	Output Type:	Digitale
Model #:	MS-321-LCD	Measurement Type:	Pressure
Serial #:	E47U020014	Range:	0-0.5"H2O
Location:	N.A.	Version:	

CALIBRATORS SPECIFICATION			
Calibrator:	Fluke Pression	Certification #:	2021008414
Serial #:	3330050	Certification Date:	2021-11-22
Certified by:	Alpha Controls	Next Certification:	2022-11-22
Comments:			
Calibrator:	Fluke 744	Certification #:	2022001379
Serial #:	8223003	Certification Date:	2022-02-18
Certified by:	Alpha Controls	Next Certification:	2022-05-18
Comments:			

Instrumentation Saint-Laurent inc.
Certified ISO 17025

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CLAS 2010-02

SCC Accredited LAB #669

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-006 2022-05-10

CALIBRATION RESULTS

Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Accuracy	Uncertainty
Conformity	Comment					
0.0000 "H2O	0.000 "H2O	-0.012 "H2O	-0.012 "H2O	-0.012 "H2O	+\-0.25 "H2O	0.10 "H2O
Compliant	Verification of the indicator					
0.2500 "H2O	0.250 "H2O	0.237 "H2O	-0.013 "H2O	0.237 "H2O	+\-0.25 "H2O	0.10 "H2O
Compliant	Verification of the indicator					
0.5000 "H2O	0.500 "H2O	0.488 "H2O	-0.012 "H2O	0.488 "H2O	+\-0.25 "H2O	0.10 "H2O
Compliant	Verification of the indicator					
0.7500 "H2O	0.750 "H2O	0.742 "H2O	-0.008 "H2O	0.742 "H2O	+\-0.25 "H2O	0.10 "H2O
Compliant	Verification of the indicator					
1.0000 "H2O	1.000 "H2O	0.989 "H2O	-0.011 "H2O	0.989 "H2O	+\-0.25 "H2O	0.10 "H2O
Compliant	Verification of the indicator					
0.0000 "H2O	0.0000 V.DC.	0.0004 V.DC.	+0.0004 V.DC.	0.0004 V.DC.	+\-0.25 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
0.2500 "H2O	2.5000 V.DC.	2.3569 V.DC.	-0.1431 V.DC.	2.3569 V.DC.	+\-0.25 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
0.5000 "H2O	5.0000 V.DC.	4.9466 V.DC.	-0.0534 V.DC.	4.9466 V.DC.	+\-0.25 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
0.7500 "H2O	7.5000 V.DC.	7.4342 V.DC.	-0.0658 V.DC.	7.4342 V.DC.	+\-0.25 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
1.0000 "H2O	10.0000 V.DC.	9.8526 V.DC.	-0.1474 V.DC.	9.8526 V.DC.	+\-0.25 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					

Environmental Conditions: Temperature: N.A Humidity: N.A.

Comments:

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2022-05-10
Next Calibration:	2023-05-10
Certificate Date:	2022-05-10

CALIBRATION CONFORMITY		
	Before	**After**
Compliant:	X	X
Non Compliant:		

- Instrumentation St. Laurent Inc. Certify that the above instrument, meets or exceeds the specifications established by the manufacturer. The company's quality system complies with the requirements of ISO 17025 :2017 and the standards used to perform the calibration is traceable to NRC and / or NIST.
- Reported uncertainties represent a 95 % of confidence level assuming a normal distribution k=2.
- The declaration of conformity does not include Instrumentation St-Laurent Inc. uncertainty measurement. Decision rule is based on binary statement for simple acceptance rule against ILAC G8 standard and test tolerance limits are based on customer specifications, unless otherwise specified.
- The results presented in this certificate relate only to objects subject to calibration.
- It is the customer's responsibility to ensure that calibrated equipment meets its intended use.
- The date format used in this certificate is: YYYY-MM-DD.

Assessment Service Calibration Laboratory (ASCL) of the National Research Council of Canada (NRC) has assessed and certified calibration laboratory's ability and traceability to the International System of Units (SI) or to standards acceptable according to ASCL. This calibration certificate is issued in accordance with the terms of ASCL certification and accreditation requirements of the Standards Council of Canada (SCC). SCC accreditation number: # 669. ASCL and SCC does not guarantee the accuracy of individual calibrations by accredited laboratories.

Marco Miron - Technicien

Version 1

MAY 2022

Instrumentation
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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-001 2022-05-10

CLIENT	
Company:	Services Polytests Inc
Address:	695 B rue Gaudette
	St-Jean-sur-Richelieu, Québec, J3B 7S7

CALIBRATION SPECIFICATION	
Service Procedure:	4IN9105
Required Accuracy:	+\- 2.0°C
Calibration Frequency:(days)	365

INSTRUMENT SPECIFICATION			
Instrument Type:	Indicator	**Input Type:**	Temp
Manufacturer:	Fluke	**Output Type:**	Digitale
Model #:	52-II	**Measurement Type:**	Temperature
Serial #:	90630037	**Range:**	Divers
Location:	N.A.	**Version:**	

CALIBRATORS SPECIFICATION			
Calibrator:	Fluke 744	**Certification #:**	2022003082
Serial #:	8180008	**Certification Date:**	2022-04-12
Certified by:	Alpha Controls	**Next Certification:**	2023-04-12
Comments:			

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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-001 2022-05-10

CALIBRATION RESULTS						
Entry Source	**Given Value**	**Actual Value**	**Deviation Error**	**After Calib Value**	**Accuracy**	**Uncertainty**
Conformity	**Comment**					
0.0 °C	0.0 °C	0.1 °C	+0.1 °C	0.1 °C	+/- 2.0 °C	0.2 °C
Compliant	T1 typeJ					
125.0 °C	125.0 °C	125.1 °C	+0.1 °C	125.1 °C	+/- 2.0 °C	0.2 °C
Compliant	T1 typeJ					
250.0 °C	250.0 °C	250.1 °C	+0.1 °C	250.1 °C	+/- 2.0 °C	0.2 °C
Compliant	T1 typeJ					
375.0 °C	375.0 °C	375.1 °C	+0.1 °C	375.1 °C	+/- 2.0 °C	0.2 °C
Compliant	T1 typeJ					
500.0 °C	500.0 °C	500.1 °C	+0.1 °C	500.1 °C	+/- 2.0 °C	0.2 °C
Compliant	T1 typeJ					
0.0 °C	0.0 °C	0.2 °C	+0.2 °C	0.2 °C	+/- 2 °C	0.2 °C
Compliant	T2 typeJ					
125.0 °C	125.0 °C	125.1 °C	+0.1 °C	125.1 °C	+/- 2 °C	0.2 °C
Compliant	T2 typeJ					
250.0 °C	250.0 °C	250.1 °C	+0.1 °C	250.1 °C	+/- 2.0 °C	0.2 °C
Compliant	T2 typeJ					
375.0 °C	375.0 °C	375.1 °C	+0.1 °C	375.1 °C	+/- 2.0 °C	0.2 °C
Compliant	T2 typeJ					
500.0 °C	500.0 °C	500.1 °C	+0.1 °C	500.1 °C	+/- 2.0 °C	0.2 °C
Compliant	T2 typeJ					
0.0 °C	0.0 °C	0.2 °C	+0.2 °C	0.2 °C	+/- 2.0 °C	0.3 °C
Compliant	T1 typeK					
125.0 °C	125.0 °C	125.2 °C	+0.2 °C	125.2 °C	+/- 2.0 °C	0.3 °C
Compliant	T1 typeK					
250.0 °C	250.0 °C	250.1 °C	+0.1 °C	250.1 °C	+/- 2.0 °C	0.3 °C
Compliant	T1 typeK					
375.0 °C	375.0 °C	375.1 °C	+0.1 °C	375.1 °C	+/- 2.0 °C	0.3 °C
Compliant	T1 typeK					
500.0 °C	500.0 °C	500.1 °C	+0.1 °C	500.1 °C	+/- 2.0 °C	0.3 °C
Compliant	T1 typeK					
0.0 °C	0.0 °C	0.3 °C	+0.3 °C	0.3 °C	+/- 2.0 °C	0.3 °C
Compliant	T2 typeK					
125.0 °C	125.0 °C	125.2 °C	+0.2 °C	125.2 °C	+/- 2.0 °C	0.3 °C
Compliant	T2 typeK					
250.0 °C	250.0 °C	250.2 °C	+0.2 °C	250.2 °C	+/- 2.0 °C	0.3 °C
Compliant	T2 typeK					
375.0 °C	375.0 °C	375.2 °C	+0.2 °C	375.2 °C	+/- 2.0 °C	0.3 °C
Compliant	T2 typeK					

Version 1

Instrumentation Saint-Laurent Inc.
Certified ISO 17025

CLAS NRC-CNRC
CLAS 2010-92

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N°666

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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-001 2022-05-10

CALIBRATION RESULTS

Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Accuracy	Uncertainty
Conformity	**Comment**					
500.0 °C	500.0 °C	500.1 °C	+0.1 °C	500.1 °C	+/- 2.0 °C	1.0 °C
Compliant	T2 typeK					

Environmental Conditions: Temperature: 21 °C Humidity: 41 %RH

Comments:

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2022-05-10
Next Calibration:	2023-05-10
Certificate Date:	2022-05-10

CALIBRATION CONFORMITY	Before	After
Compliant:	X	X
Non Compliant:		

= Instrumentation St. Laurent Inc. Certify that the above instrument, meets or exceeds the specifications established by the manufacturer. The company's quality system complies with the requirements of ISO 17025 :2017 and the standards used to perform the calibration is traceable to NRC and / or NIST.
= Reported uncertainties represent a 95 % of confidence level assuming a normal distribution k=2.
= The declaration of conformity does not include Instrumentation St-Laurent Inc. uncertainty measurement. Decision rule is based on binary statement for simple acceptance rule against ILAC G8 standard and test tolerance limits are based on customer specifications, unless otherwise specified.
= The results presented in this certificate relate only to objects subject to calibration.
= It is the customer's responsibility to ensure that calibrated equipment meets its intended use.
= The date format used in this certificate is: YYYY-MM-DD.

Assessment Service Calibration Laboratory (ASCL) of the National Research Council of Canada (NRC) has assessed and certified calibration laboratory's ability and traceability to the International System of Units (SI) or to standards acceptable according to ASCL. This calibration certificate is issued in accordance with the terms of ASCL certification and accreditation requirements of the Standards Council of Canada (SCC). SCC accreditation number: # 666. ASCL and SCC does not guarantee the accuracy of individual calibrations by accredited laboratories.

Marco Miron - Technician

May 2022

5F09105 Version 1

Instrumentation
Saint•Laurent inc.
Certified ISO 17025

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CLAS 2010-02

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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-015/2 2022-05-11

CLIENT	
Company:	Services Polytests Inc
Address:	695 B rue Gaudette
	St-Jean-sur-Richelieu, Québec, J3B 7S7

CALIBRATION SPECIFICATION	
Service Procedure:	4IN9101
Required Accuracy:	+\- 4.0°F
Calibration Frequency:(days)	181

INSTRUMENT SPECIFICATION			
Instrument Type:	Recorder	Input Type:	Temp
Manufacturer:	Keithley	Output Type:	Digitale
Model #:	7700	Measurement Type:	Temperature
Serial #:	1213648	Range:	Divers
Location:	N/A	Version:	

CALIBRATORS SPECIFICATION			
Calibrator:	Fluke 744	Certification #:	2022003082
Serial #:	8180008	Certification Date:	2022-04-12
Certified by:	Alpha Controls	Next Certification:	2023-04-12
Comments:			

5F09101 Version 1

Instrumentation Saint-Laurent inc.
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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-015/2 2022-05-11

CALIBRATION RESULTS

Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Accuracy	Uncertainty
Conformity	Comment					
662.0 °F	662.0 °F	661.4 °F	-0.6 °F	661.4 °F	+/- 4.0 °F	+/- 0.5 °F
Compliant	ID. No. 201 (Flue) en type "K" En Loop avec EM-015					
482.0 °F	482.0 °F	481.4 °F	-0.6 °F	481.4 °F	+/- 4.0 °F	+/- 0.5 °F
Compliant	ID. No. 202 (Right) en type "K" En Loop avec EM-015					
482.0 °F	482.0 °F	481.7 °F	-0.3 °F	481.7 °F	+/- 4.0 °F	+/- 0.5 °F
Compliant	ID. No. 203 (Back) en type "K" En Loop avec EM-015					
482.0 °F	482.0 °F	481.7 °F	-0.3 °F	481.7 °F	+/- 4.0 °F	+/- 0.5 °F
Compliant	ID. No. 204 (Bottom) en type "K" En Loop avec EM-015					
482.0 °F	482.0 °F	481.9 °F	-0.1 °F	481.9 °F	+/- 4.0 °F	+/- 0.5 °F
Compliant	ID. No. 205 (Top) en type "K" En Loop avec EM-015					
482.0 °F	482.0 °F	481.8 °F	-0.2 °F	481.8 °F	+/- 4.0 °F	+/- 0.5 °F
Compliant	ID. No. 206 (Left) en type "K" En Loop avec EM-015					
662.0 °F	662.0 °F	661.8 °F	-0.2 °F	661.8 °F	+/- 4.0 °F	+/- 0.5 °F
Compliant	ID. No. 208 (Catalyst down) en type "K" En Loop avec EM-015					
77.0 °F	77.0 °F	76.7 °F	-0.3 °F	76.7 °F	+/- 4.0 °F	+/- 0.4 °F
Compliant	ID. No. 215 (DGM 1 In) en type "J" En Loop avec EM-015					
77.0 °F	77.0 °F	76.7 °F	-0.3 °F	76.7 °F	+/- 4.0 °F	+/- 0.4 °F
Compliant	ID. No. 216 (DGM 1 Out) en type "J" En Loop avec EM-015					
77.0 °F	77.0 °F	76.8 °F	-0.2 °F	76.8 °F	+/- 4.0 °F	+/- 0.4 °F
Compliant	ID. No. 217 (DGM 2 In) en type "J" En Loop avec EM-015					
77.0 °F	77.0 °F	76.8 °F	-0.2 °F	76.8 °F	+/- 4.0 °F	+/- 0.4 °F
Compliant	ID. No. 218 (DGM 2 Out) en type "J" En Loop avec EM-015					

Environmental Conditions:	Temperature: 21 °C	Humidity: 42 %RH
Comments:		

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2022-05-11
Next Calibration:	2022-11-11
Certificate Date:	2022-05-11

CALIBRATION CONFORMITY	Before	After
Compliant:	X	X
Non Compliant:		

- Instrumentation St. Laurent Inc. Certify that the above instrument, meets or exceeds the specifications established by the manufacturer. The company's quality system complies with the requirements of ISO 17025 :2017 and the standards used to perform the calibration is traceable to NRC and / or NIST.
- Reported uncertainties represent a 95 % of confidence level assuming a normal distribution k=2.
- The declaration of conformity does not include Instrumentation St-Laurent Inc. uncertainty measurement. Decision rule is based on binary statement for simple acceptance rule against ILAC G8 standard and test tolerance limits are based on customer specifications, unless otherwise specified.
- The results presented in this certificate relate only to objects subject to calibration.
- It is the customer's responsibility to ensure that calibrated equipment meets its intended use.
- The date format used in this certificate is: YYYY-MM-DD.

Version 1

Instrumentation
Saint•Laurent inc.
Certified ISO 17025

CLAS
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CLAS 2010-02

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Accredité CSN
N°669

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Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-015/2 2022-05-11

Assessment Service Calibration Laboratory (ASCL) of the National Research Council of Canada (NRC) has assessed and certified calibration laboratory's ability and traceability to the International System of Units (SI) or to standards acceptable according to ASCL. This calibration certificate is issued in accordance with the terms of ASCL certification and accreditation requirements of the Standards Council of Canada (SCC). SCC accreditation number: # 669. ASCL and SCC does not guarantee the accuracy of individual calibrations by accredited laboratories.

Marco Miron - Technicien

MAY 2022

5F09101 Version 1

Instrumentation
Saint•Laurent inc.
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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-015 2022-05-11

CLIENT	
Company:	Services Polytests Inc
Address:	695 B rue Gaudette
	St-Jean-sur-Richelieu, Québec, J3B 7S7

CALIBRATION SPECIFICATION	
Service Procedure:	4IN9101
Required Accuracy:	+\- 2°C
Calibration Frequency:(days)	365

INSTRUMENT SPECIFICATION			
Instrument Type:	Recorder	Input Type:	Temp
Manufacturer:	Keithley	Output Type:	Digitale
Model #:	7700	Measurement Type:	Temperature
Serial #:	1213648	Range:	Divers
Location:	N/A	Version:	

CALIBRATORS SPECIFICATION			
Calibrator:	Fluke 744	Certification #:	2022003082
Serial #:	8180008	Certification Date:	2022-04-12
Certified by:	Alpha Controls	Next Certification:	2023-04-12
Comments:			

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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-015 2022-05-11

CALIBRATION RESULTS

Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Accuracy	Uncertainty
Conformity	Comment					
-190.0 °C	-190.0 °C	-190.0 °C	0.0 °C	190.0 °C	+\- 2.0 °C	+/- 0.4 °C
Compliant	Input#1TypeK					
0.0 °C	0.0 °C	0.0 °C	0.0 °C	0.0 °C	+\- 2.0 °C	+/- 0.3 °C
Compliant	Input#1TypeK					
750.0 °C	750.0 °C	750.0 °C	0.0 °C	750.0 °C	+\- 2.0 °C	+/- 0.3 °C
Compliant	Input#1TypeK					
100.0 °C	100.0 °C	100.0 °C	0.0 °C	100.0 °C	+\- 2.0 °C	+/- 0.3 °C
Compliant	Input#2 TypeK					
100.0 °C	100.0 °C	100.0 °C	0.0 °C	100.0 °C	+\- 2.0 °C	+/- 0.3 °C
Compliant	Input#3 TypeK					
100.0 °C	100.0 °C	100.0 °C	0.0 °C	100.0 °C	+\- 2.0 °C	+/- 0.3 °C
Compliant	Input#4 TypeK					
100.0 °C	100.0 °C	100.0 °C	0.0 °C	100.0 °C	+\- 2.0 °C	+/- 0.3 °C
Compliant	Input#5TypeK					
100.0 °C	100.0 °C	100.0 °C	0.0 °C	100.0 °C	+\- 2.0 °C	+/- 0.3 °C
Compliant	Input#6TypeK					
100.0 °C	100.0 °C	100.0 °C	0.0 °C	100.0 °C	+\- 2.0 °C	+/- 0.3 °C
Compliant	Input#7TypeK					
100.0 °C	100.0 °C	100.0 °C	0.0 °C	100.0 °C	+\- 2.0 °C	+/- 0.3 °C
Compliant	Input#8TypeK					
100.0 °C	100.0 °C	100.0 °C	0.0 °C	100.0 °C	+\- 2.0 °C	+/- 0.3 °C
Compliant	Input#9TypeK					
100.0 °C	100.0 °C	100.0 °C	0.0 °C	100.0 °C	+\- 2.0 °C	+/- 0.2 °C
Compliant	Input#10TypeJ					
100.0 °C	100.0 °C	100.1 °C	+0.1 °C	100.1 °C	+\- 2.0 °C	+/- 0.2 °C
Compliant	Input#11TypeJ					
100.0 °C	100.0 °C	100.1 °C	+0.1 °C	100.1 °C	+\- 2.0 °C	+/- 0.2 °C
Compliant	Input#12TypeJ					
100.0 °C	100.0 °C	100.1 °C	+0.1 °C	100.1 °C	+\- 2.0 °C	+/- 0.2 °C
Compliant	Input#13 TypeJ					
100.0 °C	100.0 °C	100.2 °C	+0.2 °C	100.2 °C	+\- 2.0 °C	+/- 0.2 °C
Compliant	Input#14TypeJ					
100.0 °C	100.0 °C	100.1 °C	+0.1 °C	100.1 °C	+\- 2.0 °C	+/- 0.2 °C
Compliant	Input#15 TypeJ					
100.0 °C	100.0 °C	100.2 °C	+0.2 °C	100.2 °C	+\- 2.0 °C	+/- 0.2 °C
Compliant	Input#16TypeJ					
100.0 °C	100.0 °C	100.2 °C	+0.2 °C	100.2 °C	+\- 2.0 °C	+/- 0.2 °C
Compliant	Input#17TypeJ					
100.0 °C	100.0 °C	100.2 °C	+0.2 °C	100.2 °C	+\- 2.0 °C	+/- 0.2 °C
Compliant	Input#18TypeJ					

Version 1

Instrumentation Saint•Laurent inc.
Certified ISO 17025

CLAS NRC·CNRC CLAS 2010-02

SCC Accredited LAB Accréditée SCC N°669

80 rue de la montagne
St-Joseph du lac
(Québec), J0N 1M0
Phone: (450) 473-6168
Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-015 2022-05-11

CALIBRATION RESULTS

Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Accuracy	Uncertainty
Conformity	**Comment**					
100.0 °C	100.0 °C	100.2 °C	+0.2 °C	100.2 °C	+\- 2.0 °C	+/- 0.2 °C
Compliant	Input#19TypeJ					
100.0 °C	100.0 °C	100.1 °C	+0.1 °C	100.1 °C	+\- 2.0 °C	+/- 0.2 °C
Compliant	Input#20TypeJ					
12.000 mA	12.000 mA	12.000 mA	0.000 mA	12.000 mA	+\- 0,100 mA	1.00 mA
Compliant	Input#21					
12.000 mA	12.000 mA	12.000 mA	0.000 mA	12.000 mA	+\- 0,100 mA	1.00 mA
Compliant	Input#22					

Environmental Conditions: Temperature: 21 °C Humidity: 42 %RH

Comments: Test avec EM-147

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2022-05-11
Next Calibration:	2023-05-11
Certificate Date:	2022-05-11

CALIBRATION CONFORMITY	Before	After
Compliant:	X	X
Non Compliant:		

- Instrumentation St. Laurent Inc. Certify that the above instrument, meets or exceeds the specifications established by the manufacturer. The company's quality system complies with the requirements of ISO 17025 :2017 and the standards used to perform the calibration is traceable to NRC and / or NIST.
- Reported uncertainties represent a 95 % of confidence level assuming a normal distribution k=2.
- The declaration of conformity does not include Instrumentation St-Laurent Inc. uncertainty measurement. Decision rule is based on binary statement for simple acceptance rule against ILAC G8 standard and test tolerance limits are based on customer specifications, unless otherwise specified.
- The results presented in this certificate relate only to objects subject to calibration.
- It is the customer's responsibility to ensure that calibrated equipment meets its intended use.
- The date format used in this certificate is: YYYY-MM-DD.

Assessment Service Calibration Laboratory (ASCL) of the National Research Council of Canada (NRC) has assessed and certified calibration laboratory's ability and traceability to the International System of Units (SI) or to standards acceptable according to ASCL. This calibration certificate is issued in accordance with the terms of ASCL certification and accreditation requirements of the Standards Council of Canada (SCC). SCC accreditation number: # 669. ASCL and SCC does not guarantee the accuracy of individual calibrations by accredited laboratories.

Marco Miron – Technician

May 2022

5F09101 Version 1

Calibration Certificate ID
CA0123-007-042022-ACC

METTLER TOLEDO

Mettler-Toledo Inc.

Service Division
1900 Polaris Parkway
Columbus, OH 43240
1-800-METTLER

Accuracy Calibration Certificate

Customer

Company:	Services Polytests		
Address:	695-B Rue Gaudette		
City:	Saint-Jean-Sur-Richelieu	**Contact:**	Danick Power
Zip / Postal:	J3B 7S7	**Order Number:**	0332427627
State / Province:	Quebec		

Weighing Device

Manufacturer:	Ohaus	**Instrument Type:**	Weighing Instrument
Model:	AR2140	**Asset Number:**	EM-051
Serial No.:	M355832901O091	**Terminal Model:**	N/A
Building:	N/A	**Terminal Serial No.:**	N/A
Floor:	N/A	**Terminal Asset No.:**	N/A
Room:	N/A	**Alternate Asset No.:**	N/A

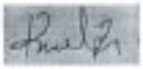
Range	Max. Capacity	Readability (d)
1	210 g	0.0001 g

Procedure

Calibration Guideline:	EURAMET cg-18 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction:	30260953

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

The sensitivity/span of the weighing instrument was adjusted before As Left calibration with an external weight. As Left 350

As Found Calibration Date:	20-04-2022	**Service Technician:**	
As Left Calibration Date:	20-04-2022		Kamel Mohand Kaci
Issue Date:	20-04-2022		
Next Calibration Date:	31-10-2022		

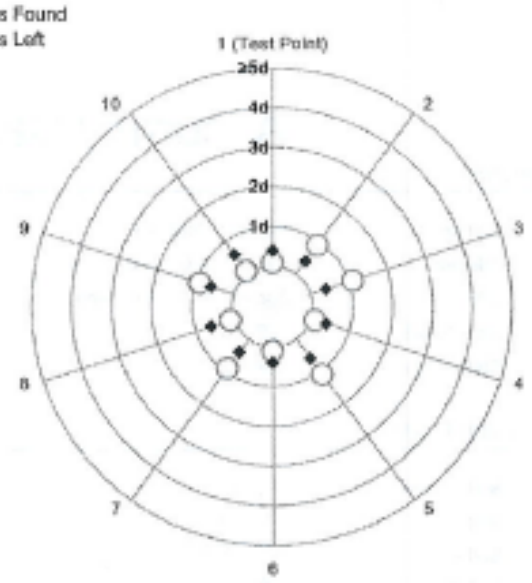
Measurement Results

Repeatability

Test Load: 100 g

	As Found	As Left
1	100.0000 g	100.0000 g
2	99.9999 g	100.0000 g
3	100.0001 g	100.0000 g
4	100.0000 g	100.0000 g
5	100.0001 g	100.0001 g
6	100.0000 g	100.0000 g
7	99.9999 g	100.0000 g
8	100.0000 g	100.0001 g
9	99.9999 g	100.0001 g
10	100.0000 g	100.0001 g

Standard Deviation	0.00007 g	0.00005 g



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

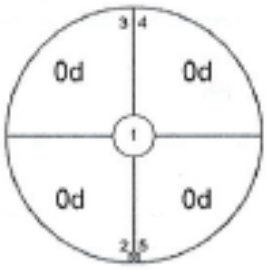
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

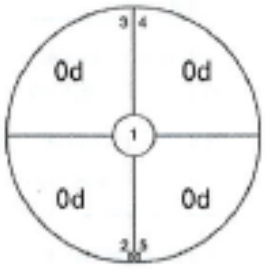
Test Load: 100 g

Position	As Found	As Left
1	0.0000 g	0.0000 g
2	0.0000 g	0.0000 g
3	0.0000 g	0.0000 g
4	0.0000 g	0.0000 g
5	0.0000 g	0.0000 g

Maximum Deviation	0.0000 g	0.0000 g



As Found



As Left

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

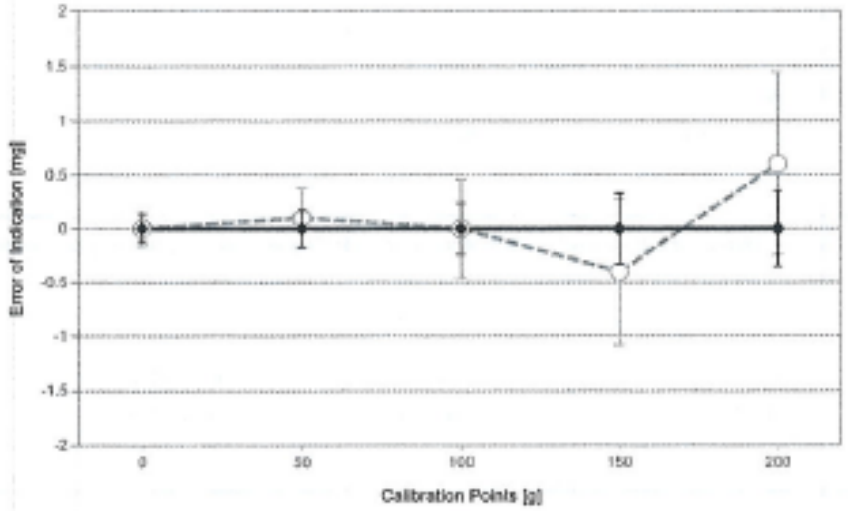
Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.16 mg	2
2	50.0000 g	50.0001 g	0.0001 g	0.28 mg	2
3	100.0000 g	100.0000 g	0.0000 g	0.46 mg	2
4	150.0000 g	149.9996 g	-0.0004 g	0.68 mg	2
5	200.0001 g	200.0007 g	0.0006 g	0.84 mg	2

As Left

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.12 mg	2
2	50.0000 g	50.0000 g	0.0000 g	0.17 mg	2
3	100.0000 g	100.0000 g	0.0000 g	0.24 mg	2
4	150.0000 g	150.0000 g	0.0000 g	0.33 mg	2
5	200.0001 g	200.0001 g	0.0000 g	0.35 mg	2



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

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

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

Measurement Uncertainty of the Weighing Instrument in Use

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

Temperature coefficient for the evaluation of the measurement uncertainty in use: $3.0 \cdot 10^{-6}$ / K

Temperature range on site for the evaluation of the measurement uncertainty in use: 4 K

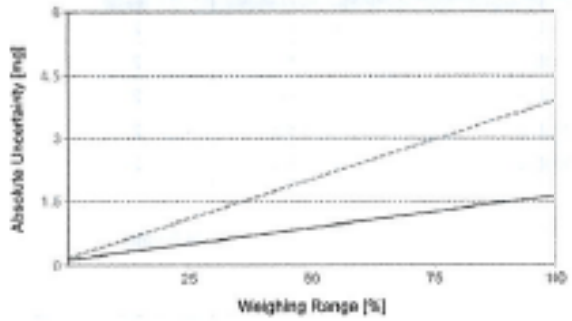
Linearization of Uncertainty Equation

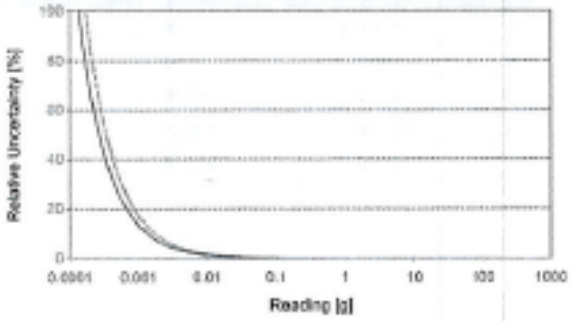
	Range		As Found	As Left
	d	Max		
1	0.0001 g	210 g	$U_1 = 0.17\ mg + 0.0178\ mg/g \cdot R$	$U_1 = 0.13\ mg + 0.00719\ mg/g \cdot R$

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

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

Net Indication	As Found		As Left	
0.0210 g	0.17 mg	0.81%	0.13 mg	0.62%
0.2100 g	0.17 mg	0.083%	0.13 mg	0.063%
2.1000 g	0.21 mg	0.0099%	0.15 mg	0.0069%
21.0000 g	0.54 mg	0.0026%	0.28 mg	0.0013%
210.0000 g	3.9 mg	0.0019%	1.6 mg	0.00078%





As Found

As Left

Test Equipment

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

Weight Set 1: OIML E2

Weight Set No.:	350	Date of Issue:	15-02-2022
Certificate Number:	220554739-1	Calibration Due Date:	28-02-2023

Remarks

This document is issued to record completion of the work performed by METTLER TOLEDO on the subject device in accordance with agreed standards. It does not guarantee the continued performance of the subject device. Any measurements recorded are based on the subject device's performance at a given time as tested by METTLER TOLEDO and, except where explicitly stated otherwise, do not express an opinion as to the sufficiency of any customer designed procedures used to test the device. This document is not a warranty, either implied or express. METTLER TOLEDO expressly disclaims any liability arising from the use of the information in this document for any purpose other than as specified herein.

METTLER TOLEDO Service

Custom Tolerance Assessment

Assessment done without considering measurement uncertainty.
One or more of the measurements from the attached calibration certificate were assessed against customer-defined tolerances.

	As Found	As Left
Overall	✓	✓
Repeatability	✓	✓
Eccentricity	✓	✓
Error of Indication	✓	✓

Measurement Results

Repeatability

Test Load: 100 g

	As Found	As Left
1	100.0000 g	100.0000 g
2	99.9999 g	100.0000 g
3	100.0001 g	100.0000 g
4	100.0000 g	100.0000 g
5	100.0001 g	100.0001 g
6	100.0000 g	100.0000 g
7	99.9999 g	100.0000 g
8	100.0000 g	100.0001 g
9	99.9999 g	100.0001 g
10	100.0000 g	100.0001 g

Standard Deviation	0.00007 g	0.00005 g
Tolerance	0.00020 g ✓	0.00020 g ✓

2022-04-20

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	0.0000 g	0.0000 g
2	0.0000 g	0.0000 g
3	0.0000 g	0.0000 g
4	0.0000 g	0.0000 g
5	0.0000 g	0.0000 g

Maximum Deviation	**0.0000 g**		**0.0000 g**	
Tolerance	**0.0003 g**	✓	**0.0003 g**	✓

Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Tolerance	
1	0.0000 g	0.0000 g	0.0000 g	0.0002 g	✓
2	50.0000 g	50.0001 g	0.0001 g	0.0002 g	✓
3	100.0000 g	100.0000 g	0.0000 g	0.0004 g	✓
4	150.0000 g	149.9996 g	-0.0004 g	0.0006 g	✓
5	200.0001 g	200.0007 g	0.0006 g	0.0010 g	✓

As Left

	Reference Value	Indication	Error of Indication	Tolerance	
1	0.0000 g	0.0000 g	0.0000 g	0.0002 g	✓
2	50.0000 g	50.0000 g	0.0000 g	0.0002 g	✓
3	100.0000 g	100.0000 g	0.0000 g	0.0004 g	✓
4	150.0000 g	150.0000 g	0.0000 g	0.0006 g	✓
5	200.0001 g	200.0001 g	0.0000 g	0.0010 g	✓

TRANSCAT
Trust in every measure

ACCREDITATION ISO 17025
SCC Scope Number 668

CALIBRATION CERTIFICATE

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

Client :	Polytests	**Certificate Number :**	**157-77C603-223**
Address :	695 B rue Gaudette Saint-Jean-sur-Richelieu, QC J3B7S7	**Calibration date :**	04-03-2022

Technician:
Coutu, Daniel

David Llorens, Quality Manager

SERVICE DESCRIPTION:

Masses description :	ASTM E617	**Date approved :**	04-03-2022
Precision class :	ASTM 6	**Next Calibration :**	04-03-2027
Density :	7.95g/cm³	**CCN accreditation # :**	668
Identification (if unique) :	EM-090	**CLAS Certification # :**	2010-01

Test conditions :	Temp °C:	21.05	kPa Pressure:	102.3	Humidity:	49.4

NOTES:

For weight calibration, we use the procedure "Comparaison individuelle" PDL-09-MG-001 and the procedure "Détermination des incertitudes" PDL-09-MG-002. This certificate cannot be copied without written approval from Dispersion Laboratory. The results presented in these pages relate only to objects subjected to calibration.n

REMARKS:

March 2022

TRANSCAT
Trust in every measure

ACCREDITATION ISO 17025
SCC Scope Number 666

CALIBRATION CERTIFICATE

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

Client :	Polytests	**Certificate Number :**	**157-77C603-223**
Address :	695 B rue Gaudette	**CCN Accreditation # :**	666
	Saint-Jean-sur-Richelieu, QC	**CLAS Certification # :**	2010-01
	J3B7S7	**Precision class :**	ASTM 6
		Calibration date :	04-03-2022
Mass :	2 kg	**Follow-up date :**	04-03-2027

CALIBRATION RESULTS, CONVENTIONAL MASS:

Nominal Mass	Serial #	Inventory #	Conventional mass	Conventional mass after adjustment	Tolerance ± (mg)	Uncertainties ± (mg)
2 kg		EM-090	2.0001384 kg		200 mg	2.0 mg

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ACCREDITATION ISO 17025
SCC Scope Number 668

CALIBRATION CERTIFICATE

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

Client :	Polytests	**Certificate Number :**	**157-77C603-223**
Address :	695 B rue Gaudette	**CCN Accreditation # :**	668
	Saint-Jean-sur-Richelieu, QC	**CLAS Certification # :**	2010-01
	J3B7S7	**Precision class :**	ASTM 6
		Calibration date :	04-03-2022
Mass :	2 kg	**Follow-up date :**	04-03-2027

CALIBRATION RESULTS, CORRECTIONS:

Nominal Mass	Serial #	Inventory #	Conventional mass Corrections	Conventional mass Corrections after adjustment	Tolerance ± (mg)	Uncertainties ± (mg)
2 kg		EM-090	138.4 mg		200 mg	2.0 mg

CALIBRATION CERTIFICATE

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

BALANCES

The following balances are used for calibration purposes :

> 5 kg to 25 kg :	Mettler Toledo XP32003L, SNR 1125271214, max. 32100 g, d = 0.005 g
> 1 kg to 5 kg	Mettler Toledo PR5003, SNR 11153 1634, max. 5100 g, d = 0.001 g
> 300 g to 2 kg :	Mettler Toledo XP2004S, SNR B131185222, max. 2100 g, d = 0.1 mg
> 100 g to 200 g :	Mettler Toledo AT201 SNR BA1115230146, max. 205 g, d = 0.01 mg
> 5 g to 100 g :	Mettler Toledo AX106 SNR 1127063924, max. 111 g, d = 1 µg
1 mg to 5 g :	Mettler UMX5, SNR 1121103055, max. 5.1 g, d = 0.1 µg

We are also using these balances in our automated procedure :

> 200 g to 1 kg :	Mettler Toledo AX1005 SNR 1127063210, max. 1109 g, d = 0.01 mg
> 5 g to 100 g :	Mettler Toledo AX106 SNR 1120143015, max. 111 g, d = 1 µg
1 mg to 5 g :	Mettler UMX5, SNR 1125140561, max. 5.1 g, d = 0.1 µg

Our balances are periodically verified, according to our PDL-11-MG-001 control procedure.

UNCERTAINTIES:

The following uncertainties exist :

1. *Uncertainty associated with the weighting process.*
2. *Uncertainty associated with air density.*
3. *Uncertainty associated with the measurement standard.*
4. *Uncertainty associated with the density of the mass beirg calibrated.*

The uncertainty of the weighing process includes long-term reproducibility.

Uncertainties specified in this report are expanded uncertainties representing a confidence level of approximately 95% obtained by multiplying the combined standard uncertainty by a coverage factor of k = 2. For more detailed information refer to the GUM (Guide to the Expression of Uncertainty in Measurement, 1995 Edition)

TRACEABILITY

The Calibration Laboratory Assessment Service (CLAS) of the National Research Council of Canada (NRC) has assessed and certified specific calibration capabilities of this laboratory and their traceability to recognized national measurement standards and to the International System of Units (SI). This certificate of calibration is issued in accordance with the conditions of certification granted by CLAS and the conditions of accreditation granted by the Standards Council of Canada (SCC). Neither the CLAS nor the SCC guarantees the accuracy of individual calibration by accredited laboratories.

TRANSCAT
Trust in every measure

ACCREDITATION ISO 17025
SCC Scope Number 668

CALIBRATION CERTIFICATE

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

USED REFERENCES

Item	Serial #	Manufacturer	Calibration date	Due date
300g Labo	98-0868-50-2	Denver Instrument Company	01-10-2020	31-03-2022
1kg-1mg Labo	MT-01	Mettler Toledo	01-10-2020	31-03-2022
2kg Labo	98-0868-50-3	Denver Instrument Company	01-10-2020	31-03-2022
1kg Labo	98-088850-1	Denver Instrument Company	01-10-2020	31-03-2022
5kg Labo	129099	Mettler Toledo	01-10-2020	31-03-2022
10kg Labo	DI000G991	Dispersion	23-03-2021	31-03-2022
20kg Labo	69976	Mettler Toledo	06-10-2021	31-10-2022
1 mg-10kg	4000026011	Troemner	15-10-2021	31-10-2022
2kg Labo	129098	Mettler Toledo	01-10-2020	31-03-2022

ENVIRONMENTAL CONDITIONS

Item	Serial #	Manufacturer	Calibration date	Due date
THE004	107080	Control Company	04-03-2021	31-03-2022

Calibration Certificate ID
CA0206-112-122021-ACC-USI

METTLER TOLEDO

Mettler-Toledo Inc.
Service Division
1900 Polaris Parkway
Columbus, OH 43240
1-800-METTLER

Accredited by the American Association for Laboratory Accreditation (A2LA)
CALIBRATION CERT #1902.01
ISO 17025 Registered
ANSI/NCSL Z540-1 Accredited

Accuracy Calibration Certificate

Customer

Company:	Services Polytests		
Address:	695-B Rue Gaudette		
City:	Saint-Jean-Sur-Richelieu	Contact:	Danick Power
Zip / Postal:	J3B 7S7		
State / Province:	Quebec		

Weighing Device

Manufacturer:	RICE LAKE	Instrument Type:	Weighing Instrument
Model:	4X4HP-10K	Asset Number:	EM-114 EM-137
Serial No.:	C18395	Terminal Model:	IQ+355
Building:	N/A	Terminal Serial No.:	184851
Floor:	N/A	Terminal Asset No.:	N/A
Room:	N/A		

Range	Max. Capacity	Readability (d)
1	400 kg	0.05 kg

Procedure

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

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

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

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

The calibration was agreed with the user below the maximum capacity of the balance.

	Temperature	
As Found	Start: 20.0 °C	End: 20.0 °C
As Left	Start: 20.0 °C	End: 20.0 °C

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

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

As Found Calibration Date:	20-12-2021
As Left Calibration Date:	20-12-2021
Issue Date:	20-12-2021

Authorized A2LA Signatory:

Marc-Andre Chouinard

20 dec 2021

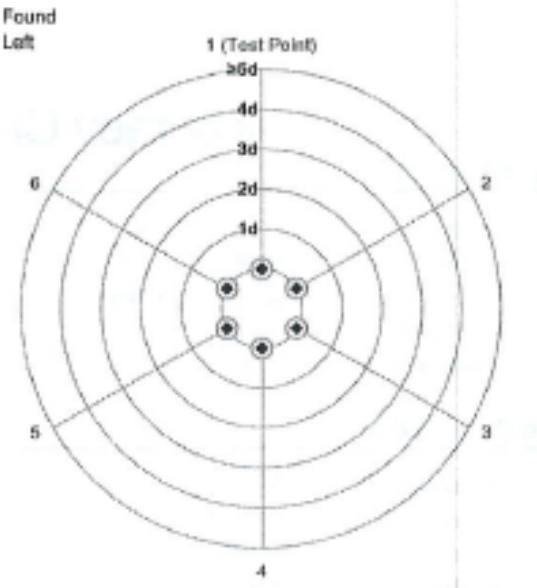
Measurement Results

Repeatability

Test Load: 70 kg

	As Found	As Left
1	70.10 kg	70.00 kg
2	70.10 kg	70.00 kg
3	70.10 kg	70.00 kg
4	70.10 kg	70.00 kg
5	70.10 kg	70.00 kg
6	70.10 kg	70.00 kg

Standard Deviation	0.000 kg	0.000 kg



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

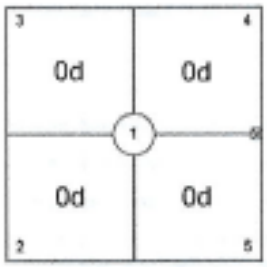
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

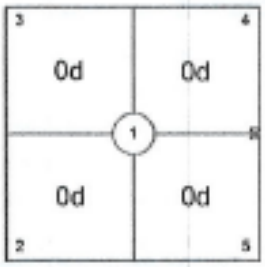
Test Load: 50 kg

Position	As Found	As Left
1	50.05 kg	50.00 kg
2	50.05 kg	50.00 kg
3	50.05 kg	50.00 kg
4	50.05 kg	50.00 kg
5	50.05 kg	50.00 kg

Maximum Deviation	0.00 kg	0.00 kg



As Found



As Left

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

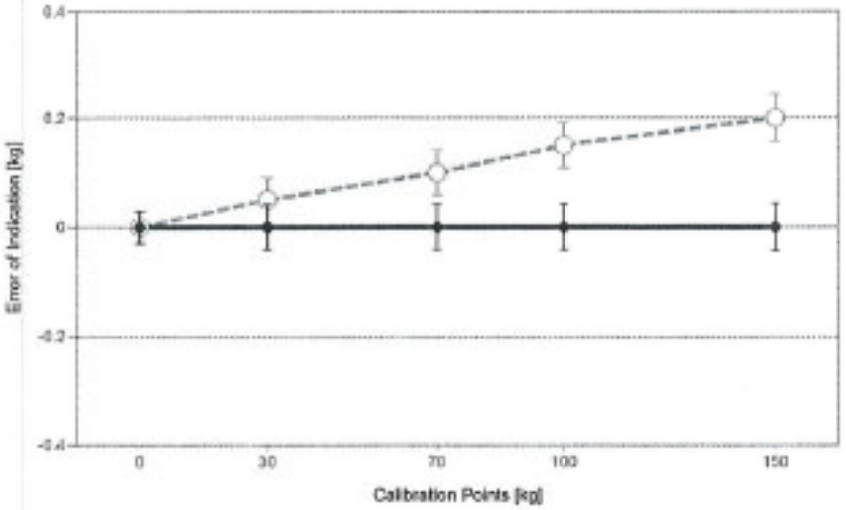
Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0 kg	0.00 kg	0.00 kg	0.029 kg	2
2	30 kg	30.05 kg	0.05 kg	0.041 kg	2
3	70 kg	70.10 kg	0.10 kg	0.041 kg	2
4	100 kg	100.15 kg	0.15 kg	0.042 kg	2
5	150 kg	150.20 kg	0.20 kg	0.043 kg	2
6	100 kg	100.15 kg	0.15 kg	0.042 kg	2
7	70 kg	70.10 kg	0.10 kg	0.041 kg	2
8	30 kg	30.05 kg	0.05 kg	0.041 kg	2
9	0 kg	0.00 kg	0.00 kg	0.029 kg	2

As Left

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0 kg	0.00 kg	0.00 kg	0.029 kg	2
2	30 kg	30.00 kg	0.00 kg	0.041 kg	2
3	70 kg	70.00 kg	0.00 kg	0.041 kg	2
4	100 kg	100.00 kg	0.00 kg	0.042 kg	2
5	150 kg	150.00 kg	0.00 kg	0.043 kg	2
6	100 kg	100.00 kg	0.00 kg	0.042 kg	2
7	70 kg	70.00 kg	0.00 kg	0.041 kg	2
8	30 kg	30.00 kg	0.00 kg	0.041 kg	2
9	0 kg	0.00 kg	0.00 kg	0.029 kg	2



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

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

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

Test Equipment

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

Weight Set 1: OIML M1

Weight Set No.:	92294	Date of Issue:	23-09-2021
Certificate Number:	M21-0283	Calibration Due Date:	23-09-2022

Weight Set 2: OIML M1

Weight Set No.:	T-100	Date of Issue:	12-05-2021
Certificate Number:	1412861	Calibration Due Date:	12-05-2022

Remarks

N/A

End of Accredited Section

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

Measurement Uncertainty of the Weighing Instrument in Use

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

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

Temperature range on site for the evaluation of the measurement uncertainty in use: 20 K

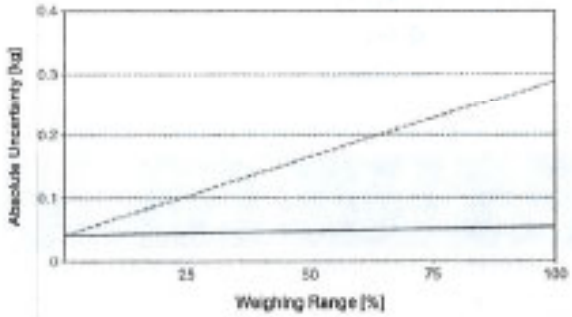
Linearization of Uncertainty Equation

	Range		As Found	As Left
	d	Max		
1	0.05 kg	150 kg	$U_f = 41\ g + 1.66\ g/kg \cdot R$	$U_f = 41\ g + 0.0938\ g/kg \cdot R$

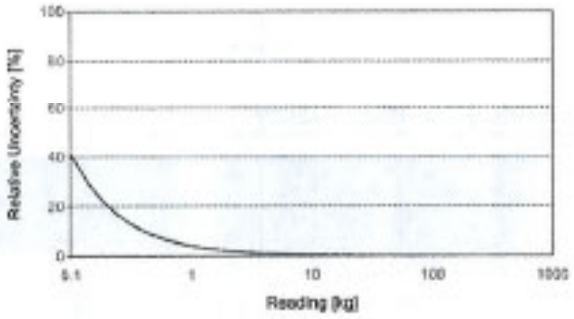
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

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

Net Indication	As Found		As Left	
1.50 kg	0.043 kg	2.9%	0.041 kg	2.7%
15.00 kg	0.066 kg	0.44%	0.042 kg	0.28%
30.00 kg	0.091 kg	0.30%	0.044 kg	0.15%
75.00 kg	0.17 kg	0.22%	0.048 kg	0.064%
150.00 kg	0.29 kg	0.19%	0.055 kg	0.037%



As Found



As Left

METTLER TOLEDO Service

Handbook 44 Tolerance Assessment (Maintenance)

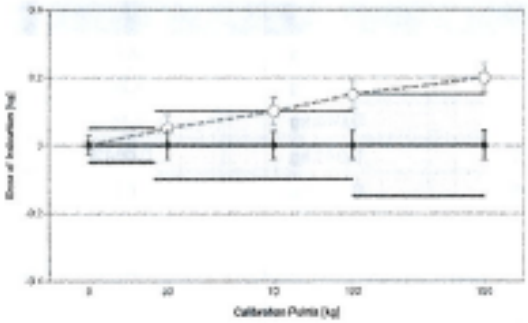
Assessment done without considering measurement uncertainty.
The measurements from the attached calibration certificate were assessed against the Tolerances defined by NIST Handbook 44.
The range of measurements for both Eccentricity and Repeatability (if performed) tests is assessed against Maintenance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

	As Found	As Left
Overall	✗	✓

✓ = Passed
✗ = Failed

Weighing Device

Range	Max. Capacity	Readability (d)	Verification Scale Interval (e)	Class
1	400 kg	0.05 kg	0.05 kg	III



Tolerances according to NIST Handbook 44

Test Load		Tolerance
From	To	
0.00 kg	0.00 kg	0.0125 kg
0.05 kg	25.00 kg	0.05 kg
25.05 kg	100.00 kg	0.1 kg
100.05 kg	150.00 kg	0.15 kg

○ As Found
◆ As Left
— Tolerance

Eccentricity and Repeatability

Test	Test Load	Tolerance	As Found		As Left	
			Max. Error / Range	Result	Max. Error / Range	Result
Eccentricity (Max. Error)	50 kg	0.10 kg	0.05 kg	✓	0.00 kg	✓
Eccentricity (Range)	50 kg	0.1 kg	0.00 kg	✓	0.00 kg	✓
Repeatability (Max. Error)	70 kg	0.1 kg	0.10 kg	✓	0.00 kg	✓
Repeatability (Range)	70 kg	0.10 kg	0.00 kg	✓	0.00 kg	✓

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

Error of Indication

	Reference Value	Tolerance	As Found		As Left	
			Error of Indication	Result	Error of Indication	Result
1	0 kg	0.05 kg	0.00 kg	✓	0.00 kg	✓
2	30 kg	0.10 kg	0.05 kg	✓	0.00 kg	✓
3	70 kg	0.10 kg	0.10 kg	✓	0.00 kg	✓
4	100 kg	0.10 kg	0.15 kg	✗	0.00 kg	✓
5	150 kg	0.15 kg	0.20 kg	✗	0.00 kg	✓
6	100 kg	0.10 kg	0.15 kg	✗	0.00 kg	✓
7	70 kg	0.10 kg	0.10 kg	✓	0.00 kg	✓
8	30 kg	0.10 kg	0.05 kg	✓	0.00 kg	✓
9	0 kg	0.05 kg	0.00 kg	✓	0.00 kg	✓

Instrumentation Saint-Laurent Inc.
Certified ISO 17025

CLAS NRC-CNRC
CLAS 2010-02

80 rue de la montagne
St-Joseph du lac
(Québec), J0N 1M0
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Fax: (450) 473-6207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-126 2022-05-10

CLIENT	
Company:	Services Polytests Inc
Address:	695 B rue Gaudette
	St-Jean-sur-Richelieu, Québec, J3B 7S7

CALIBRATION SPECIFICATION	
Service Procedure:	4IN9106
Required Accuracy:	+\- 1"Hg
Calibration Frequency:(days)	365

INSTRUMENT SPECIFICATION			
Instrument Type:	Pressure Gauge	Input Type:	Pression
Manufacturer:	Dwyer	Output Type:	Digitale
Model #:	DPG200	Measurement Type:	Pressure
Serial #:	N.A.	Range:	0-28"Hg
Location:	N.A.	Version:	

CALIBRATORS SPECIFICATION			
Calibrator:	Crystal XP2i 300	Certification #:	2021008359
Serial #:	870437	Certification Date:	2021-11-15
Certified by:	Alpha Controls	Next Certification:	2022-11-15
Comments:			
Calibrator:	Fluke 744	Certification #:	2022003082
Serial #:	8180008	Certification Date:	2022-04-12
Certified by:	Alpha Controls	Next Certification:	2023-04-12
Comments:			

5F09106 Version 1

Instrumentation Saint•Laurent inc.
Certified ISO 17025

CLAS NRC·CNRC CLAS 2010-02

SCC Accredited LAB Accréditié CCN N°669

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Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-126 2022-05-10

CALIBRATION RESULTS

Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Accuracy	Uncertainty
Conformity	Comment					
0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	+\- 1 "Hg	1 "Hg
Compliant	Verification of the indicator					
-7.50 "Hg	-7.50 "Hg	-7.64 "Hg	-0.14 "Hg	-7.64 "Hg	+\- 1 "Hg	1 "Hg
Compliant	Verification of the indicator					
-15.00 "Hg	-15.00 "Hg	-15.24 "Hg	-0.24 "Hg	-15.24 "Hg	+\- 1 "Hg	1 "Hg
Compliant	Verification of the indicator					
-22.50 "Hg	-22.50 "Hg	-22.90 "Hg	-0.40 "Hg	-22.90 "Hg	+\- 1 "Hg	1 "Hg
Compliant	Verification of the indicator					
-28.00 "Hg	-28.00 "Hg	-28.51 "Hg	-0.51 "Hg	-28.51 "Hg	+\- 1 "Hg	1 "Hg
Compliant	Verification of the indicator					
0.00 "Hg	10.0000 V.DC.	10.0778 V.DC.	+0.0778 V.DC.	10.0778 V.DC.	+\- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
-7.50 "Hg	8.0000 V.DC.	8.0447 V.DC.	+0.0447 V.DC.	8.0447 V.DC.	+\- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
-15.00 "Hg	6.0000 V.DC.	6.0069 V.DC.	+0.0069 V.DC.	6.0069 V.DC.	+\- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
-22.50 "Hg	4.0000 V.DC.	3.9596 V.DC.	-0.0404 V.DC.	3.9596 V.DC.	+\- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
-28.00 "Hg	2.5333 V.DC.	2.4444 V.DC.	-0.0389 V.DC.	2.4444 V.DC.	+\- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					

Environmental Conditions:	Temperature: 21 °C	Humidity: 41 %RH
Comments:		

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2022-05-10
Next Calibration:	2023-05-10
Certificate Date:	2022-05-10

CALIBRATION CONFORMITY	Before	After
Compliant:	X	X
Non Compliant:		

- Instrumentation St. Laurent Inc. Certify that the above instrument, meets or exceeds the specifications established by the manufacturer. The company's quality system complies with the requirements of ISO 17025 :2017 and the standards used to perform the calibration is traceable to NRC and / or NIST.
- Reported uncertainties represent a 95 % of confidence level assuming a normal distribution k=2.
- The declaration of conformity does not include Instrumentation St-Laurent Inc. uncertainty measurement. Decision rule is based on binary statement for simple acceptance rule against ILAC G8 standard and test tolerance limits are based on customer specifications, unless otherwise specified.
- The results presented in this certificate relate only to objects subject to calibration.
- It is the customer's responsibility to ensure that calibrated equipment meets its intended use.
- The date format used in this certificate is: YYYY-MM-DD.

Assessment Service Calibration Laboratory (ASCL) of the National Research Council of Canada (NRC) has assessed and certified calibration laboratory's ability and traceability to the International System of Units (SI) or to standards acceptable according to ASCL. This calibration certificate is issued in accordance with the terms of ASCL certification and accreditation requirements of the Standards Council of Canada (SCC). SCC accreditation number: # 669. ASCL and SCC does not guarantee the accuracy of individual calibrations by accredited laboratories.

Marco Miron - Technicien

Version 1

MAY 2022

Instrumentation
Saint•Laurent inc.
Certified ISO 17025

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Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-127 2022-05-10

CLIENT	
Company:	Services Polytests Inc
Address:	695 B rue Gaudette
	St-Jean-sur-Richelieu, Québec, J3B 7S7

CALIBRATION SPECIFICATION	
Service Procedure:	4IN9106
Required Accuracy:	+\- 1"Hg
Calibration Frequency:(days)	365

INSTRUMENT SPECIFICATION			
Instrument Type:	Pressure Gauge	Input Type:	Pression
Manufacturer:	Dwyer	Output Type:	Digitale
Model #:	DPG200	Measurement Type:	Pressure
Serial #:	N.A.	Range:	0-28"Hg
Location:	N.A.	Version:	

CALIBRATORS SPECIFICATION			
Calibrator:	Fluke 744	Certification #:	2022003082
Serial #:	8180008	Certification Date:	2022-04-12
Certified by:	Alpha Controls	Next Certification:	2023-04-12
Comments:			
Calibrator:	Crystal XP2i 300	Certification #:	2021008359
Serial #:	670437	Certification Date:	2021-11-15
Certified by:	Alpha Controls	Next Certification:	2022-11-15
Comments:			

Instrumentation Saint•Laurent inc.
Certified ISO 17025

CLAS NRC·CNRC CLAS 2010-02

SCC Accredited LAB Accréditée CCN N°669

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Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-127 2022-05-10

CALIBRATION RESULTS

Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Accuracy	Uncertainty
Conformity	**Comment**					
0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	+/-1 "Hg	1 "Hg
Compliant	Verification of the indicator					
-7.50 "Hg	-7.50 "Hg	-7.52 "Hg	-0.02 "Hg	-7.52 "Hg	+/- 1 "Hg	1 "Hg
Compliant	Verification of the indicator					
-15.00 "Hg	-15.00 "Hg	-15.03 "Hg	-0.03 "Hg	-15.03 "Hg	+/- 1 "Hg	1 "Hg
Compliant	Verification of the indicator					
-22.50 "Hg	-22.50 "Hg	-22.56 "Hg	-0.06 "Hg	-22.56 "Hg	+/- 1 "Hg	1 "Hg
Compliant	Verification of the indicator					
-28.00 "Hg	-28.00 "Hg	-28.11 "Hg	-0.11 "Hg	-28.11 "Hg	+/- 1 "Hg	1 "Hg
Compliant	Verification of the indicator					
0.00 "Hg	10.0000 V.DC.	10.0236 V.DC.	+0.0236 V.DC.	10.0236 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
-7.50 "Hg	8.0000 V.DC.	8.0275 V.DC.	+0.0275 V.DC.	8.0275 V.DC.	+\- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
-15.00 "Hg	6.0000 V.DC.	6.0185 V.DC.	+0.0185 V.DC.	6.0185 V.DC.	+\- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
-22.50 "Hg	4.0000 V.DC.	4.0002 V.DC.	+0.0002 V.DC.	4.0002 V.DC.	+\- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
-28.00 "Hg	2.5333 V.DC.	2.5160 V.DC.	-0.0173 V.DC.	2.5160 V.DC.	+\- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					

Environmental Conditions: Temperature: 21 °C Humidity: 41 %RH

Comments:

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2022-05-10
Next Calibration:	2023-05-10
Certificate Date:	2022-05-10

CALIBRATION CONFORMITY		
	Before	**After**
Compliant:	X	X
Non Compliant:		

- Instrumentation St. Laurent Inc. Certify that the above instrument, meets or exceeds the specifications established by the manufacturer. The company's quality system complies with the requirements of ISO 17025 :2017 and the standards used to perform the calibration is traceable to NRC and / or NIST.
- Reported uncertainties represent a 95 % of confidence level assuming a normal distribution k=2.
- The declaration of conformity does not include Instrumentation St-Laurent Inc. uncertainty measurement. Decision rule is based on binary statement for simple acceptance rule against ILAC G8 standard and test tolerance limits are based on customer specifications, unless otherwise specified.
- The results presented in this certificate relate only to objects subject to calibration.
- It is the customer's responsibility to ensure that calibrated equipment meets its intended use.
- The date format used in this certificate is: YYYY-MM-DD.

Assessment Service Calibration Laboratory (ASCL) of the National Research Council of Canada (NRC) has assessed and certified calibration laboratory's ability and traceability to the International System of Units (SI) or to standards acceptable according to ASCL. This calibration certificate is issued in accordance with the terms of ASCL certification and accreditation requirements of the Standards Council of Canada (SCC). SCC accreditation number: # 669. ASCL and SCC does not guarantee the accuracy of individual calibrations by accredited laboratories.

Marco Miron - Technicien

Version 1

May 2022

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Trust in every measure

ACCREDITATION ISO 17025
SCC Scope Number 668

CALIBRATION CERTIFICATE

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

Client :	Polytests	**Certificate Number :**	**157-77C603-221**
Address :	695 B rue Gaudette Saint-Jean-sur-Richelieu, QC J3B7S7	**Calibration date :**	04-03-2022

Technician:
Coutu, Daniel

David Llorens, Quality Manager

SERVICE DESCRIPTION:

Masses description :	ASTM E617	**Date approved :**	04-03-2022
Precision class :	ASTM 1	**Next Calibration :**	04-03-2027
Density :	7.95g/cm³	**CCN accreditation # :**	668
Identification (if unique) :	1000026013	**CLAS Certification # :**	2010-01

Test conditions :	Temp °C:	21.05	kPa Pressure:	102.3	Humidity:	49.4

NOTES:

For weight calibration, we use the procedure "Comparaison individuelle" PDL-09-MG-001 and the procedure "Détermination des incertitudes" PDL-09-MG-002. This certificate cannot be copied without written approval from Dispersion Laboratory. The results presented in these pages relate only to objects subjected to calibration.n

REMARKS:

March 2022

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ACCREDITATION ISO 17025
SCC Scope Number 668

CALIBRATION CERTIFICATE

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

Client :	Polytests	**Certificate Number :**	**157-77C603-221**
Address :	695 B rue Gaudette	**CCN Accreditation # :**	668
	Saint-Jean-sur-Richelieu, QC	**CLAS Certification # :**	2010-01
	J3B7S7	**Precision class :**	ASTM 1
		Calibration date :	04-03-2022
Mass :	200 g	**Follow-up date :**	04-03-2027

CALIBRATION RESULTS, CONVENTICNAL MASS:

Nominal Mass	Serial #	Inventory #	Conventional mass	Conventional mass after adjustment	Tolerance ± (mg)	Uncertainties ± (mg)
200 g*	1000026013	EM-129	199.99964 g	199.99986 g	0.50 mg	0.10 mg

*Applicable only for adjusted masses **Falls outside of the specified class

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ACCREDITATION ISO 17025
SCC Scope Number 668

CALIBRATION CERTIFICATE

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

Client :	Polytests	**Certificate Number :**	**157-77C603-221**
Address :	695 B rue Gaudette	**CCN Accreditation # :**	668
	Saint-Jean-sur-Richelieu, QC	**CLAS Certification # :**	2010-01
	J3B7S7	**Precision class :**	ASTM 1
		Calibration date :	04-03-2022
Mass :	200 g	**Follow-up date :**	04-03-2027

CALIBRATION RESULTS, CORRECTIONS:

Nominal Mass	Serial #	Inventory #	Conventional mass Corrections	Conventional mass Corrections after adjustment	Tolerance ± (mg)	Uncertainties ± (mg)
200 g*	1000028013	EM-129	-0.46 mg	-0.14 mg	0.50 mg	0.10 mg

*Applicable only for adjusted masses **Fails outside of the specified class

CALIBRATION CERTIFICATE

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

BALANCES

The following balances are used for calibration purposes:

> 5 kg to 25 kg :	Mettler Toledo XP32003L, SNR 1123271214, max. 32100 g, d = 0.005 g
> 1 kg to 5 kg	Mettler Toledo PR5003, SNR 1115311634, max. 5100 g, d = 0.001 g
> 300 g to 2 kg :	Mettler Toledo XP2004S, SNR B131185222, max. 2100 g, d = 0.1 mg
> 100 g to 200 g :	Mettler Toledo AT201 SNR BA1115230146, max. 205 g, d = 0.01 mg
> 5 g to 100 g :	Mettler Toledo AX106 SNR 1127063924, max. 111 g, d = 1 µg
1 mg to 5 g :	Mettler UMX5, SNR 1121103055, max. 5.1 g, d = 0.1 µg

We are also using these balances in our automated procedure :

> 200 g to 1 kg :	Mettler Toledo AX1005 SNR 1127063210, max. 1109 g, d = 0.01 mg
> 5 g to 100 g :	Mettler Toledo AX106 SNR 1120143015, max. 111 g, d = 1 µg
1 mg to 5 g :	Mettler UMX5, SNR 1125140561, max. 5.1 g, d = 0.1 µg

Our balances are periodically verified, according to our PDL-11-MG-001 control procedure.

UNCERTAINTIES:

The following uncertainties exist :

1. *Uncertainty associated with the weighting process.*
2. *Uncertainty associated with air density.*
3. *Uncertainty associated with the measurement standard.*
4. *Uncertainty associated with the density of the mass being calibrated.*

The uncertainty of the weighing process includes long-term reproducibility.

Uncertainties specified in this report are expanded uncertainties representing a confidence level of approximately 95% obtained by multiplying the combined standard uncertainty by a coverage factor of k = 2. For more detailed information refer to the GUM (Guide to the Expression of Uncertainty in Measurement, 1995 Edition)

TRACEABILITY

The Calibration Laboratory Assessment Service (CLAS) of the National Research Council of Canada (NRC) has assessed and certified specific calibration capabilities of this laboratory and their traceability to recognized national measurement standards and to the International System of Units (SI). This certificate of calibration is issued in accordance with the conditions of certification granted by CLAS and the conditions of accreditation granted by the Standards Council of Canada (SCC). Neither the CLAS nor the SCC guarantees the accuracy of individual calibration by accredited laboratories.

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ACCREDITATION ISO 17025
SCC Scope Number 668

CALIBRATION CERTIFICATE

9900 Chemin de la Côte-de-Liesse, Montréal, QC H8T 1A1
www.dispersion.ca 1.866.395.5066

USED REFERENCES

Item	Serial #	Manufacturer	Calibration date	Due date
300g Labo	96-0888-50-2	Denver Instrument Company	01-10-2020	31-03-2022
1kg-1mg Labo	MT-01	Mettler Toledo	01-10-2020	31-03-2022
2kg Labo	96-0888-50-3	Denver Instrument Company	01-10-2020	31-03-2022
1kg Labo	96-088850-1	Denver Instrument Company	01-10-2020	31-03-2022
5kg Labo	129099	Mettler Toledo	01-10-2020	31-03-2022
10kg Labo	DI000G991	Dispersion	23-03-2021	31-03-2022
20kg Labo	69976	Mettler Toledo	06-10-2021	31-10-2022
1 mg-10kg	4000028011	Troemner	15-10-2021	31-10-2022
2kg Labo	129098	Mettler Toledo	01-10-2020	31-03-2022

ENVIRONMENTAL CONDITIONS

Item	Serial #	Manufacturer	Calibration date	Due date
THE004	107080	Control Company	04-03-2021	31-03-2022

Instrumentation
Saint•Laurent inc.
Certified ISO 17025

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(Québec), J0N 1M0
Phone: (450) 473-6169
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Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-136 2022-05-25

CLIENT	
Company:	Services Polytests Inc
Address:	695 B rue Gaudette
	St-Jean-sur-Richelieu, Québec, J3B 7S7

CALIBRATION SPECIFICATION	
Service Procedure:	ISL-004
Required Accuracy:	+\-2°C +\-3%RH
Calibration Frequency:(days)	365

INSTRUMENT SPECIFICATION			
Instrument Type:	Hygrometer	Input Type:	Temp/%RH
Manufacturer:	Fluke	Output Type:	Digitale
Model #:	971	Measurement Type:	Temp/Humidity
Serial #:	10610850	Range:	5-95%RH -20a60°C
Location:	N.A.	Version:	

CALIBRATORS SPECIFICATION			
Calibrator:	Hygrometre 485B-1/RPM	Certification #:	2022001936
Serial #:	035V4V	Certification Date:	2022-03-11
Certified by:	Alpha Controls	Next Certification:	2023-03-11
Comments:			

Instrumentation Saint•Laurent inc.
Certified ISO 17025

CLAS NRC-CNRC
CLAS 2010-02

SCC Accredited LAB
LAB Accréditée CCN
N°669

80 rue de la montagne
St-Joseph du lac
(Québec), J0N 1M0
Phone: (450) 473-6169
Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-136 2022-05-25

CALIBRATION RESULTS

Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Accuracy	Uncertainty
Conformity	Comment					
25.0 °C	25.0 °C	25.1 °C	+0.1 °C	25.1 °C	+/- 2.0 °C	1.0 °C
40.0 °C	40.0 °C	40.3 °C	+0.3 °C	40.3 °C	+/- 2.0 °C	1.0 °C
30.0 %RH	30.0 %RH	28.1 %RH	-1.9 %RH	28.1 %RH	+/- 3.0 %RH	-- %RH
55.0 %RH	55.0 %RH	52.8 %RH	-2.2 %RH	52.8 %RH	+/- 3.0 %RH	-- %RH
75.0 %RH	75.0 %RH	73.8 %RH	-1.2 %RH	73.8 %RH	+/- 3.0 %RH	-- %RH

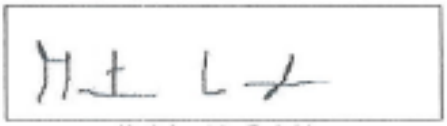
Environmental Conditions:	Temperature: 22 °C	Humidity: 39 %RH
Comments:		

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2022-05-25
Next Calibration:	2023-05-25
Certificate Date:	2022-05-25

CALIBRATION CONFORMITY	Before	After
Compliant:	X	X
Non Compliant:		

- Instrumentation St. Laurent Inc. Certify that the above instrument, meets or exceeds the specifications established by the manufacturer. The company's quality system complies with the requirements of ISO 17025 :2017 and the standards used to perform the calibration is traceable to NRC and / or NIST.
- Reported uncertainties represent a 95 % of confidence level assuming a normal distribution k=2.
- The declaration of conformity does not include Instrumentation St-Laurent Inc. uncertainty measurement. Decision rule is based on binary statement for simple acceptance rule against ILAC G8 standard and test tolerance limits are based on customer specifications, unless otherwise specified.
- The results presented in this certificate relate only to objects subject to calibration.
- It is the customer's responsibility to ensure that calibrated equipment meets its intended use.
- The date format used in this certificate is: YYYY-MM-DD.

Assessment Service Calibration Laboratory (ASCL) of the National Research Council of Canada (NRC) has assessed and certified calibration laboratory's ability and traceability to the International System of Units (SI) or to standards acceptable according to ASCL. This calibration certificate is issued in accordance with the terms of ASCL certification and accreditation requirements of the Standards Council of Canada (SCC). SCC accreditation number: # 669. ASCL and SCC does not guarantee the accuracy of individual calibrations by accredited laboratories.



Martin Langlois - Technicien

May 2022

Version 1

Instrumentation
Saint•Laurent inc.
Certified ISO 17025

80 rue de la montagne
St-Joseph du lac
(Québec), J0N 1M0
Phone: (450) 473-6169
Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-147 2022-05-11

CLIENT	
Company:	Services Polytests Inc
Address:	695 B rue Gaudette
	St-Jean-sur-Richelieu, Québec, J3B 7S7

CALIBRATION SPECIFICATION	
Service Procedure:	4IN9101
Required Accuracy:	+\- 2.0C
Calibration Frequency:(days)	365

INSTRUMENT SPECIFICATION			
Instrument Type:	Recorder	Input Type:	Divers
Manufacturer:	Keithley	Output Type:	Digital
Model #:	2700	Measurement Type:	Temperature
Serial #:	1349443	Range:	Divers
Location:	N.A.	Version:	

CALIBRATORS SPECIFICATION			
Calibrator:	Fluke 744	Certification #:	2022003082
Serial #:	8180008	Certification Date:	2022-04-12
Certified by:	Alpha Controls	Next Certification:	2023-04-12
Comments:			

5F09101 Version 1

Instrumentation Saint•Laurent inc.
Certified ISO 17025

CLAS NRC-CNRC
CLAS 2010-02

SCC Accredited Lab
Accredited CSN
N°669

80 rue de la montagne
St-Joseph du lac
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Phone: (450) 473-6169
Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-147 2022-05-11

CALIBRATION RESULTS

Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Accuracy	Uncertainty
Conformity	**Comment**					
EntrySource	GivenValue	ActualValue	Deviation	Post Calib	Tolerance	Incertitude
Conformity	Voir Commentaire					

Environmental Conditions: Temperature: 21 °C Humidity: 42 %RH

Comments: Data Acquisition system Conforme

Les 2 slot de l'enregistreur ont été vérifié.

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2022-05-11
Next Calibration:	2023-05-11
Certificate Date:	2022-05-11

CALIBRATION CONFORMITY	Before	After
Compliant:	X	X
Non Compliant:		

- Instrumentation St. Laurent Inc. Certify that the above instrument, meets or exceeds the specifications established by the manufacturer. The company's quality system complies with the requirements of ISO 17025 :2017 and the standards used to perform the calibration is traceable to NRC and / or NIST.
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- The declaration of conformity does not include Instrumentation St-Laurent Inc. uncertainty measurement. Decision rule is based on binary statement for simple acceptance rule against ILAC G8 standard and test tolerance limits are based on customer specifications, unless otherwise specified.
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Marco Miron - Technicien

May 2022

Version 1

Instrumentation Saint•Laurent Inc.
Certified ISO 17025

CLAS NRC·CNRC
CLAS 2010-02

SCC Accredited LAB
LAB Accredité CON
N°669

80 rue de la montagne
St-Joseph du lac
(Québec) J0N 1M0
Phone: (450) 473-6169
Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-154/2 2022-05-11

CALIBRATION RESULTS

Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Accuracy	Uncertainty
Conformity	Comment					
77.0 °F	77.0 °F	76.4 °F	-0.6 °F	76.4 °F	+/- 4.0 °F	+/- 0.5 °F
Compliant	ID. No. 111 (Filtre 1) en type "T" En Loop avec EM-154					
77.0 °F	77.0 °F	76.3 °F	-0.7 °F	76.3 °F	+/- 4.0 °F	+/- 0.5 °F
Compliant	ID. No. 112 (Filtre 2) en type "T" En Loop avec EM-154					
140.0 °F	140.0 °F	139.7 °F	-0.3 °F	139.7 °F	+/- 4.0 °F	+/- 0.4 °F
Compliant	ID. No. 113 (Tunnal) en type "J" En Loop avec EM-154					
68.0 °F	68.0 °F	67.6 °F	-0.4 °F	67.6 °F	+/- 4.0 °F	+/- 0.4 °F
Compliant	ID. No. 114 (Room) en type "J" En Loop avec EM-154					
77.0 °F	77.0 °F	76.6 °F	-0.4 °F	76.6 °F	+/- 4.0 °F	+/- 0.4 °F
Non-Compliant	ID. No. 115 (Analyzer gaz) en type "J" En Loop avec EM-154					

Environmental Conditions:	Temperature: 21 °C	Humidity: 42 %RH
Comments:		

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2022-05-11
Next Calibration:	2022-11-11
Certificate Date:	2022-05-11

CALIBRATION CONFORMITY	Before	After
Compliant:	X	X
Non Compliant:		

- Instrumentation St. Laurent Inc. Certify that the above instrument, meets or exceeds the specifications established by the manufacturer. The company's quality system complies with the requirements of ISO 17025 :2017 and the standards used to perform the calibration is traceable to NRC and / or NIST.
- Reported uncertainties represent a 95 % of confidence level assuming a normal distribution k=2.
- The declaration of conformity does not include Instrumentation St-Laurent Inc. uncertainty measurement. Decision rule is based on binary statement for simple acceptance rule against ILAC G8 standard and test tolerance limits are based on customer specifications, unless otherwise specified.
- The results presented in this certificate relate only to objects subject to calibration.
- It is the customer's responsibility to ensure that calibrated equipment meets its intended use.
- The date format used in this certificate is: YYYY-MM-DD.

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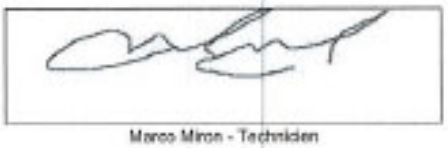

Marco Miron - Technicien

Version 1

Instrumentation
Saint•Laurent Inc.
Certified ISO 17025

CLAS
NRC·CNRC
CLAS 2010-02

SCC Accredited
LAB
Accredité CCN
N°689

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Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-154/2 2022-05-11

CLIENT	
Company:	Services Polytests Inc
Address:	695 B rue Gaudette
	St-Jean-sur-Richelieu, Québec, J3B 7S7

CALIBRATION SPECIFICATION	
Service Procedure:	4IN9101
Required Accuracy:	+\- 4.0°F
Calibration Frequency:(days)	181

INSTRUMENT SPECIFICATION			
Instrument Type:	Recorder	**Input Type:**	Temp
Manufacturer:	Keithley	**Output Type:**	Digitale
Model #:	7700	**Measurement Type:**	Temperature
Serial #:	1306774	**Range:**	Divers
Location:	N/A	**Version:**	

CALIBRATORS SPECIFICATION			
Calibrator:	Fluke 744	**Certification #:**	2022003082
Serial #:	8180008	**Certification Date:**	2022-04-12
Certified by:	Alpha Controls	**Next Certification:**	2023-04-12
Comments:			

5F09101 Version 1

Instrumentation
Saint•Laurent Inc.
Certified ISO 17025

80 rue de la montagne
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(Québec), J0N 1M0
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Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-154 2022-05-11

CLIENT	
Company:	Services Polytests Inc
Address:	695 B rue Gaudette
	St-Jean-sur-Richelieu, Québec, J3B 7S7

CALIBRATION SPECIFICATION	
Service Procedure:	4IN9101
Required Accuracy:	+\- 2°C
Calibration Frequency:(days)	365

INSTRUMENT SPECIFICATION			
Instrument Type:	Recorder	Input Type:	Temp
Manufacturer:	Keithley	Output Type:	Digitale
Model #:	7700	Measurement Type:	Temperature
Serial #:	1306774	Range:	Divers
Location:	N/A	Version:	

CALIBRATORS SPECIFICATION			
Calibrator:	Fluke 744	Certification #:	2022003082
Serial #:	8180008	Certification Date:	2022-04-12
Certified by:	Alpha Controls	Next Certification:	2023-04-12
Comments:			

Instrumentation Saint•Laurent Inc.
Certified ISO 17025

CLAS NRC·CNRC CLAS 2010-02

SCC Accredited LAB Accrédité CCN N°889

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St-Joseph du lac
(Québec), J0N 1M0
Phone: (450) 473-6169
Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-154 2022-05-11

CALIBRATION RESULTS

Entry Source / Conformity	Given Value / Comment	Actual Value	Deviation Error	After Calib Value	Accuracy	Uncertainty
-17.000 mV	-17.000 mV	-17.106 mV	-0.106 mV	-17.106 mV	+/- 0.500 mV	0.1 mV
Compliant	Input#1					
0.000 mV	0.000 mV	-0.105 mV	-0.105 mV	-0.105 mV	+/- 0.500 mV	0.1 mV
Compliant	Input#1					
20.000 mV	20.000 mV	19.897 mV	-0.103 mV	19.897 mV	+/- 0.500 mV	0.1 mV
Compliant	Input#1					
30.000 mV	30.000 mV	29.870 mV	-0.130 mV	29.870 mV	+/- 0.500 mV	0.1 mV
Compliant	Input#2					
30.000 mV	30.000 mV	29.870 mV	-0.130 mV	29.870 mV	+/- 0.500 mV	0.1 mV
Compliant	Input#3 Non-Conforme					
5.000 V.DC.	5.000 V.DC.	5.000 V.DC.	0.000 V.DC.	5.000 V.DC.	+/- 0.050 V.DC.	0.1 V.DC.
Compliant	Input#4					
30.000 mV	30.000 mV	29.647 mV	-0.353 mV	29.647 mV	+/- 0.050 mV	0.1 mV
Compliant	Input#5					
30.000 mV	30.000 mV	29.642 mV	-0.358 mV	29.642 mV	+/- 0.050 mV	0.1 mV
Compliant	Input#6					
100.00 Ohms	100.00 Ohms	101.02 Ohms	+'.02 Ohms	101.02 Ohms	+/- 0.10 Ohms	+/- 0.051 Ohms
Non-Compliant	Input#7					
100.00 Ohms	100.00 Ohms	101.00 Ohms	+'.00 Ohms	101.00 Ohms	+/- 0.10 Ohms	+/- 0.051 Ohms
Non-Compliant	Input#8					
100.00 Ohms	100.00 Ohms	101.00 Ohms	+'.00 Ohms	101.00 Ohms	+/- 0.10 Ohms	+/- 0.051 Ohms
Non-Compliant	Input#9					
100.00 Ohms	100.00 Ohms	100.90 Ohms	+0.90 Ohms	100.90 Ohms	+/- 0.10 Ohms	+/- 0.051 Ohms
Non-Compliant	Input#10					
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	+/- 2.0 °C	+/- 0.3 °C
Compliant	Input#11TypeT					
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	+/- 2.0 °C	+/- 0.3 °C
Compliant	Input#12TypeT					
100.0 °C	100.0 °C	99.7 °C	+0.3 °C	99.7 °C	+/- 2.0 °C	+/- 0.2 °C
Compliant	Input#13 TypeJ					
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	+/- 2.0 °C	+/- 0.2 °C
Compliant	Input#14TypeJ					
100.0 °C	100.0 °C	99.9 °C	-0.1 °C	99.9 °C	+/- 2.0 °C	+/- 0.2 °C
Compliant	Input#15 TypeJ					
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	+/- 2.0 °C	+/- 0.2 °C
Compliant	Input#16TypeJ					
100.00 Ohms	100.00 Ohms	101.08 Ohms	+1.08 Ohms	101.08 Ohms	+/- 0.10 Ohms	+/- 0.051 Ohms
Non-Compliant	Input#17					
100.00 Ohms	100.00 Ohms	101.04 Ohms	+1.04 Ohms	101.04 Ohms	+/- 0.10 Ohms	+/- 0.051 Ohms
Non-Compliant	Input#18					

Version 1

Instrumentation Saint•Laurent Inc.
Certified ISO 17025

CLAS NRC-CNRC CLAS 2010-02

SCC Accredited LAB N°669

80 rue de la montagne
St-Joseph du lac
(Québec), J0N 1M0
Phone: (450) 473-6169
Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-154 2022-05-11

CALIBRATION RESULTS

Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Accuracy	Uncertainty
Conformity	**Comment**					
100.00 Ohms	100.00 Ohms	101.03 Ohms	+0.02 Ohms	101.03 Ohms	+/- 0.10 Ohms	+/- 0.051 Ohms
Non-Compliant	Input#19					
100.00 Ohms	100.00 Ohms	100.99 Ohms	+0.99 Ohms	100.99 Ohms	+/- 0.10 Ohms	+/- 0.051 Ohms
Non-Compliant	Input#20					
12.000 mA	12.000 mA	12.001 mA	+0.001 mA	12.001 mA	+/- 0.100 mA	1.00 mA
Compliant	Input#21					
12.000 mA	12.000 mA	-------- mA	-------- mA	-------- mA	+/- 0.100 mA	1.00 mA
Non-Compliant	Input#22 Fonctionne pas					

Environmental Conditions: Temperature: 21 °C Humidity: 42 %RH

Comments: Test avec EM-147

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2022-05-11
Next Calibration:	2023-05-11
Certificate Date:	2022-05-11

CALIBRATION CONFORMITY	Before	After
Compliant:	X	X
Non Compliant:		

- Instrumentation St. Laurent Inc. Certify that the above instrument, meets or exceeds the specifications established by the manufacturer. The company's quality system complies with the requirements of ISO 17025 :2017 and the standards used to perform the calibration is traceable to NRC and / or NIST.
- Reported uncertainties represent a 95 % of confidence level assuming a normal distribution k=2.
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- The date format used in this certificate is: YYYY-MM-DD.

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Marco Miron - Technicien

May 2022

5F09101 Version 1

Trescal
/ CALIBRATION SOLUTIONS TO IMPROVE YOUR PERFORMANCE /
/ LA MÉTROLOGIE AU SERVICE DE VOTRE PERFORMANCE /

4407 Rue Charlemi, Montréal-Nord (Québec)
H1H 1T6 Canada
TEL.: (514) 329-3242 / 1 888 776-6666
FAX: (514) 329-3750
info.canada@trescal.com

2022.01.17

Certificat d'Étalonnage / Certificate of Calibration

CLIENT :
SERVICES POLYTESTS INC.
695-B GAUDETTE
ST-JEAN-SUR-RICHELIEU, QC J3B7S7

Description: STOPWATCH
Fabricant/ Manufacturer: EXTECH
Modèle/ Model : 365510
No série / Serial no : 131636
Inventaire / Asset # : EM-175

CERTIFICAT No / Certificate No: 347561

PROCÉDURE / Procedure :
TRESCAL - EXTECH_365510

Date étalonnage/ Calibration Performed : aaaa - mm - jj
2021-12-24

Echéance/ Due Date : 2022-12-24

Type de résultat / *Results type* : As-Found = As-Left

Résultats d'essais / *Test results* : Conforme / In Tolerance

Conditions de mesure / Measurement conditions

TEMPÉRATURE / Temp. : 23.0°C

HUMIDITÉ / Humidity : 36% RH

Usage restreint/ *Restricted use* : ☐

Réparation effectuée / *Repair performed* : ☐

Ajustement effectué / *Adjustment performed* : ☐

ÉTALONS UTILISÉS/ Standards Used:

Identification	Manuf.	Model	Description	Ser. #	Étalonné/ Cal.	Échéance/ Due
PR0313	H-P	53132A	UNIVERSAL COUNTER	3546A03142	2021-08-25	2022-08-25
PR0392	AGILENT	33250A	FUNCTION/ARBITRARY WAVEFORM GENERATOR	MY40008014	2021-06-11	2023-06-11

Les spécifications mentionnées comme limites de tolérances d'essai sont celles établies par le manufacturier, sauf indication contraire.
Test tolerance limits are based on manufacturers specifications unless stated otherwise.

NOTES :

Technicien :
Technician

M. BARBAK

Le système qualité de la société est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour le processus d'étalonnage sont retraçables au SI par l'entremise du CNRC et/ou du NIST.
Our quality system complies with the requirements of ISO 17025 and the standards used for the calibration are traceable to SI through NRC and/or NIST.

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| LA MÉTROLOGIE AU SERVICE DE VOTRE PERFORMANCE |

Certificat d'Étalonnage
Certificate of Calibration

	347561
CLIENT / Customer :	SERVICES POLYTESTS INC.
DESCRIPTION / Description :	STOPWATCH
MANUFACTURIER / Manufacturer :	EXTECH
MODÈLE / Model :	365510

DESCRIPTION Description	LIMITES Limits	LECTURES Readings	LIMITES Limits
	Min		Max
Temps écoulé, chronomètre sous test / Elapsed time on test stopwatch		Comptes / Counts Chronomètre/timer 162444	

Minutes	Seconds	1/100 sec
27	4	44

Total au compteur / Reference timer: 162447,4 comptes/counts

(Δt) Deviation (1/100sec): -3,40

		Min	Readings	Max
Deviation Par jour/ Per day (%):	-0,0021 %			
Deviation Par jour/ Per day (sec):	**-1,81 sec**	* Secondes -3,00	Deviation 24hrs **-1,81**	* Secondes 3,00

* Tolérances basées sur une déviation maximale de 3 sec/jour
* Tolerances based on a 3 sec/day maximum deviation

Incertitude/ Uncertainty: ±37 ms

Lorsque fournies dans le rapport, les incertitudes de mesure sont des incertitudes élargies représentant un niveau de confiance d'approximativement 95% , obtenu en multipliant l'incertitude-type composée par un facteur de couverture de k=2.

When supplied in the report, the measurement uncertainties are expanded uncertainties representing a confidence level of approximately 95% , obtain by multiplying the combined standard uncertainty by a coverage factor of k=2.

POLYCONTROLS
INTEGRATION • CALIBRATION • INSTRUMENTATION

CLAS
NRC-CNRC
CLAS 2009-02

8866

CALIBRATION CERTIFICATE # 15752

Calibration date : 2022/01/03
Certificate issued : 2022/01/04

Services Polytests
695 B Gaudette street
St-Jean-sur-Richelieu, Québec, Canada
J3B 7S7

Calibration of
Shinigawa DCDı-2e S/N : 23544

QUALITY PROGRAM CONFORMANCE

All calibrations are performed in accordance with Polycontrols Laboratory Quality Assurance Manual and conform to ISO/IEC 17025: 2017, ISO 9001 – 2015 and/or other quality requirements defined in customers purchase descriptions. The results are strictly valid for the device under test or calibration. If applicable, the decision rule is described in the certificate.

TRACEABILITY

The traceability for flow standard to the National Institute of Standards and Technology, NIST, is maintained by Fluke Corporation of Phoenix, Arizona and conform to ISO/IEC 17025, ANSI/NCSL Z540-1-1994, ISO-10012-1 and MIL-STD 45662A.

The Calibration Laboratory Assessment Service (CLAS) of the National Research Council of Canada (NRC) has assessed and certified specific calibration capabilities of this laboratory and traceability to the International System of Units (SI) or to standards acceptable to the CLAS program. This certificate of calibration is issued in accordance with the conditions of certification granted by CLAS and the conditions of accreditation granted by the Standards Council of Canada (SCC). Neither CLAS nor SCC guarantee the accuracy of individual calibrations by accredited laboratories.

CALIBRATION AND MEASUREMENT CAPABILITY

Calibration measurement capabilities have an uncertainty of ±0.2% of reading for a flow range between 5 SCCM to 10 SLPM, ±0.3% of reading for a flow range between 10 SLPM to 30 SLPM, ±0.2% of reading for a flow range between 30 SLPM to 3000 SLPM, ±0.3% of reading for a flow range above 3000 SLPM to 6000 SLPM and ±0.5% of reading for a flow range under 5 SCCM down to 1 SCCM, air or nitrogen equivalent. The reported uncertainty is expanded using a coverage factor k=2 for a level of confidence of approximately 95%, assuming a normal distribution including resolution of the instrument. The test uncertainty ratio (TUR) of this calibration is at least 4:1 unless otherwise stated.

CONDITION SUMMARY OF THE DEVICE UNDER TEST

Initial conditions	In good condition
Work done	Calibration of the instrument
	Initial readings = Final readings, no adjustment
Results	Final readings in tolerance with K factor = 0.98
Remarks	Calibration frequency every 12 months

Olivier Duchesne Bamber
Metrologist

Laboratory Manager

3650, Matte blvd. (Unit A-1), Brossard (Quebec), Canada, J4Y 2Z2
Tel: (450) 444-3600 Fax: (450) 444-1088 www.polycontrols.com

POLYCONTROLS
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CLAS
NRC·CNRC
CLAS 2009-02

Calibration certificate # 15752

Serial Number:	23544	Test stand:	1
Calibration Date:	2022/01/03	Procedure:	POS-CAL-005
Instrument ID:	EM-178	Decision rule:	Method #3

Standard equipment used for final calibration

Description	Model	Serial #	Traceability	Due date
Fluke molbloc_30 slpm	3E4-VCR-V-Q	2403	1500308202	2022/06/03
Fluke molbox1	Molbox1	755	1500311473	2022/07/02
RTD Mist	M22	2208102	2020003043	2021/04/23
Module 44.5 PSI avec Baro 163671	Module 30	160659	2021003409	2022/05/04

Final specifications of the device under test		Calibration conditions	
Gas	Air	Gas	Air
Operation temperature		Ambient temperature	24 °C
Inlet pressure		Ambient pressure	1026.11 mbar
Outlet pressure		Orientation	Horizontal
Reference temperature		Seals	Viton
Reference pressure		Valve	
Range	10-2000 ALH		
Input/Output Signals	-		
Supply			
Accuracy ±2 %O.R.			

Final readings

Test Flow ALH	Device under test L	Measured values Pressure PSIA	Temperature °C	Reference L	Calculated Reference L	Calculated Error L	Acceptable Error L	Uncertainty k = 2 L	TUR
191.6813	31.7373	14.8912	21.32	32.3469	31.9453	-0.2080	0.6389	0.1060	>4
963.3374	160.6832	14.9054	21.36	162.5214	160.3710	0.3122	3.2074	0.5321	>4
1761.9667	292.1086	14.9135	21.50	297.3725	293.4193	-1.3107	5.8684	0.9737	>4

POLYCONTROLS

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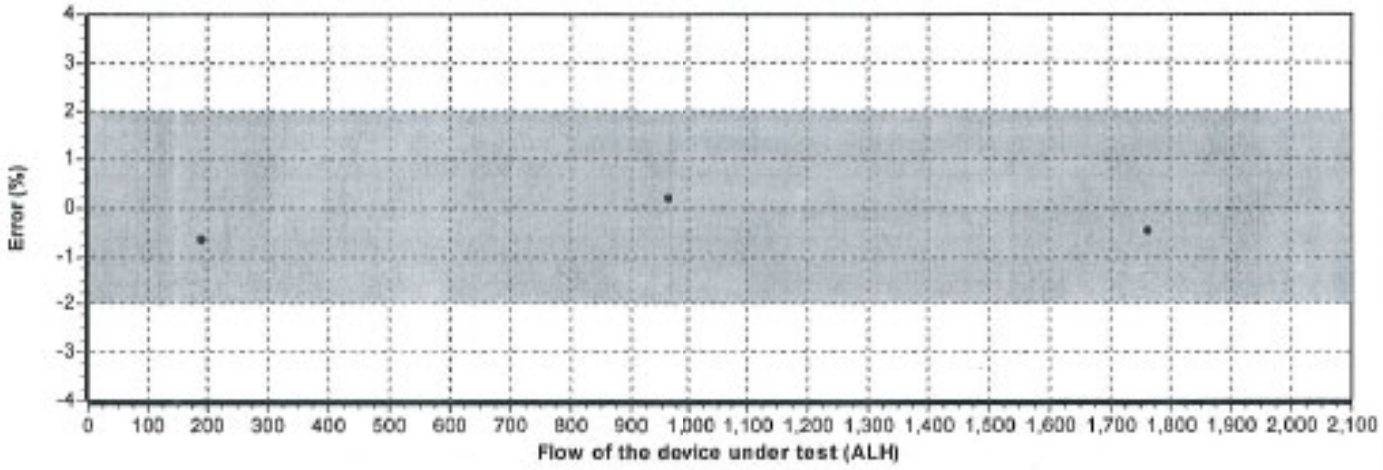
CLAS NRC-CNRC CLAS 2009-02

Calibration certificate # 15752

Serial Number:	23544	Test stand:	1
Calibration Date:	2022/01/03	Procedure:	POS-CAL-005
Instrument ID:	EM-178	Decision rule:	Method #3

Final results



See the appendix for the guideline of decision rule

2022-01-11

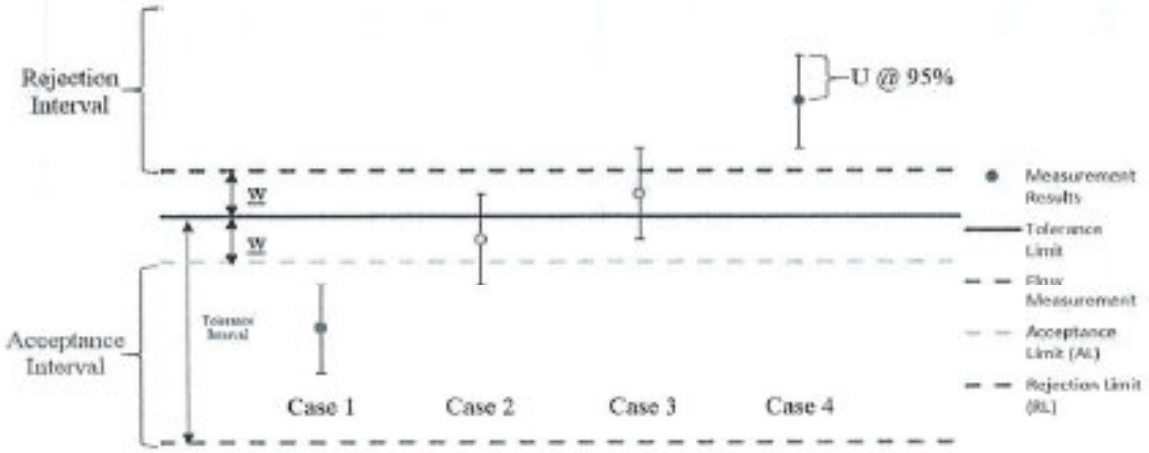
Fc : 1.006554

Appendix for the decision rule

Method #3 Non-binary Statement with Guard Band, uncertainty directly taken into account

This decision rule uses a guard band to define the acceptance and rejection interval. The acceptance limit is defined by the following mathematical formula AL = TL – w and the rejection limit RL = TL + w, where w = rU. The multiple r that is multiplied by the expanded measurement uncertainty U can be defined following ILAC G8: 2019 table 1 section 5.2. The expanded measurement uncertainty U has a 95% coverage probability (k = 2). Non-binary statement with guard band exists when the result is limited to four choices: pass, conditional pass, conditional fail, and fail.

Statements of conformity are reported as:



Graphical representation of a Non-Binary Statement with a Guard Band

Case 1 – *Below acceptance limit AL,* ***Status: In tolerance.***

- The result is inside the acceptance interval. However, assuming a normal distribution, the risk that the result is outside the tolerance limit could be up to 2.5%. Uncertainty is directly taken into account. Green.

Case 2 – *Below tolerance limit TL, greater than acceptance limit AL,* ***Status: In tolerance-Conditional.***

- The result is outside the acceptance interval but below tolerance limit. However, the observed value is inside the guard band w = TL – AL and the status is conditional on the customer's risk assessment. Uncertainty is directly taken into account. Yellow.

Case 3 – *Greater than tolerance limit, below rejection limit RL,* ***Status: Out of tolerance-Conditional.***

- Le result is greater than tolerance limit but outside the rejection interval. However, the observed value is inside the guard band w = TL – RL and the status is conditional on the customer's risk assessment. Uncertainty is directly taken into account. Yellow.

Case 4 – *Greater than rejection limit RL,* ***Status: Out of tolerance.***

- The result is inside the rejection interval. Uncertainty is directly taken into account. Red.

3650, Matte blvd. (Unit A-1), Brossard (Quebec), Canada, J4Y 2Z2
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CLAS
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CLAS 2009-02

CALIBRATION CERTIFICATE # 15754

Calibration date : 2022/01/03
Certificate issued : 2022/01/04

Services Polytests
695 B Gaudette street
St-Jean-sur-Richelieu, Québec, Canada
J3B 7S7

Calibration of
Shinigawa DCDa-2e S/N : 23543

QUALITY PROGRAM CONFORMANCE

All calibrations are performed in accordance with Polycontrols Laboratory Quality Assurance Manual and conform to ISO/IEC 17025: 2017, ISO 9001 – 2015 and/or other quality requirements defined in customers purchase descriptions. The results are strictly valid for the device under test or calibration. If applicable, the decision rule is described in the certificate.

TRACEABILITY

The traceability for flow standard to the National Institute of Standards and Technology, NIST, is maintained by Fluke Corporation of Phoenix, Arizona and conform to ISO/IEC 17025, ANSI/NCSL Z540-1-1994, ISO-10012-1 and MIL-STD 45662A.

The Calibration Laboratory Assessment Service (CLAS) of the National Research Council of Canada (NRC) has assessed and certified specific calibration capabilities of this laboratory and traceability to the International System of Units (SI) or to standards acceptable to the CLAS program. This certificate of calibration is issued in accordance with the conditions of certification granted by CLAS and the conditions of accreditation granted by the Standards Council of Canada (SCC). Neither CLAS nor SCC guarantee the accuracy of individual calibrations by accredited laboratories.

CALIBRATION AND MEASUREMENT CAPABILITY

Calibration measurement capabilities have an uncertainty of ±0.2% of reading for a flow range between 5 SCCM to 10 SLPM, ±0.3% of reading for a flow range between 10 SLPM to 30 SLPM, ±0.2% of reading for a flow range between 30 SLPM to 3000 SLPM, ±0.3% of reading for a flow range above 3000 SLPM to 6000 SLPM and ±0.5% of reading for a flow range under 5 SCCM down to 1 SCCM, air or nitrogen equivalent. The reported uncertainty is expanded using a coverage factor k=2 for a level of confidence of approximately 95%, assuming a normal distribution including resolution of the instrument. The test uncertainty ratio (TUR) of this calibration is at least 4:1 unless otherwise stated.

CONDITION SUMMARY OF THE DEVICE UNDER TEST

Initial conditions	In good condition
Work done	Initial readings = Final readings, no adjustment Calibration of the instrument
Results	Final readings in tolerance
Remarks	Calibration frequency every 12 months

Olivier Duchesne Bamber
Metrologist

Laboratory Manager

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Calibration certificate # 15754			
Serial Number:	23543	Test stand:	3
Calibration Date:	2022/01/03	Procedure:	POS-CAL-005
Instrument ID:	EM-179	Decision rule:	Method #3

Standard equipment used for final calibration

Description	Model	Serial #	Traceability	Due date
Fluke molbloc_30 slpm	3E4-VCR-V-Q	2403	1500308202	2022/06/03
Fluke molbox1	Molbox1	755	1500311473	2022/07/02
RTD Mist	M22	2208102	2020003043	2021/04/23
Module 44.5 PSI avec Baro 163671	Module 30	160659	2021003409	2022/05/04

Final specifications of the device under test		Calibration conditions	
Gas	Air	Gas	Air
Operation temperature		Ambient temperature	23.5 °C
Inlet pressure		Ambient pressure	1024.68 mbar
Outlet pressure		Orientation	Horizontal
Reference temperature		Seals	Viton
Reference pressure		Valve	
Range	10-2000 ALH		
Input/Output Signals	-		
Supply			
Accuracy ±2 %O.R.			

Final readings

Test Flow ALH	Device under test L	Measured values Pressure PSIA	Temperature °C	Reference L	Calculated Reference L	Calculated Error L	Acceptable Error L	Uncertainty k = 2 L	TUR
337.6703	56.9625	14.8927	21.40	56.9866	56.2889	0.6736	1.1258	0.1868	>4
993.5699	168.1100	14.9008	21.41	167.6884	165.5494	2.5606	3.3110	0.5493	>4
1714.5316	288.1350	14.9140	21.58	288.7148	284.9453	3.1897	5.6989	0.9457	>4

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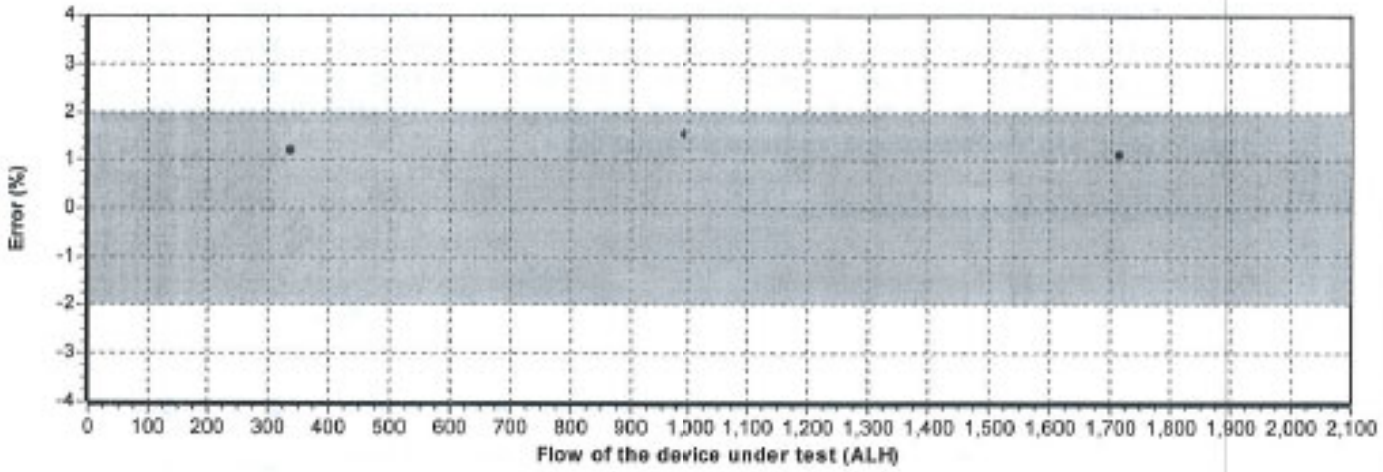
CLAS NRC·CNRC CLAS 2089-02

8055

Calibration certificate # 15754

Serial Number:	23543	Test stand:	3
Calibration Date:	2022/01/03	Procedure:	POS-CAL-005
Instrument ID:	EM-179	Decision rule:	Method #3

Final results



See the appendix for the guideline of decision rule

2022-01-11

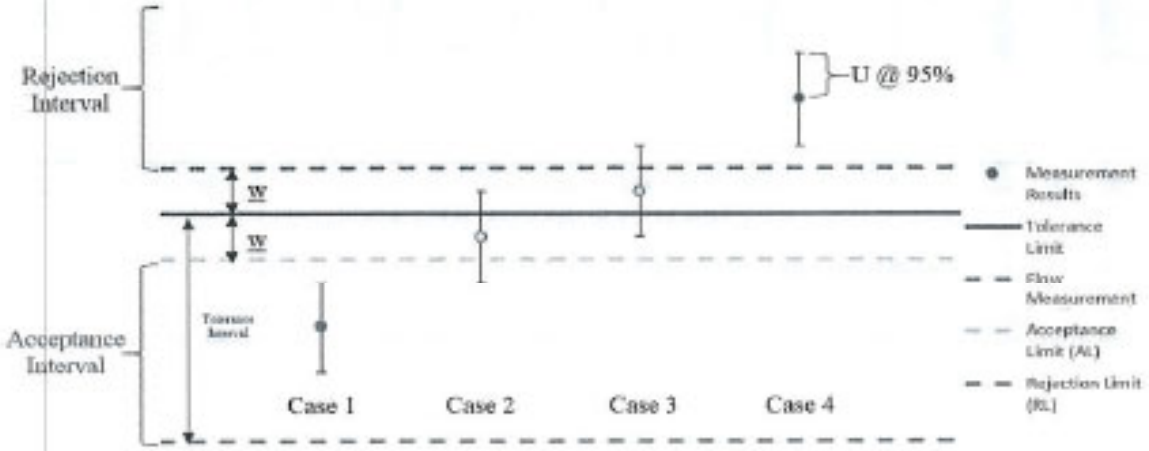
Fc: 0,98817 47

Appendix for the decision rule

Method #3 Non-binary Statement with Guard Band, uncertainty directly taken into account

This decision rule uses a guard band to define the acceptance and rejection interval. The acceptance limit is defined by the following mathematical formula AL = TL – w and the rejection limit RL = TL + w, where w = rU. The multiple r that is multiplied by the expanded measurement uncertainty U can be defined following ILAC G8: 2019 table 1 section 5.2. The expanded measurement uncertainty U has a 95% coverage probability (k = 2). Non-binary statement with guard band exists when the result is limited to four choices: pass, conditional pass, conditional fail, and fail.

Statements of conformity are reported as:



Graphical representation of a Non-Binary Statement with a Guard Band

Case 1 – *Below acceptance limit AL,* ***Status: In tolerance.***

- The result is inside the acceptance interval. However, assuming a normal distribution, the risk that the result is outside the tolerance limit could be up to 2.5%. Uncertainty is directly taken into account. Green.

Case 2 – *Below tolerance limit TL, greater than acceptance limit AL,* ***Status: In tolerance-Conditional.***

- The result is outside the acceptance interval but below tolerance limit. However, the observed value is inside the guard band w = TL – AL and the status is conditional on the customer's risk assessment. Uncertainty is directly taken into account. Yellow.

Case 3 – *Greater than tolerance limit, below rejection limit RL,* ***Status: Out of tolerance-Conditional.***

- Le result is greater than tolerance limit but outside the rejection interval. However, the observed value is inside the guard band w = TL – RL and the status is conditional on the customer's risk assessment. Uncertainty is directly taken into account. Yellow.

Case 4 – *Greater than rejection limit RL,* ***Status: Out of tolerance.***

- The result is inside the rejection interval. Uncertainty is directly taken into account. Red.

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ACCREDITATION ISO 17025
SCC Scope Number 668

CALIBRATION CERTIFICATE

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

Client :	Polytests	**Certificate Number :**	**157-77C603-222**
Address :	695 B rue Gaudette Saint-Jean-sur-Richelieu, QC J3B7S7	**Calibration date :**	04-03-2022

Technician:
Coutu, Daniel

David Llorens, Quality Manager

SERVICE DESCRIPTION:

Masses description :	NIST F	**Date approved :**	14-03-2022
Precision class :	NIST F	**Next Calibration :**	04-03-2026
Density :	7.7g/cm³	**CCN accreditation # :**	668
Identification (if unique) :	DI000D532	**CLAS Certification # :**	2010-01

Test conditions :	Temp °C:	21.05	kPa Pressure:	102.3	Humidity:	49.4

NOTES:

For weight calibration, we use the procedure "Comparaison individuelle" PDL-09-MG-001 and the procedure "Détermination des incertitudes" PDL-09-MG-002. This certificate cannot be copied without written approval from Dispersion Laboratory. The results presented in these pages relate only to objects subjected to calibration.n

REMARKS:

March 2022

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SCC Scope Number 668

CALIBRATION CERTIFICATE

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www.dispersion.ca 1.866.390.5066

Client :	Polytests	**Certificate Number :**	**157-77C603-222**
Address :	695 B rue Gaudette	**CCN Accreditation # :**	668
	Saint-Jean-sur-Richelieu, QC	**CLAS Certification # :**	2010-01
	J3B7S7	**Precision class :**	NIST F
		Calibration date :	04-03-2022
Mass :	10 kg	**Follow-up date :**	04-03-2026

CALIBRATION RESULTS, CONVENTICNAL MASS:

Nominal Mass	Serial #	Inventory #	Conventional mass	Conventional mass after adjustment	Tolerance ± (mg)	Uncertainties ± (mg)
10 kg	DI00D632	EM205	9.999938 kg		1 000 mg	10 mg

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CALIBRATION CERTIFICATE

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Client :	Polytests	**Certificate Number :**	**157-77C603-222**
Address :	695 B rue Gaudette	**CCN Accreditation # :**	668
	Saint-Jean-sur-Richelieu, QC	**CLAS Certification # :**	2010-01
	J3B7S7	**Precision class :**	NIST F
		Calibration date :	04-03-2022
Mass :	10 kg	**Follow-up date :**	04-03-2026

CALIBRATION RESULTS, CORRECTIONS:

Nominal Mass	Serial #	Inventory #	Conventional mass Corrections	Conventional mass Corrections after adjustment	Tolerance ± (mg)	Uncertainties ± (mg)
10 kg	DI000D532		-62 mg		1 000 mg	10 mg

CALIBRATION CERTIFICATE

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BALANCES

The following balances are used for calibration purposes :

> 5 kg to 25 kg :	Mettler Toledo XP32003L, SNR 1123271214, max. 32100 g, d = 0.005 g
> 1 kg to 5 kg	Mettler Toledo PR5003, SNR 11153 1634, max. 5100 g, d = 0.001 g
> 300 g to 2 kg :	Mettler Toledo XP2004S, SNR B131185222, max. 2100 g, d = 0.1 mg
> 100 g to 200 g :	Mettler Toledo AT201 SNR BA1115230146, max. 205 g, d = 0.01 mg
> 5 g to 100 g :	Mettler Toledo AX106 SNR 1127063924, max. 111 g, d = 1 µg
1 mg to 5 g :	Mettler UMX5, SNR 1121103055, max. 5.1 g, d = 0.1 µg

We are also using these balances in our automated procedure :

> 200 g to 1 kg :	Mettler Toledo AX1005 SNR 1127063210, max. 1109 g, d = 0.01 mg
> 5 g to 100 g :	Mettler Toledo AX106 SNR 1120143015, max. 111 g, d = 1 µg
1 mg to 5 g :	Mettler UMX5, SNR 1125140561, max. 5.1 g, d = 0.1 µg

Our balances are periodically verified, according to our PDL-11-MG-001 control procedure.

UNCERTAINTIES:

The following uncertainties exist :

1. *Uncertainty associated with the weighting process.*
2. *Uncertainty associated with air density.*
3. *Uncertainty associated with the measurement standard.*
4. *Uncertainty associated with the density of the mass being calibrated.*

The uncertainty of the weighing process includes long-term reproducibility.

Uncertainties specified in this report are expanded uncertainties representing a confidence level of approximately 95% obtained by multiplying the combined standard uncertainty by a coverage factor of k = 2. For more detailed information refer to the GUM (Guide to the Expression of Uncertainty in Measurement, 1995 Edition)

TRACEABILITY

The Calibration Laboratory Assessment Service (CLAS) of the National Research Council of Canada (NRC) has assessed and certified specific calibration capabilities of this laboratory and their traceability to recognized national measurement standards and to the International System of Units (SI). This certificate of calibration is issued in accordance with the conditions of certification granted by CLAS and the conditions of accreditation granted by the Standards Council of Canada (SCC). Neither the CLAS nor the SCC guarantees the accuracy of individual calibration by accredited laboratories.

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CALIBRATION CERTIFICATE

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www.dispersion.ca 1.866.390.5066

USED REFERENCES

Item	Serial #	Manufacturer	Calibration date	Due date
300g Labo	96-0888-50-2	Denver Instrument Company	01-10-2020	31-03-2022
1kg-1mg Labo	MT-01	Mettler Toledo	01-10-2020	31-03-2022
2kg Labo	96-0888-50-3	Denver Instrument Company	01-10-2020	31-03-2022
1kg Labo	96-088850-1	Denver Instrument Company	01-10-2020	31-03-2022
5kg Labo	129099	Mettler Toledo	01-10-2020	31-03-2022
10kg Labo	DI000G991	Dispersion	23-03-2021	31-03-2022
20kg Labo	69976	Mettler Toledo	06-10-2021	31-10-2022
1 mg-10kg	4000028011	Troemner	15-10-2021	31-10-2022
2kg Labo	129098	Mettler Toledo	01-10-2020	31-03-2022

ENVIRONMENTAL CONDITIONS

Item	Serial #	Manufacturer	Calibration date	Due date
THE004	107080	Control Company	04-03-2021	31-03-2022

Instrumentation
Saint•Laurent inc.

80 rue de la montagne
St-Joseph du lac
(Québec), J0N 1M0
Phone: (450) 473-6169
Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-224 2022-05-25

CLIENT	
Company:	Services Polytests Inc
Address:	695 B rue Gaudette
	St-Jean-sur-Richelieu, Québec, J3B 7S7

CALIBRATION SPECIFICATION	
Service Procedure:	ISL-022
Required Accuracy:	+/- 1/32"
Calibration Frequency:(days)	365

INSTRUMENT SPECIFICATION			
Instrument Type:	Ruban à mesurer	**Input Type:**	Mesure
Manufacturer:	Stanley	**Output Type:**	N/A
Model #:	Leverlock 12'	**Measurement Type:**	Inch
Serial #:	N/A	**Range:**	0 à 12'
Location:	Portable	**Version:**	

CALIBRATORS SPECIFICATION			
Calibrator:	tape a mesurer	**Certification #:**	VB-19652440
Serial #:	22091327	**Certification Date:**	2022-03-10
Certified by:	Starrett	**Next Certification:**	2023-03-10
Comments:			

Version 1

Instrumentation Saint•Laurent inc.

80 rue de la montagne
St-Joseph du lac
(Québec), J0N 1M0
Phone: (450) 473-6168
Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-224 2022-05-25

CALIBRATION RESULTS

Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Accuracy	
	Comment					
1.00 "	1.00 "	1.00 "	0.00 "	1.00 "	+/- 1/32 "	
36.00 "	36.00 "	36.00 "	0.00 "	36.00 "	+/- 1/32 "	
72.00 "	72.00 "	72.00 "	0.00 "	72.00 "	+/- 1/32 "	
108.00 "	108.00 "	108.00 "	0.00 "	108.00 "	+/- 1/32 "	
132.00 "	132.00 "	132.00 "	0.00 "	132.00 "	+/- 1/32 "	

Environmental Conditions: Temperature: 22 °C Humidity: 39 %RH

Comments:

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2022-05-25
Next Calibration:	2023-05-25
Certificate Date:	2022-05-25

CALIBRATION CONFORMITY		
	Before	**After**
Compliant:	X	X
Non Compliant:		

- Instrumentation St. Laurent Inc. Certify that the above instrument, meets or exceeds the specifications established by the manufacturer. The company's quality system complies with the requirements of ISO 17025 :2017 and the standards used to perform the calibration is traceable to NRC and / or NIST.
- Reported uncertainties represent a 95 % of confidence level assuming a normaldistribution k=2.
- The declaration of conformity does not include Instrumentation St-Laurent Inc. uncertainty measurement. Decision rule is based on binary statement for simple acceptance rule against ILAC G8 standard and test tolerance limits are based on :ustomer specifications, unless otherwise specified.
- The results presented in this certificate relate only to objects subject to calibration.
- It is the customer's responsibility to ensure that calibrated equipment meets its intended use.
- The date format used in this certificate is: YYYY-MM-DD.

Martin Langlais - Technicien

MAY 2022

Version 1

Instrumentation
Saint•Laurent inc.
Certified ISO 17025

CLAS
NRC-CNRC
CLAS 2010-02

SCC Accredited LAB
LAB
Accredited CSN
N°669

80 rue de la montagne
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(Québec), J0N 1M0
Phone: (450) 473-6169
Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-249 2022-05-10

CLIENT	
Company:	Services Polytests Inc
Address:	695 B rue Gaudette
	St-Jean-sur-Richelieu, Québec, J3B 7S7

CALIBRATION SPECIFICATION	
Service Procedure:	4IN9106
Required Accuracy:	+/- 0.25 "H2O
Calibration Frequency:(days)	365

INSTRUMENT SPECIFICATION			
Instrument Type:	Indicator	Input Type:	Pression
Manufacturer:	Dwyer	Output Type:	Voltage
Model #:	MS-321-LCD	Measurement Type:	Pressure
Serial #:	N/A	Range:	0 à 0.10 "H2O
Location:	Banc de test	Version:	

CALIBRATORS SPECIFICATION			
Calibrator:	Fluke Pression	Certification #:	2021008414
Serial #:	3330050	Certification Date:	2021-11-22
Certified by:	Alpha Controls	Next Certification:	2022-11-22
Comments:			
Calibrator:	Fluke 744	Certification #:	2022001379
Serial #:	8223003	Certification Date:	2022-02-18
Certified by:	Alpha Controls	Next Certification:	2022-05-18
Comments:			

Instrumentation Saint-Laurent inc.
Certified ISO 17025

CLAS NRC·CNRC CLAS 2010-02

SCC Accredited LAB LAB Accredité SCC N°669

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St-Joseph du lac
(Québec), J0N 1M0
Phone: (450) 473-6169
Fax: (450) 473-6207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-249 2022-05-10

CALIBRATION RESULTS

Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Accuracy	Uncertainty
Conformity	**Comment**					
0.0000 "H2O	0.0000 "H2O	0.0010 "H2O	0.0010 "H2O	0.0010 "H2O	+/- 0.25 "H2O	0.10 "H2O
Compliant	Verification of the indicator					
0.0250 "H2O	0.0250 "H2O	0.0254 "H2O	+0.0004 "H2O	0.0254 "H2O	+/- 0.25 "H2O	0.10 "H2O
Compliant	Verification of the indicator					
0.0500 "H2O	0.0500 "H2O	0.0496 "H2O	-0.0004 "H2O	0.0496 "H2O	+/- 0.25 "H2O	0.10 "H2O
Compliant	Verification of the indicator					
0.0750 "H2O	0.0750 "H2O	0.0740 "H2O	-0.0010 "H2O	0.0740 "H2O	+/- 0.25 "H2O	0.10 "H2O
Compliant	Verification of the indicator					
0.1000 "H2O	0.1000 "H2O	0.9963 "H2O	-0.0037 "H2O	0.9963 "H2O	+/- 0.25 "H2O	0.10 "H2O
Compliant	Verification of the indicator					
0.0000 "H2O	0.0000 V.DC.	0.0715 V.DC.	+0.0715 V.DC.	0.0715 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
0.0250 "H2O	2.5000 V.DC.	2.4770 V.DC.	-0.023 V.DC.	2.4770 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
0.0500 "H2O	5.0000 V.DC.	4.9157 V.DC.	-0.0843 V.DC.	4.9157 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
0.0750 "H2O	7.5000 V.DC.	7.4215 V.DC.	-0.0785 V.DC.	7.4215 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
0.1000 "H2O	10.0000 V.DC.	9.9532 V.DC.	-0.0468 V.DC.	9.9532 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					

Environmental Conditions:	Temperature: 21 °C	Humidity: 41 %RH
Comments:		

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2022-05-10
Next Calibration:	2023-05-10
Certificate Date:	2022-05-10

CALIBRATION CONFORMITY		
	Before	**After**
Compliant:	X	X
Non Compliant:		

- Instrumentation St. Laurent Inc. Certify that the above instrument, meets or exceeds the specifications established by the manufacturer. The company's quality system complies with the requirements of ISO 17025 :2017 and the standards used to perform the calibration is traceable to NRC and / or NIST.
- Reported uncertainties represent a 95 % of confidence level assuming a normal distribution k=2.
- The declaration of conformity does not include Instrumentation St-Laurent Inc. uncertainty measurement. Decision rule is based on binary statement for simple acceptance rule against ILAC G8 standard and test tolerance limits are based on customer specifications, unless otherwise specified.
- The results presented in this certificate relate only to objects subject to calibration.
- It is the customer's responsibility to ensure that calibrated equipment meets its intended use.
- The date format used in this certificate is: YYYY-MM-DD.

Assessment Service Calibration Laboratory (ASCL) of the National Research Council of Canada (NRC) has assessed and certified calibration laboratory's ability and traceability to the International System of Units (SI) or to standards acceptable according to ASCL. This calibration certificate is issued in accordance with the terms of ASCL certification and accreditation requirements of the Standards Council of Canada (SCC). SCC accreditation number: # 669. ASCL and SCC does not guarantee the accuracy of individual calibrations by accredited laboratories.

Marco Miron - Technicien

Version 1

MAY 2022

CERTIFICATE OF CALIBRATION

ACCREDITED
CALIBRATION
CERT #2260.01

Certificate Number: 2022004548

Manufacturer:	Control Company	***RMA:***	AC22051901
Model:	4199	***Workorder:***	2022004548
Description:	Barometer	***Barcode:***	AL00040350-P
Serial:	192343395	***Received Conditions:***	In Tolerance
ID:	EM 304	***Calibration Date:***	06-Jun-2022
Customer:	SERVICES POLYTESTS 695-B GUADETTE ST-JEAN-SUR-RICHELIEU QC J3B 7S7	***Calibration Due:***	06-Jun-2023
		Temperature:	21.52°C
		Humidity:	44.1%RH

STATEMENT OF UNCERTAINTY: The reported expanded uncertainty of measurement is stated as the standard measurement uncertainty multiplied by the coverage factor K = 2, which for a normal distribution corresponds to a coverage probability of approximately 95 percent. Alpha Controls & Instrumentation Inc. certifies this instrument was calibrated on the date shown using standards traceable to NIST/NRC or accepted intrinsic standards and in compliance with ISO/IEC-17025:2017 and ANSI/NCSL Z540-1.

Any statement of compliance is made without taking measurement uncertainty into account and is based on UUT performance against required tolerance only. The customer must ensure equipment calibrated meets the intended use.

Tolerance is based on manufacturer specification if not stated otherwise. Calibration results relate to items calibrated only.

STANDARDS USED

Description	*Model*	*ID*	*Cal Date*	*Due Date*
Pressure Controller/Calibrator	Fluke Calibration 6270A	PRE-CAL-08	No Cal Required	
Pressure Measurement Module	Fluke Calibration PM600-A7M	PRE-MOD-01	25-Oct-2021	25-Oct-2022

Notes: Adjusted from adjustment screw on back of unit.

Performed by: Anthony Morra
Technician
(digitally signed on 06-Jun-2022 8:38 am)

QA Reviewed by: Slava Peciurov
Lab Manager
(digitally signed on 06-Jun-2022 9:37 am)

Form: ROC101 Rev 9.3.e

Procedure: Pressure Gauge: CAL VER /6270A (1.1.A) — **FOUND (Pass)**

Test Description	True Value	Test Results	Tolerance	Lower Limit	Upper Limit	Status	Uncertainty
PRESSURE TEST							
993.05 mbar	993.05 mbar	998.0 mbar	±5.00 mbar	988.0 mbar	998.0 mbar	Pass	1.2e-001 mbar

Procedure: Pressure Gauge: CAL VER /6270A (1.1.A) — **LEFT (Pass)**

Test Description	True Value	Test Results	Tolerance	Lower Limit	Upper Limit	Status	Uncertainty
PRESSURE TEST							
992.90 mbar	992.90 mbar	993.0 mbar	±5.00 mbar	987.9 mbar	997.9 mbar	Pass	1.1e-001 mbar

END OF CERTIFICATE

Instrumentation
Saint•Laurent inc.
Certified ISO 17025

CLAS
NRC-CNRC
CLAS 2010-02

SCC Accredited Lab
Accréditation CCN
N°699

80 rue de la montagne
St-Joseph du lac
(Québec), J0N 1M0
Phone: (450) 473-6169
Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-313 2022-05-10

CLIENT	
Company:	Services Polytests Inc
Address:	695 B rue Gaudette
	St-Jean-sur-Richelieu, Québec, J3B 7S7

CALIBRATION SPECIFICATION	
Service Procedure:	4IN9106
Required Accuracy:	+/- 0.25"H2O
Calibration Frequency:(days)	365

INSTRUMENT SPECIFICATION			
Instrument Type:	Indicator	Input Type:	Pression
Manufacturer:	Dwyer	Output Type:	Voltage
Model #:	MS-321-LCD	Measurement Type:	Pressure
Serial #:	N.A.	Range:	0 a 0.1 inchh20
Location:	N.A.	Version:	

CALIBRATORS SPECIFICATION			
Calibrator:	Fluke Pression	Certification #:	2021008414
Serial #:	3330050	Certification Date:	2021-11-22
Certified by:	Alpha Controls	Next Certification:	2022-11-22
Comments:			
Calibrator:	Fluke 744	Certification #:	2022001379
Serial #:	8223003	Certification Date:	2022-02-18
Certified by:	Alpha Controls	Next Certification:	2022-05-18
Comments:			

Instrumentation Saint•Laurent Inc.
Certified ISO 17025

CLAS NRC·CNRC CLAS 2010-02

SCC Accredited LAB Accréditation ISO/CEI 17025 N°669

80 rue de la montagne
St-Joseph du lac
(Québec), J0N 1M0
Phone: (450) 473-6168
Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-313 2022-05-10

CALIBRATION RESULTS

Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Accuracy	Uncertainty
Conformity	**Comment**					
0.0000 "H2O	0.0000 "H2O	+0.0015 "H2O	0.0015 "H2O	+0.0015 "H2O	+/- 0.25 "H2O	0.25 "H2O
Compliant	Verification of the indicator					
0.0250 "H2O	0.0250 "H2O	0.0261 "H2O	+0.0011 "H2O	0.0261 "H2O	+/- 0.25 "H2O	0.25 "H2O
Compliant	Verification of the indicator					
0.0500 "H2O	0.0500 "H2O	0.0510 "H2O	+0.0010 "H2O	0.0510 "H2O	+/- 0.25 "H2O	0.25 "H2O
Compliant	Verification of the indicator					
0.0750 "H2O	0.0750 "H2O	0.0762 "H2O	+0.0012 "H2O	0.0762 "H2O	+/- 0.25 "H2O	0.25 "H2O
Compliant	Verification of the indicator					
0.1000 "H2O	0.1000 "H2O	0.1011 "H2O	+0.0011 "H2O	0.1011 "H2O	+/- 0.25 "H2O	0.25 "H2O
Compliant	Verification of the indicator					
0.0000 "H2O	0.0000 V.DC.	0.0420 V.DC.	+0.0420 V.DC.	0.0420 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
0.0250 "H2O	2.5000 V.DC.	2.5828 V.DC.	+0.0828 V.DC.	2.5828 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
0.0500 "H2O	5.0000 V.DC.	5.1261 V.DC.	+0.1261 V.DC.	5.1261 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
0.0750 "H2O	7.5000 V.DC.	7.6332 V.DC.	+0.1332 V.DC.	7.6332 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					
0.1000 "H2O	10.0000 V.DC.	10.1287 V.DC.	+0.1287 V.DC.	10.1287 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Verification of the analogic output					

Environmental Conditions:	Temperature:	21 °C	Humidity:	41 %RH
Comments:				

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2022-05-10
Next Calibration:	2023-05-10
Certificate Date:	2022-05-10

CALIBRATION CONFORMITY		
	Before	**After**
Compliant:	X	X
Non Compliant:		

- Instrumentation St. Laurent Inc. Certify that the above instrument, meets or exceeds the specifications established by the manufacturer. The company's quality system complies with the requirements of ISO 17025 :2017 and the standards used to perform the calibration is traceable to NRC and / or NIST.
- Reported uncertainties represent a 95 % of confidence level assuming a normal distribution k=2.
- The declaration of conformity does not include Instrumentation St-Laurent Inc. uncertainty measurement. Decision rule is based on binary statement for simple acceptance rule against ILAC G8 standard and test tolerance limits are based on customer specifications, unless otherwise specified.
- The results presented in this certificate relate only to objects subject to calibration.
- It is the customer's responsibility to ensure that calibrated equipment meets its intended use.
- The date format used in this certificate is: YYYY-MM-DD.

Assessment Service Calibration Laboratory (ASCL) of the National Research Council of Canada (NRC) has assessed and certified calibration laboratory's ability and traceability to the International System of Units (SI) or to standards acceptable according to ASCL. This calibration certificate is issued in accordance with the terms of ASCL certification and accreditation requirements of the Standards Council of Canada (SCC). SCC accreditation number: # 669. ASCL and SCC does not guarantee the accuracy of individual calibrations by accredited laboratories.

Marco Miron - Technician

Version 1

MAY 2022

POLYCONTROLS
INTEGRATION • CALIBRATION • INSTRUMENTATION

CLAS
NRC·CNRC
CLAS 2009-02

#055

CALIBRATION CERTIFICATE # 15755

Calibration date : 2022/01/04
Certificate issued : 2022/01/04

Services Polytests
695 B Gaudette street
St-Jean-sur-Richelieu, Québec, Canada
J3B 7S7

Calibration of
Positive displacement flow meter Shinigawa DCSDa-2C S/N : S8020

QUALITY PROGRAM CONFORMANCE

All calibrations are performed in accordance with Polycontrols Laboratory Quality Assurance Manual and conform to ISO/IEC 17025: 2017, ISO 9001 – 2015 and/or other quality requirements defined in customers purchase descriptions. The results are strictly valid for the device under test or calibration. If applicable, the decision rule is described in the certificate.

TRACEABILITY

The traceability for flow standard to the National Institute of Standards and Technology, NIST, is maintained by Fluke Corporation of Phoenix, Arizona and conform to ISO/IEC 17025, ANSI/NCSL Z540-1-1994, ISO-10012-1 and MIL-STD 45662A.

The Calibration Laboratory Assessment Service (CLAS) of the National Research Council of Canada (NRC) has assessed and certified specific calibration capabilities of this laboratory and traceability to the International System of Units (SI) or to standards acceptable to the CLAS program. This certificate of calibration is issued in accordance with the conditions of certification granted by CLAS and the conditions of accreditation granted by the Standards Council of Canada (SCC). Neither CLAS nor SCC guarantee the accuracy of individual calibrations by accredited laboratories.

CALIBRATION AND MEASUREMENT CAPABILITY

Calibration measurement capabilities have an uncertainty of ±0.2% of reading for a flow range between 5 SCCM to 10 SLPM, ±0.3% of reading for a flow range between 10 SLPM to 30 SLPM, ±0.2% of reading for a flow range between 30 SLPM to 3000 SLPM, ±0.3% of reading for a flow range above 3000 SLPM to 6000 SLPM and ±0.5% of reading for a flow range under 5 SCCM down to 1 SCCM, air or nitrogen equivalent. The reported uncertainty is expanded using a coverage factor k=2 for a level of confidence of approximately 95%, assuming a normal distribution including resolution of the instrument. The test uncertainty ratio (TUR) of this calibration is at least 4:1 unless otherwise stated.

CONDITION SUMMARY OF THE DEVICE UNDER TEST

Initial conditions	In good condition
Work done	Initial readings = Final readings, no adjustment Calibration of the instrument
Results	Final readings in tolerance
Remarks	Calibration frequency every 12 months

Olivier Duchesne Bamber
Metrologist

Laboratory Manager

3650, Matte blvd. (Unit A-1), Brossard (Quebec), Canada, J4Y 2Z2
Tel: (450) 444-3600 Fax: (450) 444-1088 www.polycontrols.com

POLYCONTROLS
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CLAS NRC·CNRC CLAS 2009-02

8665

Calibration certificate # 15755

Serial Number:	S8020	Test stand:	3
Calibration Date:	2022/01/04	Procedure:	POS-CAL-005
Instrument ID:	EM 318	Decision rule:	Method #3

Standard equipment used for final calibration

Description	Model	Serial #	Traceability	Due date
Fluke molbloc_30 slpm	3E4-VCR-V-Q	2403	1500308202	2022/06/03
Fluke molbox1	Molbox1	755	1500311473	2022/07/02
RTD Mist	M22	2208102	2020003043	2021/04/23
Module 44.5 PSI avec Baro 163671	Module 30	160659	2021003409	2022/05/04

Final specifications of the device under test		Calibration conditions	
Gas	Air	Gas	Air
Operation temperature		Ambient temperature	23.5 °C
Inlet pressure		Ambient pressure	1025.18 mbar
Outlet pressure		Orientation	
Reference temperature		Seals	
Reference pressure		Valve	
Range	10-2000 ALH		
Input/Output Signals	-		
Supply			
Accuracy ±2 %O.R.			

Final readings

Test Flow ALH	Device under test L	Measured values Pressure PSIA	Temperature °C	Reference L	Calculated Reference L	Calculated Error L	Acceptable Error L	Uncertainty k = 2 L	TUR
171.9473	28.4650	14.8397	20.67	28.98	28.65	-0.1850	0.5731	0.10	>4
936.1377	156.4750	14.8436	20.56	157.79	155.92	0.5550	3.1184	0.52	>4
1799.6279	239.1300	14.8962	21.62	243.25	240.39	-1.2600	4.8078	0.80	>4

POLYCONTROLS

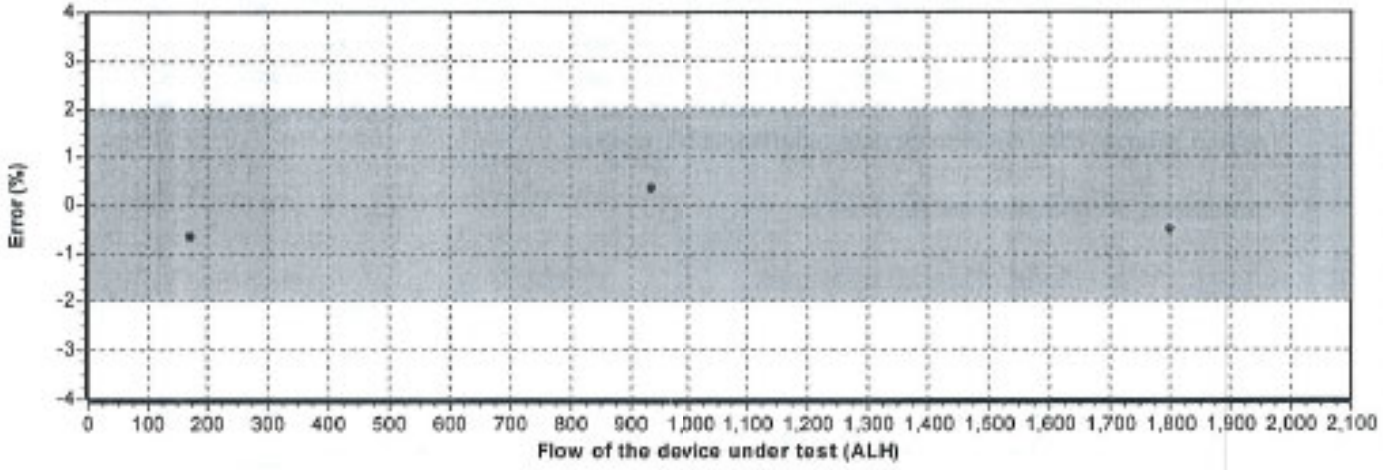
INTEGRATION • CALIBRATION • INSTRUMENTATION

CLAS NRC-CNRC CLAS 2009-02

Calibration certificate # 15755

Serial Number:	S8020	Test stand:	3
Calibration Date:	2022/01/04	Procedure:	POS-CAL-005
Instrument ID:	EM 318	Decision rule:	Method #3

Final results



See the appendix for the guideline of decision rule

2022-01-11

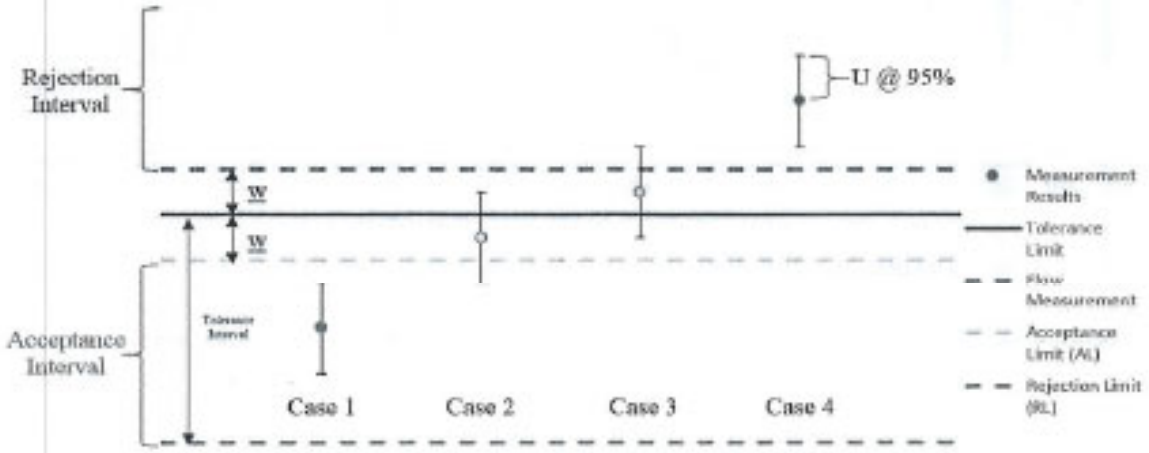
Fc : 1,005445

Appendix for the decision rule

Method #3 Non-binary Statement with Guard Band, uncertainty directly taken into account

This decision rule uses a guard band to define the acceptance and rejection interval. The acceptance limit is defined by the following mathematical formula AL = TL − w and the rejection limit RL = TL + w, where w = rU. The multiple r that is multiplied by the expanded measurement uncertainty U can be defined following ILAC G8: 2019 table 1 section 5.2. The expanded measurement uncertainty U has a 95% coverage probability (k = 2). Non-binary statement with guard band exists when the result is limited to four choices: pass, conditional pass, conditional fail, and fail.

Statements of conformity are reported as:



Graphical representation of a Non-Binary Statement with a Guard Band

Case 1 – *Below acceptance limit AL,* ***Status: In tolerance.***

- The result is inside the acceptance interval. However, assuming a normal distribution, the risk that the result is outside the tolerance limit could be up to 2.5%. Uncertainty is directly taken into account. Green.

Case 2 – *Below tolerance limit TL, greater than acceptance limit AL,* ***Status: In tolerance-Conditional.***

- The result is outside the acceptance interval but below tolerance limit. However, the observed value is inside the guard band w = TL − AL and the status is conditional on the customer's risk assessment. Uncertainty is directly taken into account. Yellow.

Case 3 – *Greater than tolerance limit, below rejection limit RL,* ***Status: Out of tolerance-Conditional.***

- Le result is greater than tolerance limit but outside the rejection interval. However, the observed value is inside the guard band w = TL − RL and the status is conditional on the customer's risk assessment. Uncertainty is directly taken into account. Yellow.

Case 4 – *Greater than rejection limit RL,* ***Status: Out of tolerance.***

- The result is inside the rejection interval. Uncertainty is directly taken into account. Red.

3650, Matte blvd. (Unit A-1), Brossard (Quebec), Canada, J4Y 2Z2
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Kalibrier-Protokoll

Certificate of conformity • Protocole d'étalonnage
Certificato di taratura • Informe de calibración

Be sure. testo

Gerät / Module type /
Modèle / Modelo: **testo 405i**

Messbereich / Measuring range /
Etendue de mesure / Rango de medición: **Velocity: 0 ... 30 m/s**
Temperature: -20 ... +60 °C

Serien-Nr. / Serial no. /
N°. de série / Número de serie: 46100640

Messwerte / Measured values / Valeurs mesurées / Valores medidos:		
Sollwert / Reference / Référence / Referencia:	Zulässige Toleranz / Permissible tolerance / Tolérance admise / Tolerancia permitida:	Istwert / Actual Value / Valeur réelle / Valor medido:
Velocity:		
8.0 m/s	**±0.7 m/s**	**8.1 m/s**
Temperature :		
24.8 °C	**±0.5 °C**	**24.7 °C**

Prüfer / Inspector /
Responsable / Verificador

EM-332

ITM INSTRUMENTS INC

MONTRÉAL
20800 Boul. Industriel,
Ste-Anne-de-Bellevue, QC H9X 0A1

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Newmarket, ON L3Y 9A1

REGINA
#D, 288 Hodsman Road
Regina, SK S4N 5X4

CALGARY
#209, 4615 112 Ave SE
Calgary, AB T2C 5J3

VANCOUVER
1282 Cliveden Av
Delta, BC V3M 6G4

www.itm.com
information@itm.com
1.800.561.8187

Certificat d'étalonnage / Calibration Certificate

Client/Customer: *Services Polytests*

Certificat/Certificate: C458078-00-01

Identification de l'unité / Unit Identification

Fabricant/Manufacturer: **Delmhorst**
Modèle/Model: **MCS-1**
Description: **Wood Moisture Content Standard**
Série/Serial: **NA**
ID de l'unité/Unit ID: **NA**

Date d'étalonnage / Calibration Date

Date d'étalonnage/Cal Date: **17-Jan-2022**
Échéance/Due Date: **17-Jan-2023**

Conditions d'étalonnage / Calibration Conditions

Température/Temperature: **21.76°C**
Humidité/Humidity: **15.39 %**
Pression barométrique/Barometric Pressure: **N/A**

Information générales / General Information

Commentaire/Remark:**N/A**

Étalons utilisés / Standards Used

ID de l'unité / Unit ID	Fabricant / Manufacturer	Modèle / Model	Date d'étalonnage / Cal Date	Date Due / Due Date
INV022	Hewlett Packard	3458A	17-Dec-2021	17-Dec-2022

L'étalonnage a été effectué à l'aide d'étalons qui ont été vérifiés par rapport à ceux de l'Institut des Étalons Nationaux de Mesure (IÉNM) du Conseil National de Recherches du Canada (CNRC) ou à ceux du National Institute of Standards and Technology (NIST) des États-Unis, et/ou ont été dérivés de constantes physiques de base et/ou par technique d'autoétalonnage proportionelle. L'incertitude d'étalonnage indiqué dans ce rapport est obtenue en utilisant un facteur de couverture de k=2 selon un degré de confiance d'environ 95%.

The calibration was performed using measurement standards traceable to the National Measurement Institute Standards (NMIS) part of the National Research Council of Canada (NRC) or the National Institute of Standards and Technology (NIST), or to accepted intrinsic standards of measurement, or is derived by ratio type self-calibration techniques. Measurement uncertainties given in this report are based on a coverage factor of k=2 corresponding to a confidence level of approximately 95%.

Étalonné par/Calibrated by: ***B. Cardin***

Approuvé par/Approved by:

EM. 334

ITM INSTRUMENTS INC

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Calgary, AB T2C 5J3

VANCOUVER
1282 Cliveden Av
Delta, BC V3M 6G4

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information@itm.com
1.800.561.8187

Résultats du test / Test Results
Procédure/Procedure: **DELMHORST MCS-1 : 3458** Rev: **1**
Type de donnée/Data Type: **À la réception\As Found** Résultats/Results: **Passer\Pass**

Description du test Test Description	Valeur réelle True Value	Lecture Reading	Limite min. Lower Limit	Limite max. Upper Limit	Status de test Test Status	Ince Elarg Exp Uncert
----- 12% MOISTURE -----						
----- 120MOHMS +/-10% -----						
120.00 MOhm		119.800 MOhm	108.000 MOhm	132.000 MOhm	Pass	4.1e+004 Ohm
----- 22% MOISTURE -----						
----- 1.1MOHMS +/-10% -----						
1.100 MOhm		1.0969 MOhm	0.9900 MOhm	1.2100 MOhm	Pass	5.8e+002 Ohm

TRANSCAT

Trust in every measure

ACCREDITATION ISO 17025 SCC Scope Number 668

CALIBRATION CERTIFICATE

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

Client :	Polytests	**Certificate Number :**	**157-77C603-225**
Address :	695 B rue Gaudette Saint-Jean-sur-Richelieu, QC J3B7S7	**Calibration date :**	14-03-2022

Technician:
Coutu, Daniel

David Llorens, Quality Manager

SERVICE DESCRIPTION:

Masses description :	ASTM E617	**Date approved :**	14-03-2022
Precision class :	ASTM 1	**Next Calibration :**	14-03-2027
Density :	7.96g/cm³	**CCN accreditation # :**	668
Identification (if unique) :	DI000J378	**CLAS Certification # :**	2010-01

Test conditions :	Temp °C:	21.16	kPa Pressure:	100.64	Humidity:	47.97

NOTES:

For weight calibration, we use the procedure "Comparaison individuelle" PDL-09-MG-001 and the procedure "Détermination des incertitudes" PDL-09-MG-002. This certificate cannot be copied without written approval from Dispersion Laboratory. The results presented in these pages relate only to objects subjected to calibration.n

REMARKS:

Mardi 2022

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ACCREDITATION ISO 17025
SCC Scope Number 668

CALIBRATION CERTIFICATE

9900 Chemin de la Côte-de-Liesse, Montréal, QC H8T 1A1
www.dispersion.ca 1.866.390.6066

Client :	Polytests	**Certificate Number :**	**157-77C603-226**
Address :	695 B rue Gaudette	**CCN Accreditation # :**	668
	Saint-Jean-sur-Richelieu, QC	**CLAS Certification # :**	2010-01
	J3B7S7	**Precision class :**	ASTM 1
		Calibration date :	14-03-2022
Mass :	100 mg	**Follow-up date :**	14-03-2027

CALIBRATION RESULTS, CONVENTIONAL MASS:

Nominal Mass	Serial #	Inventory #	Conventional mass	Conventional mass after adjustment	Tolerance ± (mg)	Uncertainties ± (mg)
100mg	DI000J378	EM-335	99.9999 mg		0.010 mg	0.002 mg

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ACCREDITATION ISO 17025

SCC Scope Number 668

CALIBRATION CERTIFICATE

9800 Chemin de la Côte-de-Liesse, Montréal, QC H8T 1A1
www.dispersion.ca 1.866.390.5066

Client :	Polytests	**Certificate Number :**	**157-77C603-225**
Address :	695 B rue Gaudette	**CCN Accreditation # :**	668
	Saint-Jean-sur-Richelieu, QC	**CLAS Certification # :**	2010-01
	J3B7S7	**Precision class :**	ASTM 1
		Calibration date :	14-03-2022
Mass :	100 mg	**Follow-up date :**	14-03-2027

CALIBRATION RESULTS, CORRECTIONS:

Nominal Mass	Serial #	Inventory #	Conventional mass Corrections	Conventional mass Corrections after adjustment	Tolerance ± (mg)	Uncertainties ± (mg)
100mg	DI000J078		-0.0001 mg		0.010 mg	0.002 mg

CALIBRATION CERTIFICATE

9900 Chemin de la Côte-de-Liesse, Montréal, QC H8T 1A1
www.dispersion.ca 1.866.390.6066

BALANCES

The following balances are used for calibration purposes:

> 5 kg to 25 kg :	Mettler Toledo XP32003L, SNR 1121271214, max. 32100 g, d = 0.005 g
> 1 kg to 5 kg	Mettler Toledo PR5003, SNR 1115311634, max. 5100 g, d = 0.001 g
> 300 g to 2 kg :	Mettler Toledo XP2004S, SNR B131185222, max. 2100 g, d = 0.1 mg
> 100 g to 200 g :	Mettler Toledo AT201 SNR BA1115230146, max. 205 g, d = 0.01 mg
> 5 g to 100 g :	Mettler Toledo AX106 SNR 1127063924, max. 111 g, d = 1 µg
1 mg to 5 g :	Mettler UMX5, SNR 1121103055, max. 5.1 g, d = 0.1 µg

We are also using these balances in our automated procedure :

> 200 g to 1 kg :	Mettler Toledo AX1005 SNR 1127063210, max. 1109 g, d = 0.01 mg
> 5 g to 100 g :	Mettler Toledo AX106 SNR 1120143015, max. 111 g, d = 1 µg
1 mg to 5 g :	Mettler UMX5, SNR 1125140561, max. 5.1 g, d = 0.1 µg

Our balances are periodically verified, according to our PDL-11-MG-001 control procedure.

UNCERTAINTIES:

The following uncertainties exist :

1. *Uncertainty associated with the weighting process.*
2. *Uncertainty associated with air density.*
3. *Uncertainty associated with the measurement standard.*
4. *Uncertainty associated with the density of the mass being calibrated.*

The uncertainty of the weighing process includes long-term reproducibility.

Uncertainties specified in this report are expanded uncertainties representing a confidence level of approximately 95% obtained by multiplying the combined standard uncertainty by a coverage factor of k = 2. For more detailed information refer to the GUM (Guide to the Expression of Uncertainty in Measurement, 1995 Edition)

TRACEABILITY

The Calibration Laboratory Assessment Service (CLAS) of the National Research Council of Canada (NRC) has assessed and certified specific calibration capabilities of this laboratory and their traceability to recognized national measurement standards and to the International System of Units (SI). This certificate of calibration is issued in accordance with the conditions of certification granted by CLAS and the conditions of accreditation granted by the Standards Council of Canada (SCC). Neither the CLAS nor the SCC guarantees the accuracy of individual calibration by accredited laboratories.

CALIBRATION CERTIFICATE

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

USED REFERENCES

Item	Serial #	Manufacturer	Calibration date	Due date
300g Labo	96-0888-50-2	Denver Instrument Company	01-10-2020	31-03-2022
1kg-1mg Labo	MT-01	Mettler Toledo	01-10-2020	31-03-2022
2kg Labo	96-0888-50-3	Denver Instrument Company	01-10-2020	31-03-2022
1kg Labo	96-088850-1	Denver Instrument Company	01-10-2020	31-03-2022
5kg Labo	129099	Mettler Toledo	01-10-2020	31-03-2022
10kg Labo	DI000G991	Dispersion	23-03-2021	31-03-2022
20kg Labo	69976	Mettler Toledo	06-10-2021	31-10-2022
1 mg-10kg	4000028011	Troemner	15-10-2021	31-10-2022
2kg Labo	129098	Mettler Toledo	01-10-2020	31-03-2022

ENVIRONMENTAL CONDITIONS

Item	Serial #	Manufacturer	Calibration date	Due date
THE004	107080	Control Company	04-03-2021	31-03-2022

APPENDIX 4: Unit pre burn

wood moistue each pieces	Temps acquisition de données	Flue temp °F	Room temp °F	Catalyst center °F	scale lbs	Right °F	Back °F	Bottom °F	Top °F	Left °F
		Flue	Room	catalyst center	weight	right	back	bottom	top	left
20-21%	0	144,0	76,4	164,3	3,1	75,5	76,1	77,8	76,3	76,8
22-19-18-19%	10	364,6	77,1	546,0	12,5	121,8	114,9	101,4	100,7	121,9
	20	474,5	78,0	753,5	11,0	170,6	154,5	130,7	143,2	172,1
	30	470,5	79,3	745,9	9,4	235,4	213,4	158,2	216,7	244,0
	40	460,8	80,5	766,1	8,1	297,7	272,9	188,0	272,4	306,5
	50	456,4	83,5	758,8	7,0	362,5	313,8	217,5	314,5	341,1
	60	457,6	85,1	735,3	6,0	401,2	340,3	249,5	338,7	360,1
	70	431,3	86,8	760,3	5,0	434,4	365,4	274,8	356,0	385,7
	80	430,7	89,4	980,1	12,1	447,6	377,5	293,9	375,6	410,3
	90	454,0	90,6	1084,3	10,6	440,1	378,7	295,6	416,9	429,1
	100	454,1	92,3	1103,7	9,3	446,9	388,4	294,2	460,9	449,3
	110	425,2	93,9	1061,8	8,1	460,2	401,1	294,7	493,9	462,4
	120	423,3	94,8	1073,8	7,1	473,9	413,8	296,6	513,3	470,0
	130	399,6	96,0	1014,0	6,3	486,4	424,4	300,3	521,2	474,8
	140	382,7	96,2	952,7	5,7	498,0	432,7	306,1	514,2	479,2
20,00	150	72,1	73,3	73,0	1,6	72,6	72,7	72,7	72,7	72,6
21-22	160	136,9	72,9	191,6	4,2	74,3	75,7	74,0	73,4	74,5
	170	249,8	73,5	369,7	3,5	94,6	90,6	85,2	92,0	94,9
23-20-19%	180	293,2	73,2	440,7	7,7	125,4	113,2	101,1	128,6	126,3
	190	276,6	73,8	775,7	7,1	145,4	130,5	120,4	152,9	147,0
	200	315,6	74,4	842,9	6,4	155,4	145,2	139,8	169,0	155,4
	210	317,4	74,8	770,9	5,7	168,2	163,4	160,7	185,8	167,5
	220	314,6	75,3	783,6	5,0	187,7	181,6	181,2	208,2	183,4
	230	322,1	76,0	756,9	4,3	209,8	199,9	199,2	235,5	207,0
	240	325,8	76,9	753,8	3,6	237,3	222,6	213,8	260,7	230,9
	250	337,6	77,6	787,5	2,8	266,1	247,4	227,4	283,4	273,8
	260	337,3	79,2	811,6	2,1	299,7	280,7	246,5	299,9	306,3
	270	340,4	80,4	834,5	1,6	322,1	301,4	266,8	308,2	330,0
	280	334,2	81,0	806,5	1,1	333,4	317,6	291,6	311,8	348,7
21-19-18-20%	290	386,3	82,1	930,1	9,1	334,0	328,2	306,7	313,9	367,5
	300	371,3	83,5	915,2	8,1	334,1	326,3	308,1	330,0	366,6
	310	399,5	85,0	1048,6	6,8	360,4	333,3	309,3	363,3	367,3
	320	413,4	87,2	1069,7	5,5	397,9	350,4	312,4	406,4	381,7
	330	421,8	89,4	1067,4	4,3	436,7	372,5	318,7	444,8	404,1
	340	416,9	91,6	1022,7	3,1	469,9	396,3	327,5	478,0	428,9
	350	381,6	93,0	878,0	2,5	497,6	416,6	341,8	498,7	455,6
	360	367,4	93,9	877,8	2,0	499,9	428,7	360,9	473,1	473,0
	370	362,3	94,2	838,7	1,6	484,8	427,7	374,1	451,2	475,7
	380	358,3	94,8	876,6	1,2	470,7	421,9	384,2	429,7	467,2
	390	346,9	95,0	783,2	0,9	457,9	416,2	395,8	411,8	457,9
	400	327,6	94,2	770,1	0,7	448,1	409,0	409,3	395,6	447,8
	410	319,1	94,0	746,5	0,4	441,3	402,6	424,4	379,4	441,0
21-20-21-19%	420	353,2	93,3	843,7	8,7	426,2	390,3	434,0	365,8	426,0
	430	371,2	94,5	934,5	7,7	410,5	376,7	426,6	367,5	408,9
	440	394,8	93,9	980,0	6,5	412,8	374,0	417,4	399,0	404,8
	450	396,6	94,5	973,2	5,4	431,3	382,1	410,5	438,7	414,8
	460	394,3	95,7	962,5	4,5	455,3	394,4	405,6	463,5	429,5
	470	390,2	96,2	939,5	3,5	476,5	408,1	402,4	480,6	445,0
	480	387,2	97,4	996,5	2,7	490,2	423,5	401,8	487,1	457,2
	490	358,4	99,1	844,1	2,2	506,5	434,3	404,4	485,0	479,0
	500	346,5	99,2	833,7	1,9	499,5	436,5	412,5	483,1	479,2
21-20-23-24-21%	510	360,0	99,2	876,7	15,8	484,1	427,6	426,2	438,6	472,9
	520	397,9	98,6	1023,9	14,6	459,9	398,7	427,8	424,5	448,6
	530	448,0	98,8	1115,1	13,1	439,8	380,9	416,7	450,0	432,9
	540	466,2	97,9	1157,2	11,3	436,6	381,4	406,2	500,2	441,9
	550	466,1	99,0	1157,3	9,7	453,3	391,4	396,3	542,1	454,4
	560	458,5	101,2	1142,3	8,2	473,3	404,3	397,7	576,9	467,7
	570	450,8	101,0	1135,7	7,0	490,0	416,2	382,8	602,9	482,6
	580	420,2	102,7	991,1	6,2	507,8	426,2	381,0	607,6	496,5
	590	384,7	103,4	901,0	5,7	523,1	433,3	382,4	584,4	505,7
	600	368,0	102,1	866,9	5,2	528,6	435,7	387,5	551,1	509,3
	610	358,8	103,3	843,2	4,7	529,3	435,8	393,4	520,2	513,1
	620	349,4	102,4	835,7	4,4	528,8	435,5	399,4	494,4	514,2
	630	336,2	102,7	813,5	4,1	522,9	432,0	407,1	469,3	508,5
	640	326,4	102,9	793,0	3,9	515,8	428,1	414,7	447,9	497,6
23-21-20-19%	650	380,0	101,9	920,5	12,3	499,2	417,0	418,6	431,7	479,8
	660	400,7	101,7	944,4	11,1	482,1	404,2	413,9	447,3	466,0
	670	403,8	100,4	939,9	10,0	474,7	401,0	404,3	474,7	468,0
	680	404,4	100,2	946,3	8,9	470,2	401,8	395,6	495,6	471,4
	690	411,5	99,5	1021,6	8,0	469,6	404,3	390,1	513,5	472,9
	700	415,7	99,0	1035,7	7,0	474,3	408,6	387,2	534,3	475,6
	710	404,3	99,9	1020,7	6,2	482,6	413,4	385,0	549,9	478,2
	720	379,6	100,1	932,5	5,6	496,1	418,6	383,7	551,0	481,9
21-21-22-23-20%	730	386,0	101,0	949,4	17,7	498,5	418,8	381,9	525,3	483,1
	740	440,3	100,9	1123,7	15,9	477,4	407,5	380,6	516,0	479,6
	750	446,5	101,6	1107,7	14,4	462,2	403,9	375,9	542,0	469,7
	760	438,0	101,7	1069,2	13,2	460,4	406,8	369,3	565,7	503,9
	770	426,9	102,2	1038,0	12,1	466,6	411,5	363,6	578,8	516,5
	780	415,5	102,9	1028,0	11,1	473,6	414,8	359,6	583,6	526,0
	790	404,9	103,3	997,2	10,3	480,2	416,3	356,7	583,9	531,6
	800	389,2	103,5	957,6	9,6	486,5	416,5	354,7	574,5	533,5
	810	379,0	103,6	938,7	9,0	487,0	415,0	353,6	557,4	531,3
	820	389,2	103,2	919,9	8,5	487,6	412,3	354,6	538,4	526,5
	830	382,8	102,9	903,5	8,0	489,6	408,7	355,7	520,1	520,0
	840	380,3	102,8	896,3	7,5	490,7	404,4	356,3	503,3	514,2
	850	354,8	102,5	869,2	7,1	492,6	401,9	356,8	490,2	510,6
	860	347,6	102,4	859,5	6,7	497,4	400,0	357,5	480,7	508,2

	870	336,9	102,0	629,2	6,5	502,6	397,7	358,4	461,3	502,9
	880	328,2	101,8	603,9	6,3	499,0	394,4	358,6	439,9	495,8
	890	323,0	101,1	791,8	6,1	493,8	390,6	358,4	420,2	487,3
	900	318,4	100,7	770,9	5,9	489,7	386,7	358,5	406,6	480,4
	910	316,1	100,6	776,1	5,8	486,7	384,0	358,9	394,1	475,7
	920	313,3	100,1	759,7	5,4	480,3	381,3	359,2	384,0	470,9
	930	309,4	99,8	753,4	5,2	477,5	379,9	359,4	375,0	466,5
	940	306,0	99,5	742,8	5,0	477,7	378,0	359,3	366,9	461,5
	950	300,5	99,4	726,9	4,8	477,7	375,9	358,7	360,1	455,8
	960	296,7	99,2	709,8	4,6	480,0	374,5	358,0	352,6	451,7
	970	294,7	98,9	709,6	4,4	481,3	372,6	356,9	345,8	447,1
	980	289,7	98,7	694,2	4,2	481,9	370,1	355,8	339,7	442,1
	990	287,3	98,5	688,5	4,0	478,2	367,4	354,7	333,9	436,2
	1000	284,7	98,2	691,9	3,9	473,6	366,1	353,7	328,2	430,1
	1010	282,6	98,1	676,0	3,7	467,6	366,4	352,8	322,7	424,3
	1020	280,7	97,6	670,7	3,5	460,9	366,6	352,1	317,6	418,5
	1030	278,0	97,2	667,5	3,3	454,6	367,0	351,0	312,7	412,7
	1040	274,6	97,0	649,2	3,2	447,7	366,5	350,1	307,7	406,5
	1050	271,5	96,3	640,1	3,0	440,1	365,5	349,4	302,9	402,9
	1060	269,3	96,2	635,1	2,9	432,0	364,6	349,1	298,6	397,2
	1070	265,7	95,8	622,0	2,7	424,9	362,9	349,0	293,6	393,3
	1080	263,1	95,4	615,9	2,6	419,3	361,5	349,1	289,5	390,5
	1090	260,9	95,4	615,9	2,4	413,4	359,9	349,4	285,7	387,9
	1100	259,3	95,0	612,6	2,3	408,2	358,8	350,0	281,8	384,9
	1110	258,7	94,7	608,1	2,1	403,7	357,7	351,0	278,3	382,4
	1120	257,6	94,5	608,1	2,0	400,2	357,0	352,2	275,1	380,5
	1130	255,6	94,4	603,9	1,9	397,0	356,2	353,6	272,6	378,7
	1140	256,7	93,9	606,9	1,7	393,4	354,8	355,2	269,8	376,9
	1150	256,8	93,7	603,2	1,5	387,6	351,8	357,4	268,1	376,0
	1160	253,6	93,7	589,1	1,4	383,3	348,9	360,0	266,3	376,7
	1170	250,9	93,5	577,9	1,2	380,1	347,1	362,2	264,2	377,2
	1180	248,9	93,3	572,0	1,1	378,2	345,9	363,4	262,0	375,1
	1190	246,2	93,3	568,7	1,0	373,2	345,0	365,0	259,4	371,2
	1200	243,3	93,0	555,6	0,8	366,7	343,7	366,7	256,4	366,5
	1210	240,1	92,7	548,4	0,7	359,6	343,0	368,9	253,3	361,5
	1220	237,1	92,3	540,6	0,6	352,6	341,8	371,1	250,3	357,0
	1230	236,1	92,0	542,2	0,5	345,9	340,1	372,1	247,2	353,7
	1240	233,9	91,8	534,4	0,3	339,9	339,2	372,4	244,7	351,4
	1250	234,8	91,6	536,3	0,3	334,2	339,0	372,1	242,1	349,9
	1260	232,6	91,4	532,7	0,2	329,3	338,2	371,7	240,8	348,6
	1270	96,0	75,4	102,1	0,0	128,2	120,8	145,2	108,9	116,4
	1280	333,0	74,9	526,1	2,5	129,9	126,2	144,0	108,6	121,0
	1290	272,6	75,0	436,7	1,8	176,3	157,2	157,6	142,7	172,8
21-20-22-23	1300	282,8	75,9	676,9	10,6	202,5	176,6	170,0	174,0	204,3
	1310	428,5	75,9	1024,3	9,9	209,4	184,6	184,3	189,7	208,8
	1320	344,8	76,6	565,7	8,9	216,3	202,3	207,0	208,4	209,4
	1330	294,0	77,1	493,5	8,3	234,4	219,9	231,4	237,8	226,6
	1340	258,0	76,4	463,9	7,8	247,7	230,6	250,4	261,7	236,6
	1350	228,8	76,2	431,4	7,3	251,8	234,6	265,5	253,5	240,5
	1360	213,6	76,6	407,6	6,9	250,8	234,9	277,9	248,2	242,0
	1370	207,9	77,2	400,3	6,5	249,9	234,1	288,9	241,4	243,5
	1380	202,2	77,0	394,2	6,1	250,1	232,8	296,5	235,4	243,8
	1390	197,3	76,7	384,5	5,8	250,0	231,8	306,2	230,3	243,5
	1400	193,8	76,7	378,7	5,5	249,7	230,7	310,5	226,1	243,8
	1410	188,0	75,6	374,7	5,2	248,6	230,7	311,2	221,7	244,9
	1420	190,2	76,0	379,9	4,8	246,2	231,1	311,6	217,9	246,1
21-20-23-20	1430	315,1	76,7	799,2	12,1	248,9	243,2	314,5	223,1	257,4
	1440	313,9	76,9	772,0	11,3	266,3	265,5	312,6	253,9	293,9
	1450	324,2	78,0	850,3	10,7	273,6	280,1	308,7	277,2	327,3
	1460	366,8	77,6	1068,6	10,0	272,9	289,2	307,6	290,3	348,7
	1470	390,4	79,1	1089,1	9,3	270,3	300,5	312,0	300,8	354,4
	1480	411,4	79,7	1163,0	8,5	269,2	314,8	321,7	312,0	357,1
	1490	437,3	77,6	1264,5	7,5	272,6	331,9	335,0	328,6	361,9
	1500	450,9	79,1	1294,6	6,6	280,4	351,7	347,4	352,7	366,5
	1510	413,2	81,4	1041,3	5,7	294,1	372,2	358,8	380,0	379,2
	1520	383,3	83,3	995,1	4,9	337,9	389,5	364,3	421,0	401,1
	1530	381,1	85,7	941,0	4,3	388,3	398,0	368,0	436,8	412,0
	1540	333,3	87,0	856,4	3,9	430,2	403,7	375,3	435,6	420,4
	1550	322,8	88,6	848,5	3,6	439,3	402,7	385,8	421,2	421,9
	1560	310,5	89,1	797,1	3,4	433,7	400,0	399,5	399,8	418,8
	1570	301,6	89,8	767,0	3,2	429,6	396,5	415,3	380,8	416,3
	1580	294,4	90,0	742,0	3,0	425,7	393,0	430,4	366,0	413,3
19-18-20-21-22	1590	322,2	90,5	880,7	11,5	422,1	387,4	442,6	351,2	408,7
	1600	362,5	90,6	938,9	10,4	408,3	371,4	441,3	356,7	393,1
	1610	382,1	91,6	1017,0	9,4	408,1	365,2	432,0	393,9	392,7
	1620	388,1	93,4	997,0	8,2	421,3	369,8	421,8	433,0	403,2
	1630	386,1	94,2	950,5	7,2	441,2	381,0	413,0	459,3	419,8
	1640	379,3	94,9	950,3	6,3	458,3	391,8	405,6	477,9	438,8
	1650	369,4	95,2	906,6	5,5	470,3	402,8	400,7	492,0	458,0
	1660	357,6	96,7	870,4	5,0	480,1	413,9	398,7	496,2	476,3
	1670	340,2	97,9	823,3	4,6	482,5	420,6	401,2	486,9	487,1
	1680	320,6	97,9	774,2	4,4	476,7	417,5	408,4	460,2	480,7
	1690	310,7	98,4	759,9	4,2	469,1	411,2	416,3	432,0	472,2
	1700	302,5	97,9	738,9	4,0	460,1	403,9	422,5	409,0	463,6
	1710	296,9	97,0	723,6	3,9	453,0	397,5	427,7	388,6	455,9
	1720	291,2	97,0	730,0	3,7	445,7	392,7	431,0	372,4	448,4
	1730	290,3	96,8	721,5	3,5	439,2	389,2	431,7	358,3	440,7
	1740	284,1	96,8	699,0	3,3	433,1	386,1	431,4	346,0	433,9
21-22-23-20	1750	332,1	96,3	1003,9	11,9	421,1	377,1	431,8	335,3	424,2
	1760	406,5	97,1	1229,6	11,0	400,8	365,6	425,6	329,7	405,6
	1770	473,9	96,5	1062,6	9,9	392,1	368,9	419,6	344,8	394,6

	1780	414,5	97,0	1041,2	8,6	402,0	382,1	415,8	393,4	403,1
	1790	420,5	97,5	1092,7	7,3	426,9	396,3	411,0	446,0	429,0
	1800	414,4	99,0	1074,4	6,2	457,0	413,3	407,6	486,6	457,9
	1810	379,3	100,2	966,4	5,5	482,9	427,8	404,4	509,5	479,5
	1820	353,7	100,9	888,8	5,0	502,6	439,5	407,6	501,4	488,6
	1830	329,1	101,3	801,1	4,7	507,9	445,0	416,5	479,4	491,7
	1840	313,9	101,5	767,4	4,5	502,8	443,4	426,2	462,8	489,0
	1850	304,5	100,7	742,9	4,3	490,4	435,7	434,4	426,6	480,6
	1860	294,9	100,5	717,8	4,1	473,6	426,0	440,5	403,2	468,4
	1870	287,7	100,0	700,6	4,0	459,0	417,8	445,7	384,5	456,6
	1880	281,0	98,6	683,0	3,8	447,1	409,6	448,8	367,0	446,8
	1890	275,4	97,6	674,8	3,7	436,3	401,9	450,4	352,4	437,8
	1900	271,8	97,3	672,7	3,5	428,2	395,7	450,7	341,3	429,8
	1910	268,0	96,6	664,9	3,3	421,3	390,3	447,3	330,6	422,3
	1920	264,9	95,9	656,7	3,2	415,5	385,9	441,4	321,6	415,4
	1930	263,2	95,9	654,2	3,0	410,5	383,5	435,6	313,4	408,4
	1940	261,1	94,8	648,3	2,9	406,0	382,2	430,2	306,1	401,8
	1950	259,8	94,9	642,6	2,7	402,2	381,4	426,0	300,3	396,1
	1960	259,0	94,8	642,0	2,6	398,8	380,5	422,8	294,7	391,2
	1970	256,5	94,5	632,5	2,4	396,0	377,3	417,9	290,0	386,2
	1980	256,5	93,9	643,6	2,3	393,9	373,7	411,6	285,5	380,2
	1990	252,8	93,6	627,0	2,2	392,2	368,7	404,5	280,8	374,2
	2000	249,8	93,6	618,3	2,0	391,9	363,6	396,4	276,3	368,0
	2010	244,3	93,4	594,5	1,9	376,5	358,2	392,8	271,8	361,4
	2020	239,2	93,1	582,4	1,8	370,6	352,6	387,5	268,2	354,1
	2030	234,4	92,9	573,0	1,7	364,1	346,3	381,3	262,9	346,5
	2040	230,5	92,3	556,6	1,6	357,4	338,6	374,6	258,1	338,2
	2050	224,1	92,0	533,8	1,5	349,5	329,9	366,0	252,9	329,8
	2060	216,3	91,6	512,0	1,4	340,4	320,1	357,0	247,0	320,5
	2070	208,4	91,1	487,2	1,4	330,1	310,2	348,1	241,5	309,9
	2080	196,0	90,8	459,4	1,3	319,4	300,4	339,3	234,7	299,2
	2090	188,5	90,3	444,4	1,2	309,1	290,9	330,9	227,9	288,8
	2100	175,1	89,8	361,1	1,2	298,3	280,7	322,4	221,5	278,2
	2110	165,5	89,2	334,0	1,2	286,9	270,2	313,7	214,0	267,8
	2120	158,8	88,6	319,4	1,1	275,4	259,8	304,6	206,9	257,5
	2130	153,5	87,9	307,3	1,1	265,0	250,2	295,3	199,7	247,7
	2140	148,1	87,5	292,5	1,1	256,0	240,9	286,3	193,1	238,3
	2150	142,7	87,0	277,3	1,0	246,0	232,0	277,1	187,2	229,5
	2160	137,7	86,4	262,8	1,0	236,1	222,8	267,8	181,2	220,9
	2170	77,1	75,6	80,0	0,0	82,3	83,0	84,3	80,6	82,2
21-22-23-19-18	2180	405,6	76,0	399,6	12,8	93,3	91,2	87,3	90,0	89,8
	2190	264,8	76,8	708,9	12,2	132,7	123,1	104,4	134,6	134,5
	2200	279,0	77,5	750,8	11,5	156,3	144,2	120,3	169,0	153,3
	2210	286,4	78,2	842,8	10,7	181,7	165,1	133,1	204,5	173,2
	2220	286,5	78,9	844,0	10,1	200,1	183,7	146,2	236,2	188,7
	2230	296,2	79,7	908,0	9,4	215,5	200,8	158,0	259,8	204,2
	2240	295,6	80,6	835,7	8,8	231,5	217,9	169,1	280,0	220,8
	2250	306,9	81,1	866,1	8,1	254,2	235,1	179,8	297,9	235,9
	2260	306,1	82,0	879,3	7,4	282,7	252,4	190,1	318,4	252,1
	2270	303,9	83,2	862,1	6,7	306,5	268,7	200,0	336,4	269,8
	2280	312,6	83,9	933,7	6,1	324,7	282,8	210,1	352,0	286,5
	2290	310,9	84,6	891,1	5,5	334,5	294,0	221,4	367,5	301,2
	2300	311,5	85,3	877,8	4,8	343,6	304,2	233,1	383,6	316,6
	2310	311,1	85,8	864,5	4,2	353,2	313,9	244,4	398,5	333,5
	2320	324,8	87,5	941,0	3,8	358,5	322,8	253,7	400,5	347,8
	2330	296,1	86,8	800,2	3,5	357,5	326,5	266,3	399,5	347,7
21-20-19-18	2340	301,2	86,4	884,6	11,8	356,6	325,5	282,8	373,3	347,4
	2350	346,5	86,3	1138,1	11,1	346,4	320,3	291,6	357,4	334,2
	2360	384,9	86,7	1040,8	10,1	342,2	323,0	296,2	356,5	321,1
	2370	346,7	87,7	928,0	9,2	353,3	333,8	300,3	385,4	324,8
	2380	334,8	87,8	891,1	8,3	367,9	341,2	303,6	409,1	337,4
	2390	334,1	88,3	887,5	7,6	382,8	347,7	305,3	419,9	356,6
	2400	344,2	87,4	934,9	6,7	399,3	357,3	305,2	435,7	380,3
	2410	327,3	88,2	869,1	6,1	414,9	369,2	304,0	453,4	403,2
	2420	316,3	89,0	878,9	5,5	424,8	377,7	305,8	461,1	412,9
	2430	307,1	89,7	836,8	5,1	435,9	385,2	312,8	456,1	417,1
	2440	304,0	90,2	847,7	4,8	440,3	389,5	323,1	435,3	418,2
	2450	298,2	90,8	822,8	4,5	441,5	391,3	334,4	416,8	418,4
	2460	288,0	91,1	780,0	4,2	441,0	391,4	345,5	399,1	418,4
	2470	274,2	91,7	735,9	4,0	438,1	388,2	354,1	383,2	417,5
	2480	264,2	91,8	708,7	3,8	433,9	383,8	362,5	369,4	415,6
20-24-23-20	2490	314,5	91,8	868,7	11,8	422,6	374,1	369,6	358,2	408,5
	2500	331,8	91,6	1016,3	11,2	402,6	361,5	367,0	359,4	394,0
	2510	332,7	91,9	1088,2	10,4	390,5	355,5	360,5	372,6	381,5
	2520	343,6	91,7	884,9	9,4	392,7	358,2	354,3	395,8	380,9
	2530	337,7	92,0	869,9	8,6	404,7	367,7	348,6	422,4	394,0
	2540	339,5	92,1	924,5	7,7	420,7	379,3	343,0	441,3	411,2
	2550	332,3	92,2	920,5	7,0	435,6	388,7	338,6	458,2	423,5
	2560	327,5	93,5	903,9	6,4	446,6	396,8	336,9	469,3	430,7
	2570	314,0	94,0	868,2	5,9	456,5	404,6	338,5	466,3	436,5
	2580	302,2	94,3	826,5	5,5	458,7	410,6	342,3	449,1	442,3
	2590	288,2	94,4	773,6	5,3	455,6	410,7	347,6	428,1	442,3
21-20-19-18	2600	344,5	94,7	997,0	18,3	441,3	396,9	352,5	407,5	428,1
	2610	352,4	94,5	936,9	17,2	425,9	378,2	349,4	423,9	398,4
	2620	378,5	94,9	1047,2	15,9	415,7	369,4	342,8	448,0	380,9
	2630	392,4	95,1	1074,8	14,4	420,3	374,2	335,1	482,6	379,7
	2640	399,5	96,6	1062,1	12,9	433,5	386,7	327,2	517,4	390,2
	2650	416,0	96,7	1095,0	11,4	449,9	402,2	320,3	545,3	407,6
	2660	396,0	97,4	1044,3	10,2	466,1	418,0	314,5	568,9	426,1
	2670	373,8	98,2	962,3	9,3	475,1	429,5	310,8	578,5	447,8
	2680	349,3	98,3	883,0	8,8	477,8	432,8	309,4	566,6	461,2

2690	333,1	99,0	672,1	8,4	481,1	430,9	310,9	541,0	466,0
2700	214,5	79,6	567,0	3,6	350,8	332,5	361,2	258,8	348,6
2710	212,3	79,5	559,4	3,5	345,0	329,0	356,3	255,7	343,5
2720	210,3	79,4	549,3	3,4	339,0	326,7	352,3	252,6	338,8
2730	209,7	79,4	546,1	3,3	333,7	326,0	349,3	249,4	333,7
2740	208,6	79,3	538,9	3,2	329,0	326,3	346,8	246,2	329,5
2750	208,4	79,2	539,1	3,1	325,2	326,5	344,1	243,7	326,4
2760	207,2	79,2	534,0	3,0	322,0	326,5	341,2	241,5	324,2
2770	206,7	79,1	525,2	2,9	319,4	325,4	337,8	239,5	322,1
2780	203,9	79,1	519,1	2,8	317,1	323,8	334,3	237,3	319,9
2790	203,6	79,0	517,2	2,7	314,3	320,9	330,9	235,4	317,8
2800	200,9	79,0	499,8	2,6	311,8	316,5	326,6	233,5	315,2
2810	197,4	78,9	486,9	2,6	307,0	311,7	322,0	231,2	313,1
2820	193,3	78,8	475,6	2,5	301,8	306,2	316,9	228,3	310,6
2830	189,8	78,8	462,2	2,4	296,4	300,6	311,9	225,4	307,4
2840	186,1	78,7	448,8	2,3	290,2	294,4	306,5	222,1	303,1
2850	183,2	78,6	441,2	2,3	283,6	288,5	301,4	218,4	298,2
2860	180,1	78,6	427,6	2,2	277,0	283,0	296,2	214,9	293,3
2870	176,4	78,4	416,5	2,2	269,7	277,1	291,2	211,3	288,7
2880	172,8	78,4	405,4	2,1	262,8	271,6	286,1	207,7	283,7
2890	169,0	78,4	392,8	2,1	256,2	266,0	280,7	204,3	277,9
2900	165,7	78,2	384,7	2,0	249,5	260,1	275,4	200,6	271,5
2910	162,3	78,2	371,5	2,0	243,3	254,2	270,0	196,7	264,8
2920	156,9	78,1	358,0	2,0	237,6	248,1	264,5	192,8	257,7
2930	151,3	78,0	300,9	2,0	231,7	241,7	258,9	188,5	249,6
2940	141,5	78,0	278,0	1,9	225,6	235,1	253,4	184,1	241,4
2950	135,3	77,9	262,9	1,9	218,9	227,6	247,7	179,4	232,8
2960	130,5	77,9	250,2	1,9	211,9	219,8	241,7	174,3	224,1
2970	126,2	77,9	238,7	1,9	204,9	212,0	235,7	169,2	215,5
2980	122,7	77,8	228,1	1,9	198,2	204,3	229,5	164,2	207,2
2990	119,5	77,7	219,1	1,9	191,5	197,2	223,5	159,6	199,8
3000	116,3	77,6	209,8	1,9	185,0	190,4	217,2	155,2	192,7
3010	113,5	77,6	201,4	1,8	178,9	183,8	210,7	151,1	186,0

Wood moisture each pieces	Temps acquisition de données	Flue temp °F	Room temp °F	Catalyst °F	scale lbs	Right °F	Back °F	Bottom °F	Top °F	Left °F
18-19	0	74,8	73,7	288,2	1,9	74,7	74,7	75,8	74,7	74,8
20-19-18	10	75,1	73,8	676,2	7,0	98,5	98,9	87,0	88,3	106,4
	20	370,0	74,0	624,5	6,5	143,7	133,8	106,2	129,5	158,7
	30	402,5	74,0	626,2	5,6	181,5	165,5	133,6	175,2	203,6
	40	439,3	74,4	693,2	4,5	226,0	197,7	165,0	223,5	245,2
	50	300,1	74,5	545,0	3,8	278,7	235,4	206,1	267,1	295,3
	60	236,4	74,8	443,2	3,5	290,3	251,0	233,5	281,3	310,4
	70	207,7	74,7	397,7	3,4	283,9	252,1	254,7	274,6	304,0
	80	195,7	74,8	375,9	3,2	276,1	248,9	271,8	262,6	296,0
	90	187,1	75,0	361,0	3,0	269,7	245,4	284,4	250,4	290,7
19-18-20	100	324,8	75,0	346,7	9,9	263,9	242,0	291,3	240,5	285,2
	110	426,9	75,4	643,5	8,4	280,3	257,7	291,1	256,7	299,9
	120	429,7	75,5	666,9	7,3	325,1	291,8	294,5	300,2	351,3
	130	416,0	75,8	680,7	6,3	365,8	333,2	300,4	332,3	402,4
	140	398,5	76,3	786,2	5,6	394,3	363,0	308,7	349,3	431,4
	150	364,0	76,3	927,0	4,8	401,7	371,8	315,1	368,6	437,6
	160	351,7	76,7	843,7	4,2	413,0	374,9	316,5	388,8	434,3
	170	337,5	76,8	781,2	3,6	424,0	380,4	319,3	398,3	435,8
	180	330,8	77,4	858,6	3,3	425,3	383,0	325,8	394,0	434,8
18-19-21	190	324,4	77,3	771,8	9,0	417,4	376,8	339,1	385,0	425,4
	200	335,8	77,6	844,4	8,4	398,3	359,3	344,3	375,8	404,7
	210	363,9	77,7	950,1	7,6	395,0	350,0	344,2	392,5	392,8
	220	376,5	77,9	964,1	6,7	410,0	354,8	344,3	421,4	397,2
	230	378,4	78,3	940,0	5,9	432,0	370,3	347,4	446,1	413,0
	240	365,4	78,2	854,4	5,1	452,9	389,3	354,8	462,1	434,3
	250	343,1	78,7	806,1	4,7	469,4	405,8	364,5	455,9	450,6
	260	331,9	79,1	786,5	4,3	474,4	417,7	373,1	435,9	454,9
	270	332,3	78,8	789,7	4,0	469,3	415,3	378,1	417,3	449,7
8-19-18-19-20-2 20,00	280	395,8	79,7	550,8	22,5	465,8	405,6	384,0	398,4	438,1
	290	363,5	79,1	351,6	25,4	425,9	384,1	388,8	378,3	416,8
	300	363,9	78,8	955,6	24,3	390,1	359,1	383,7	354,2	399,1
	310	339,1	79,3	852,4	23,3	385,4	342,6	377,7	352,3	404,5
	320	338,4	78,8	872,0	22,5	346,9	331,1	372,8	379,1	393,3
	330	350,4	78,4	893,5	21,4	335,5	324,6	368,0	412,1	391,0
	340	332,7	78,4	883,7	20,6	332,8	323,4	361,5	429,9	376,6
	350	341,4	78,3	909,2	19,7	329,4	322,2	354,3	434,7	375,1
	360	359,7	78,5	971,1	18,6	332,3	325,6	348,1	446,5	378,7
	370	355,0	78,6	935,0	17,6	341,6	333,1	341,7	463,5	386,3
	380	354,2	78,6	901,0	16,6	351,7	340,4	336,5	475,0	393,4
	390	355,9	78,8	906,8	15,6	359,6	346,3	330,0	483,9	400,9
	400	365,5	78,6	943,1	14,6	366,8	352,1	325,4	493,6	408,4
	410	384,6	79,0	1047,5	13,5	378,8	360,4	321,3	510,8	418,3
	420	390,8	79,2	1059,1	12,4	396,1	372,1	317,4	530,2	426,3
	430	391,6	79,4	1062,2	11,2	419,6	384,5	314,0	549,4	438,7
	440	357,7	79,6	923,2	10,4	440,2	396,0	311,7	561,0	449,1
	450	338,9	79,6	876,9	9,8	452,0	401,8	310,4	544,4	454,4
	460	326,5	79,7	847,0	9,3	458,0	403,7	310,6	525,7	457,3
	470	308,2	79,5	806,7	9,0	457,1	402,2	312,5	501,4	452,9
	480	294,2	79,2	793,2	8,8	450,5	396,8	317,9	472,1	442,6
	490	284,0	79,3	773,5	8,5	441,8	389,4	326,5	443,4	434,8
	500	271,7	79,3	726,1	8,4	435,4	383,5	335,9	419,2	430,4
	510	259,3	79,2	683,0	8,2	430,6	378,4	343,4	397,9	428,7
	520	250,6	79,2	669,1	8,0	427,1	373,4	350,7	378,8	426,6
	530	246,3	79,1	664,5	7,9	424,8	369,0	358,2	362,3	423,9
	540	243,5	79,0	659,0	7,7	422,5	365,6	365,3	349,1	420,3
	550	239,0	79,0	646,2	7,6	420,1	363,0	371,5	337,8	416,4
	560	237,6	78,9	656,8	7,4	417,6	361,4	377,9	328,9	412,1
	570	239,1	78,8	667,0	7,3	415,8	362,5	384,9	322,6	408,7
	580	239,0	79,0	662,9	7,1	414,9	366,2	391,8	317,9	406,5
	590	237,7	78,8	656,6	6,9	414,7	370,4	398,2	313,9	405,0
	600	235,4	78,9	646,4	6,7	415,1	374,2	403,9	310,2	403,6
	610	233,8	78,8	644,9	6,6	415,6	376,7	409,0	306,8	402,6
	620	232,9	78,8	636,6	6,4	416,3	378,1	412,5	303,5	401,7
	630	229,8	78,8	621,9	6,3	415,4	373,3	413,8	300,8	400,3
	640	227,6	78,9	621,5	6,1	412,5	368,7	413,0	297,3	397,8
	650	226,7	78,9	619,5	6,0	408,5	364,2	412,0	294,0	395,5
	660	226,5	78,9	621,8	5,8	405,5	361,0	411,7	291,6	394,1
	670	225,8	78,8	622,1	5,7	404,9	358,8	412,3	289,6	393,2
	680	225,7	78,7	621,9	5,5	404,1	357,8	413,1	287,1	392,4
	690	224,4	78,9	617,0	5,4	404,9	356,2	412,4	286,3	392,0
	700	222,8	78,7	610,8	5,2	403,6	355,2	410,5	284,4	390,6
	710	222,0	78,8	606,1	5,1	401,3	354,6	408,9	283,0	388,9
	720	221,3	78,7	602,5	5,0	399,1	355,2	407,8	280,5	386,8
	730	220,6	78,7	601,2	4,8	397,6	356,0	407,0	277,9	384,4
	740	220,3	78,5	606,0	4,7	396,4	356,9	406,8	275,6	382,1
	750	219,9	78,5	601,6	4,6	395,0	356,7	406,4	274,3	381,0
	760	219,7	78,5	598,8	4,5	393,3	356,5	405,6	273,1	380,0
	770	220,7	78,4	615,2	4,3	393,0	357,5	405,4	271,7	378,9
	780	221,2	78,4	608,5	4,2	395,3	357,6	404,7	271,0	377,2
	790	220,5	78,3	604,3	4,0	396,2	357,1	403,0	270,7	374,0
	800	220,3	78,2	601,5	3,9	395,5	355,6	401,3	269,6	369,6
	810	219,1	78,3	596,8	3,8	393,6	354,0	399,9	268,3	365,4
	820	215,9	78,1	584,0	3,7	389,3	350,8	398,6	266,9	361,3
	830	214,7	78,1	585,7	3,6	382,8	347,4	397,8	264,2	356,4
	840	214,8	78,0	586,4	3,4	377,8	345,0	397,6	261,8	351,2
	850	211,5	77,9	570,5	3,3	374,0	343,1	396,2	259,5	346,2
	860	209,6	77,8	563,4	3,2	370,1	339,8	389,7	257,2	341,0
	870	207,7	77,9	562,0	3,1	366,5	336,1	384,6	254,6	335,8

	880	205,5	77,8	554,6	3,0	363,2	332,7	380,5	252,3	330,5
	890	203,6	77,7	550,3	2,9	359,6	329,1	376,8	249,4	325,2
	900	202,1	77,6	544,5	2,8	356,5	324,5	372,8	246,9	319,7
	910	97,1	69,9	184,4	3,4	147,8	142,1	174,5	126,3	141,8
	920	171,8	69,9	206,8	2,3	164,3	155,7	183,1	131,6	156,0
20-21-19-18	930	324,5	70,1	544,1	8,1	217,7	187,7	192,6	162,1	203,4
	940	334,1	70,2	562,9	7,3	249,9	205,2	202,2	197,1	218,5
	950	363,9	70,5	625,6	6,6	268,2	224,3	221,3	227,6	230,3
	960	351,0	70,3	914,6	5,7	274,7	245,7	244,4	247,7	236,1
	970	447,6	70,6	846,9	4,6	307,3	281,6	287,6	293,7	265,5
	980	383,0	71,3	906,7	3,8	343,4	315,1	291,1	342,6	310,7
	990	371,1	71,8	903,4	3,0	374,1	345,1	293,4	375,7	349,3
	1000	366,9	71,8	856,3	2,6	401,0	369,5	307,2	388,6	382,0
18-19-20-21-22	1010	337,2	72,6	773,0	19,3	406,1	375,2	324,4	382,5	392,3
	1020	324,0	72,9	758,6	18,5	379,7	351,2	326,7	373,1	367,5
	1030	359,9	73,0	886,3	17,6	363,6	334,6	322,8	383,3	351,9
	1040	382,0	73,5	906,4	16,7	365,7	328,9	319,0	395,9	346,6
	1050	387,9	73,6	945,9	15,6	370,1	328,8	317,5	411,4	353,4
	1060	379,3	74,1	931,5	14,7	372,3	331,6	317,0	425,5	368,9
	1070	361,4	74,7	916,1	13,9	372,1	334,1	316,9	431,9	372,9
	1080	358,3	74,7	902,5	13,0	374,6	338,1	317,0	435,4	378,7
	1090	357,7	74,8	905,2	12,1	380,1	344,7	316,5	439,5	395,6
	1100	358,2	75,3	883,1	11,2	389,2	354,0	314,4	446,3	424,7
	1110	356,0	75,4	873,6	10,6	399,0	362,6	313,9	447,2	439,2
	1120	346,6	75,7	875,1	9,9	406,9	369,8	315,5	439,0	440,2
	1130	342,2	76,0	861,4	9,1	415,5	377,2	317,1	432,5	440,4
	1140	339,9	76,0	849,8	8,5	427,5	385,6	317,4	430,1	444,2
	1150	332,6	76,2	825,2	7,9	437,9	394,7	318,5	423,9	448,4
	1160	329,6	76,3	823,9	7,4	443,1	404,7	320,5	417,6	451,3
	1170	324,9	76,7	810,2	6,9	444,6	417,7	324,9	411,2	458,3
	1180	325,0	77,2	820,5	6,4	444,0	422,1	326,7	405,6	464,1
	1190	319,9	77,3	810,4	6,0	440,3	423,2	327,6	398,8	462,9
	1200	307,3	77,0	765,3	5,7	434,0	422,8	330,7	389,6	455,7
	1210	305,0	77,1	778,2	5,5	426,8	422,6	337,9	379,6	445,6
	1220	291,4	77,4	736,8	5,3	421,3	421,2	347,5	368,0	438,9
	1230	283,1	77,6	709,4	5,2	418,0	417,8	357,0	355,9	433,4
	1240	275,6	77,8	689,7	5,0	413,6	413,8	364,5	344,9	427,7
	1250	269,9	77,6	674,7	4,8	408,4	409,7	371,0	336,3	422,4
	1260	266,7	77,7	663,6	4,7	404,8	402,0	375,3	328,9	416,7
18-19-20-21	1270	262,5	78,2	658,2	15,1	400,1	393,3	378,2	320,7	410,7
	1280	275,4	78,1	528,4	14,2	387,2	382,0	380,2	315,8	400,6
	1290	340,9	78,4	954,7	13,3	378,2	374,7	375,9	340,3	401,0
	1300	353,9	78,2	883,3	12,2	381,1	373,2	369,0	383,2	408,2
	1310	366,8	78,2	893,8	11,0	390,7	376,9	360,2	421,4	420,9
	1320	379,1	78,4	936,7	9,9	407,2	385,6	351,5	455,2	438,7
	1330	386,0	79,1	962,8	8,9	425,2	396,4	344,5	484,5	456,4
	1340	382,6	79,1	957,4	7,9	443,7	406,3	339,7	504,0	468,7
	1350	380,4	79,0	975,2	7,2	460,5	415,1	337,7	513,2	478,8
	1360	356,5	79,3	941,4	6,8	470,7	419,6	337,4	507,9	481,0
	1370	340,3	79,6	886,1	6,5	473,1	419,2	340,0	491,6	479,7
	1380	317,9	80,0	803,2	6,3	469,9	414,5	345,6	465,0	474,9
	1390	301,0	79,4	751,6	6,1	466,9	408,5	353,0	436,4	468,8
	1400	290,2	79,4	729,6	6,0	463,6	401,4	359,7	412,8	460,9
	1410	281,5	79,3	708,6	5,8	459,3	394,5	365,1	393,4	451,9
	1420	275,2	79,4	696,4	5,6	454,1	388,4	369,7	376,6	442,4
	1430	270,8	79,5	688,0	5,5	451,1	383,6	373,9	361,1	433,9
	1440	265,9	80,0	676,9	5,4	446,1	378,7	376,2	351,6	425,3
	1450	263,2	79,8	673,5	5,2	441,6	374,9	378,6	341,7	419,4
	1460	259,2	79,8	658,9	5,1	435,2	371,8	379,3	332,7	412,6
0-21-22-20-19-1I	1470	256,1	79,7	646,4	29,1	418,7	363,3	381,2	322,4	399,9
	1480	270,7	79,7	673,3	28,4	381,7	339,2	377,3	307,1	374,1
	1490	306,3	79,8	830,7	27,5	362,2	321,6	370,8	302,3	356,4
	1500	360,0	79,5	1063,6	26,4	331,2	313,6	364,8	330,5	345,5
	1510	382,8	79,6	1001,1	25,2	322,0	312,3	359,7	386,0	337,4
	1520	386,8	79,7	1030,9	23,8	318,0	315,2	354,9	427,0	333,0
	1530	414,7	79,6	1067,0	22,3	325,1	324,8	350,7	464,6	338,8
	1540	417,8	79,8	1057,2	21,0	342,7	338,1	344,6	500,0	353,4
	1550	405,6	80,1	1011,3	19,8	355,4	349,3	338,7	521,8	369,1
	1560	404,8	80,2	1015,3	18,6	366,8	359,9	333,4	539,7	385,4
	1570	412,8	80,6	1044,8	17,4	379,2	371,8	328,6	554,5	404,5
	1580	415,2	80,5	1056,1	16,2	391,8	383,9	324,4	567,9	425,3
	1590	414,2	80,7	1033,5	15,0	405,2	395,2	320,8	575,0	446,6
	1600	411,8	80,8	1023,3	13,9	418,0	405,4	317,9	581,1	465,7
	1610	407,9	81,0	1027,7	12,8	428,2	415,0	316,3	587,1	481,4
	1620	414,0	81,1	1077,6	11,8	440,5	423,9	315,8	591,2	493,3
	1630	407,8	81,1	1070,2	11,0	458,0	430,8	315,1	589,8	500,4
	1640	377,0	80,9	1003,8	10,5	465,1	432,8	316,1	574,0	502,1
	1650	363,7	81,3	1014,6	10,2	468,3	432,3	319,7	552,5	500,9
	1660	342,3	81,5	888,7	10,0	465,3	428,4	324,4	521,0	496,2
	1670	322,7	81,4	824,3	9,8	462,0	418,6	329,2	488,9	488,1
	1680	307,9	81,4	785,4	9,5	458,5	411,6	333,5	461,6	482,8
	1690	298,1	81,2	759,0	9,4	454,1	405,3	337,4	437,7	479,0
	1700	290,6	81,2	747,8	9,1	451,3	399,7	341,2	417,7	475,0
	1710	286,5	81,1	740,6	9,0	449,2	394,6	345,1	401,2	470,7
	1720	282,7	81,2	737,9	8,8	446,4	390,9	348,9	387,7	466,8
	1730	280,7	81,1	721,4	8,6	443,3	388,8	352,7	376,6	464,6
	1740	277,4	81,1	720,2	8,4	440,0	388,0	356,3	367,3	462,7
	1750	275,7	81,0	716,5	8,2	436,2	388,4	359,9	360,0	460,8
	1760	273,7	80,9	714,5	8,0	432,3	388,3	363,3	353,3	458,7
	1770	273,4	80,9	717,1	7,9	428,7	387,1	366,9	347,2	456,3
	1780	271,2	80,9	708,0	7,7	424,5	385,6	368,1	343,3	452,4

	1790	269,5	80,7	699,5	7,5	421,2	384,4	370,1	338,6	450,8
	1800	267,9	80,7	694,2	7,3	418,2	383,6	371,8	334,3	448,6
	1810	264,9	80,8	684,3	7,1	415,9	381,7	372,7	329,3	446,2
	1820	263,9	80,6	687,7	7,0	414,9	379,8	372,9	325,4	443,1
	1830	261,6	80,7	673,1	6,8	413,8	377,4	372,0	321,7	438,7
	1840	257,7	80,5	663,1	6,7	412,6	374,2	369,5	317,2	433,7
	1850	256,2	80,6	659,8	6,5	411,1	371,9	366,8	313,1	428,5
	1860	254,0	80,5	653,2	6,4	409,3	369,8	364,9	308,7	424,3
	1870	252,5	80,4	644,7	6,3	407,9	367,9	363,8	305,0	420,5
	1880	249,2	80,4	633,8	6,1	405,4	365,9	362,9	301,2	416,9
	1890	246,0	80,2	624,3	6,0	402,2	364,4	361,4	297,7	412,4
	1900	243,3	80,3	617,2	5,9	399,5	363,9	360,1	294,0	407,8
	1910	242,1	80,2	613,0	5,7	397,9	363,7	358,7	290,6	403,8
	1920	240,8	80,1	660,3	5,5	400,4	365,1	357,4	288,8	401,5
	1930	249,2	80,2	668,4	5,4	403,4	367,8	357,2	288,7	400,5
	1940	249,0	80,2	656,3	5,2	405,7	370,7	357,5	288,7	399,3
	1950	249,1	80,1	654,1	5,1	406,8	370,3	359,5	287,9	396,4
	1960	247,4	80,1	648,8	4,9	405,9	368,5	362,0	286,5	391,9
	1970	245,1	80,1	638,2	4,8	404,7	365,3	363,1	284,4	386,9
	1980	243,0	80,1	629,0	4,7	401,2	361,4	362,4	282,3	380,4
	1990	239,0	80,0	614,3	4,5	396,9	356,9	360,9	279,3	372,8
	2000	235,9	80,0	607,9	4,4	393,0	353,4	359,0	275,4	366,0
	2010	234,4	79,9	601,9	4,3	389,4	350,5	357,1	272,5	359,6
	2020	232,4	79,7	593,5	4,2	385,9	347,2	354,7	269,2	354,1
	2030	229,8	79,7	586,2	4,1	382,0	344,4	351,6	266,2	348,7
	2040	227,8	79,7	577,4	4,0	377,9	342,9	347,9	263,3	343,8
	2050	226,5	79,7	575,7	3,9	374,4	342,2	344,1	260,2	339,2
	2060	227,2	79,5	562,0	3,8	371,1	340,3	341,3	257,4	335,1
	2070	224,5	79,5	570,4	3,6	367,2	337,2	338,9	255,3	330,8
	2080	222,1	79,4	565,2	3,5	362,9	333,6	336,6	252,3	326,3
	2090	219,2	79,3	551,8	3,4	357,2	329,8	333,1	249,7	321,5
	2100	214,9	79,3	532,6	3,4	350,2	325,2	329,4	246,6	316,1
	2110	209,6	79,2	514,6	3,3	341,7	319,9	325,7	242,1	309,7
	2120	205,6	79,1	501,3	3,2	333,1	313,7	321,6	237,6	303,2
	2130	201,6	79,1	487,5	3,2	324,8	307,8	317,5	233,0	296,7
	2140	198,4	79,0	479,2	3,1	316,9	301,8	313,5	228,7	290,1
	2150	194,3	78,9	465,6	3,0	309,2	296,0	309,3	224,6	283,2
	2160	190,1	78,8	454,9	3,0	301,2	290,3	304,9	220,2	276,1
	2170	186,8	78,7	443,7	2,9	293,5	284,6	300,2	215,5	268,9
	2180	183,1	78,6	432,6	2,9	286,4	278,5	295,4	211,7	261,9
	2190	179,6	78,5	420,6	2,9	280,0	272,8	290,4	207,2	255,2
	2200	176,2	78,5	412,3	2,8	273,8	267,5	285,4	203,1	248,4
	2210	172,9	78,3	403,4	2,8	267,4	262,8	280,0	199,1	241,8
	2220	132,0	76,0	139,0	0,6	181,9	188,8	212,2	148,1	178,7
	2230	212,0	75,9	237,6	3,2	176,8	183,3	207,4	146,7	174,1
18-19-20	2240	346,7	76,2	824,9	10,8	211,1	211,1	212,5	173,7	197,2
	2250	312,4	76,2	932,5	10,3	232,6	230,6	222,4	208,2	218,1
	2260	468,7	76,3	1036,8	9,1	240,8	248,7	236,5	233,8	225,1
	2270	393,1	76,2	958,6	8,0	286,2	269,0	256,2	296,7	265,7
	2280	442,2	76,6	884,3	7,1	325,2	313,8	273,6	339,6	289,5
	2290	389,2	76,6	875,2	6,0	361,0	343,4	297,8	366,8	327,0
	2300	377,0	76,7	949,6	5,4	375,8	360,2	320,4	380,7	360,0
	2310	369,7	76,7	922,0	4,8	374,4	367,2	338,2	381,6	373,6
	2320	352,9	76,6	818,6	4,2	371,7	372,1	351,4	379,5	367,9
	2330	354,3	76,6	838,2	3,7	371,3	376,8	363,7	378,4	367,8
	2340	343,7	77,1	756,5	3,1	384,2	383,1	380,9	374,4	382,3
	2350	329,1	77,2	729,4	2,7	400,3	392,5	396,8	370,8	395,9
	2360	325,2	77,4	746,3	2,3	401,5	396,4	407,8	362,1	395,1
	2370	307,9	77,5	674,4	2,0	395,1	395,2	417,7	353,5	394,2
	2380	293,0	77,3	630,6	1,9	387,4	390,6	424,5	345,7	400,9
	2390	277,1	77,4	599,5	1,7	376,7	380,0	429,2	332,4	389,9
	2400	265,3	77,3	572,1	1,6	366,2	369,0	431,5	320,2	376,2
18-19-20	2410	303,8	77,3	741,6	10,2	355,4	359,5	428,5	305,1	362,0
	2420	324,7	76,9	822,2	9,7	340,8	351,1	417,9	295,1	347,8
	2430	345,9	76,5	833,6	8,9	332,2	344,9	404,3	295,6	341,3
	2440	361,2	76,0	884,7	8,1	335,4	344,0	394,1	311,2	348,2
	2450	366,1	75,6	887,6	7,2	348,1	346,8	388,5	333,0	366,2
	2460	371,7	75,7	858,0	6,3	371,8	357,0	385,2	354,9	387,6
	2470	371,0	76,1	856,6	5,5	404,7	376,4	383,5	374,6	391,9
	2480	372,8	76,2	879,4	4,6	438,0	397,3	382,9	390,0	415,9
	2490	364,8	76,5	877,9	3,9	466,3	414,6	383,9	401,7	434,3
	2500	359,2	77,2	908,7	3,3	485,8	422,1	386,9	407,7	438,9
	2510	337,2	77,3	782,8	3,1	480,6	421,6	391,7	404,7	435,8
	2520	319,0	78,1	726,7	2,9	463,4	414,3	402,4	399,2	429,0
	2530	307,5	78,4	706,5	2,7	449,8	407,7	413,5	373,1	425,0
	2540	299,7	78,9	686,6	2,6	439,0	401,0	421,8	358,9	422,3
	2550	292,8	79,2	676,8	2,4	430,0	395,3	428,3	345,6	419,1
	2560	287,7	79,3	659,3	2,3	422,0	389,7	432,7	334,4	415,0
18-19-18-20-21	2570	331,9	79,6	802,4	15,1	413,8	385,3	434,9	324,2	410,3
	2580	348,9	79,3	859,5	14,5	398,5	382,0	434,0	314,0	393,6
	2590	399,6	79,7	1031,0	13,3	397,4	379,3	430,3	315,4	379,4
	2600	427,0	80,0	1070,1	11,8	407,5	388,0	425,1	358,9	396,3
	2610	425,0	80,1	1059,5	10,6	417,6	397,1	419,0	404,1	415,5
	2620	434,5	80,8	1060,7	9,1	431,9	412,2	416,0	443,4	442,4
	2630	429,2	80,9	1035,2	7,9	454,7	433,7	417,4	478,1	474,8
	2640	417,1	80,9	985,1	6,8	479,5	457,5	421,8	498,1	499,0
	2650	392,8	81,4	921,3	6,0	500,3	480,4	428,1	506,2	516,5
	2660	371,1	81,9	868,7	5,4	510,6	493,8	437,3	492,5	524,3
	2670	359,6	82,1	892,5	5,0	512,6	497,5	448,9	474,7	524,9
	2680	349,7	81,9	857,4	4,7	507,1	488,3	456,8	454,6	517,8
	2690	332,2	81,7	772,2	4,4	498,8	476,5	461,5	434,7	509,1

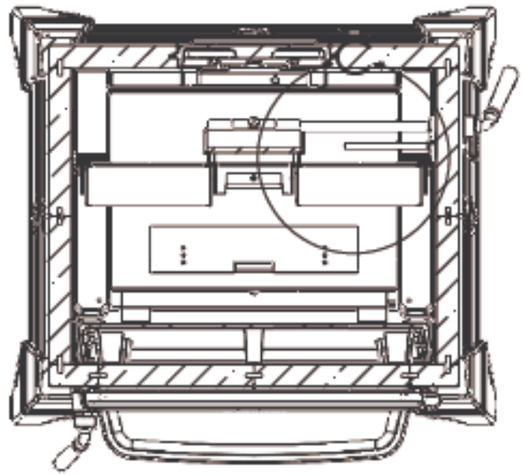
	2700	322,3	81,5	752,9	4,2	469,1	465,4	468,3	417,3	469,5
	2710	316,2	81,2	740,5	4,1	479,4	465,8	470,8	400,6	469,3
	2720	311,6	81,0	728,6	3,9	468,2	446,4	472,5	387,0	479,9
	2730	305,0	80,8	708,0	3,6	460,3	436,8	475,0	373,8	472,7
	2740	300,1	80,3	699,8	3,5	455,0	428,8	477,2	362,1	466,0
	2750	297,0	80,6	696,9	3,3	450,1	422,5	476,8	354,2	457,4
	2760	293,0	80,0	686,2	3,1	446,7	416,9	476,6	346,4	450,8
18-19-20	2770	331,0	80,6	664,2	10,6	442,1	412,6	473,6	337,9	443,6
21-20-22	2780	338,8	80,6	740,9	24,3	425,6	392,2	460,9	329,0	420,9
	2790	395,7	80,2	1001,8	22,8	398,0	366,5	445,5	315,4	393,6
	2800	366,4	80,5	963,0	21,6	389,7	350,8	423,3	333,8	380,6
	2810	353,1	80,8	917,5	20,6	382,7	343,7	404,6	382,3	375,1
	2820	358,3	81,0	918,4	19,6	380,0	342,3	389,4	417,4	368,3
	2830	356,4	81,2	909,4	18,5	381,4	344,8	375,4	440,3	373,5
	2840	353,4	81,1	899,4	17,5	387,2	349,5	361,8	454,9	385,9
	2850	369,1	81,4	947,0	16,5	394,8	354,8	349,0	469,2	397,0
	2860	391,1	81,5	1025,0	15,2	405,7	362,4	338,1	493,6	407,7
	2870	401,3	81,8	1064,9	13,8	419,4	373,1	328,7	524,7	420,8
	2880	399,7	81,9	1069,4	12,4	434,6	385,1	321,0	549,7	435,1
	2890	403,3	81,8	1077,6	11,0	447,9	397,0	315,3	570,1	449,4
	2900	374,0	82,1	936,9	10,1	462,8	408,9	311,0	582,2	463,9
	2910	346,7	82,0	924,2	9,6	470,6	415,8	310,2	571,8	469,7
	2920	328,5	81,9	884,9	9,2	471,9	415,6	313,5	543,7	463,9
	2930	319,2	81,9	833,3	8,8	470,3	411,1	320,0	512,1	454,4
	2940	315,1	81,8	833,8	8,4	469,9	406,4	329,3	486,2	446,6
	2950	315,7	81,8	858,3	8,0	467,0	404,0	340,2	467,7	441,5
	2960	307,7	81,7	787,8	7,7	465,0	403,7	350,5	456,8	440,9
	2970	289,3	81,7	741,4	7,4	461,5	401,7	360,1	438,9	437,2
	2980	278,2	81,3	722,1	7,2	456,8	398,0	368,4	419,3	434,4
	2990	274,7	81,4	738,6	7,1	452,4	394,5	376,3	401,3	431,7
	3000	269,1	81,3	716,6	6,9	448,8	391,4	381,0	386,3	431,1
	3010	264,4	81,3	705,9	6,7	441,8	388,0	385,0	372,4	430,0
	3020	259,4	81,3	687,3	6,6	437,0	383,4	386,5	360,6	427,4
	3030	253,7	81,2	674,2	6,4	431,6	378,2	387,0	350,3	423,3
	3040	250,2	81,1	665,2	6,2	425,5	373,2	386,6	340,2	418,8
	3050	247,6	81,0	664,9	6,1	423,0	369,2	382,6	332,4	414,7
	3060	247,3	80,9	666,3	5,9	420,7	367,0	398,5	325,9	412,3
	3070	247,9	80,8	663,4	5,8	420,6	367,3	405,0	320,9	411,2
	3080	248,3	80,8	664,5	5,6	419,7	368,5	410,2	317,3	410,5
	3090	248,0	80,8	661,9	5,4	417,7	370,6	414,9	314,6	410,3
	3100	246,4	80,7	652,7	5,3	415,6	372,9	418,3	312,1	410,4
	3110	244,8	80,7	652,5	5,1	414,4	373,7	419,5	309,1	409,5
	3120	240,6	80,5	638,1	5,0	409,2	370,9	416,4	305,8	407,4
	3130	237,7	80,4	627,7	4,8	403,2	366,7	410,0	302,0	404,4
	3140	234,8	80,4	618,5	4,7	397,5	362,6	403,5	297,7	401,4
	3150	231,4	80,2	610,8	4,6	391,1	358,8	398,1	293,1	398,8
	3160	229,4	80,1	609,4	4,5	385,3	355,1	393,5	288,9	392,4
	3170	228,2	80,0	605,9	4,4	380,5	352,4	389,6	284,5	387,8
	3180	226,3	80,0	602,0	4,3	377,2	350,2	386,9	280,8	382,0
	3190	224,8	79,9	599,3	4,1	373,7	348,3	382,3	276,7	376,7
	3200	221,9	79,8	587,2	4,0	369,5	345,7	378,8	273,3	371,3
	3210	219,2	79,8	582,5	3,9	365,1	342,7	375,0	269,7	365,8
	3220	217,0	79,7	575,1	3,8	360,6	339,1	370,7	265,8	359,9
	3230	217,0	79,7	584,9	3,7	356,2	336,0	365,9	262,0	354,0

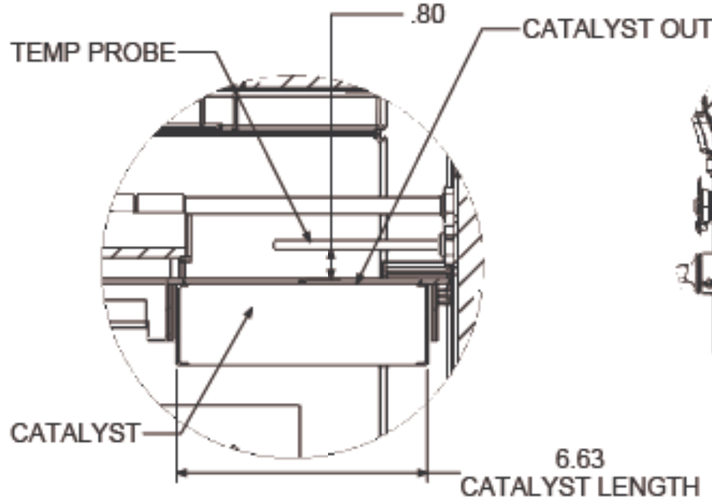
APPENDIX 5: Participants

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





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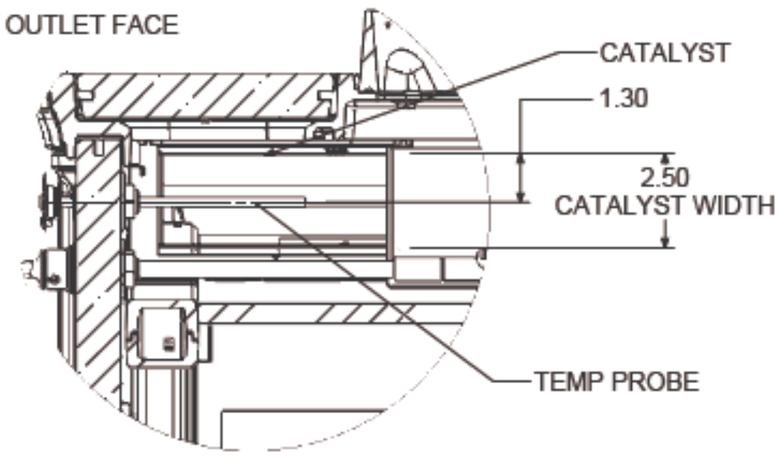

DETAIL D
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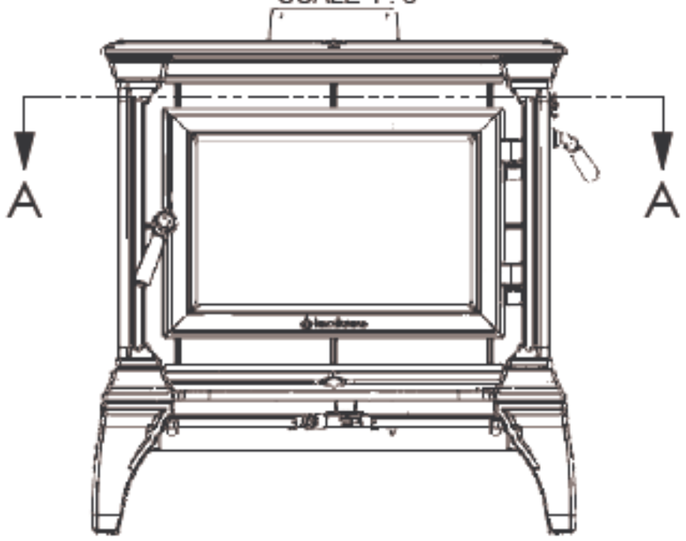
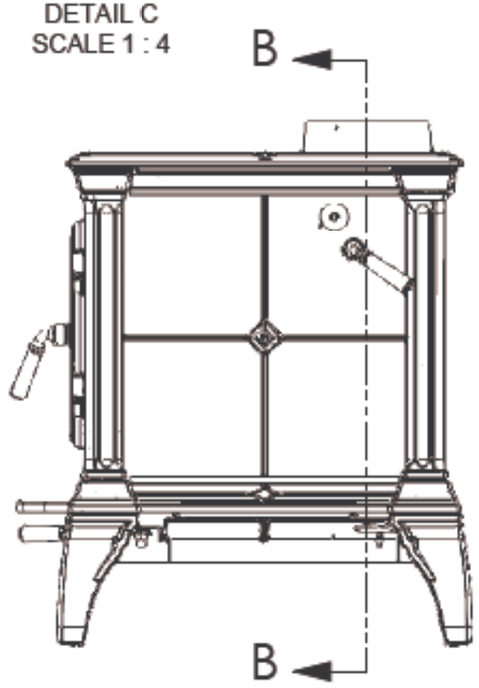
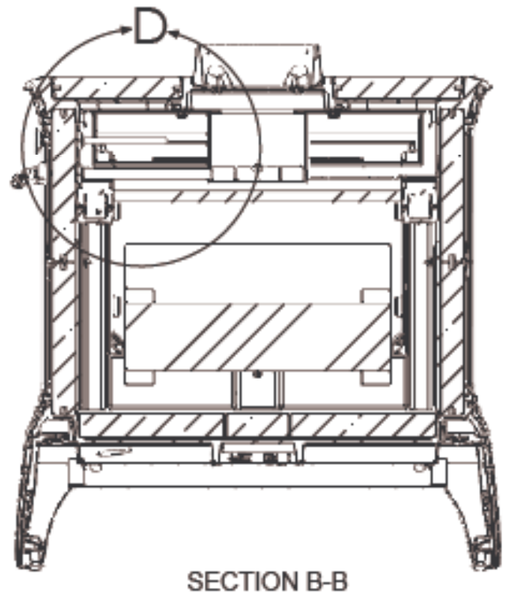
SECTION A-A
SCALE 1 : 8







SECTION B-B
SCALE 1 : 8

WEIGHT:476.91

REVISIONS

ECO	REV.	DESCRIPTION	DATE	APPROVED

VIEWS ARE THIRD ANGLE

UNLESS OTHERWISE SPECIFIED:
TOLERANCES ARE:
FRACTIONS ± 1/64 DECIMALS .XX± .015 .XXX± .005 ANGLES ± 1/4°

1.) DIMENSIONS ARE IN INCHES / MM
2.) ALL MACHINED SURFACES TO BE DE-BURRED AND SMOOTHED

MATERIAL: Material <not specified>

FINISH: FINISH

CAD GENERATED DRAWING. DO NOT MANUALLY UPDATE

APPROVALS	DATE
DRAWN WGE	8/3/2022
CHECKED	
ENGR ENG	
MFG ENG	
QUAL ENG.	

hearthstone

CASTLETON 8031 ASSEMBLY

CATALYST PROBE LOCATION

SIZE B | HEARTHSTONE DWG. NO. 8031 | REV. 0

SCALE: 1:12 | HERGOM DWG. NO. | SHEET 1 OF 1

APPENDIX 7: Operator's manual

hearthstone

Castleton I

(Model 8031)
Woodstove

OWNER'S MANUAL

Installation And Operating Instructions

NFI NATIONAL FIREPLACE INSTITUTE

We recommend that our products be installed and serviced by professionals who are certified in the U.S. by NFI (National Fireplace Institute), or by W.E.T.T. (Wood Energy Technology Transfer) in Canada.
www.nficertified.org
www.wettinc.ca

PFS C US
File# PI-20152

SAVE THIS OWNER'S MANUAL FOR FUTURE REFERENCE

PLEASE READ THIS ENTIRE OWNER'S MANUAL BEFORE YOU INSTALL AND USE YOUR NEW CASTLETON 8031 WOOD STOVE.

If this room heater is not properly installed, a house fire may result.
To reduce the risk of fire, follow the installation instructions.
Failure to follow these instructions can result in property damage, bodily injury, or even death.
Conforms to UL Std. 1482
Certified to ULC Std. S627

CONTACT LOCAL AUTHORITIES WITH JURISDICTION (BUILDING DEPARTMENT or FIRE OFFICIALS), ABOUT PERMITS REQUIRED, RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA.

California Prop 65

⚠ WARNING: This product can expose you to chemicals including glass wool fiber and carbon monoxide which are known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Castleton I (Model 8031)
Manual: 6400-41406
R: 8/3/22

NOTES ON STOVE OPERATION AND EFFICIENCY

Rating:

You have purchased a Hearthstone Castleton 8031 tested to EPA Method 28R 40 CFR Part 60 where applicable. This stove is certified to comply with the U.S. Environmental Protection Agency 2020 particulate emissions standard using crib wood. It is certified at 0.98 gr/hr. emission rate and under specific test conditions has been shown to deliver heat at rates ranging from 12,501 to 24,540 Btu (output).

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

Please refer to the Warranty section of this manual for registration instructions. In case of warranty claims, please contact the point of original sale or the nearest authorized Hearthstone dealer. Our dealer network processes all warranty claims. Authorized Hearthstone dealers can be located at www.hearthstonestoves.com.

This heater is designed to burn natural wood only. Higher efficiencies and lower emissions generally result when burning air-dried seasoned hardwoods, as compared to softwoods or to green or freshly cut hardwoods. **DO NOT BURN:** *Garbage, lawn clippings, material containing rubber (including tires), materials containing plastic, waste petroleum products paints or paint thinners, asphalt products, materials containing asbestos, construction or demolition debris, railroad ties, pressure treated wood, manure or animal remains, salt water driftwood or other previously salt water saturated materials, unseasoned wood, paper products, cardboard, plywood or particleboard.* This prohibition against burning these materials does not prohibit the use of fire starters made from paper, cardboard, sawdust, wax and similar substances for the purpose of starting a fire in an affected wood heater. Burning these materials may result in a release toxic fumes, render the heater ineffective, cause smoke and may damage catalysts.

Following the maintenance guidelines set forth in this manual will help insure the efficient use of your wood heater and minimize visible emissions. Having your stove inspected by a trained professional on a regular basis will greatly increase the potential for recognizing possible impacts to efficiency.

Proper draft is important to the efficient operation of your heater. Refer to the Normal Operation section of this manual for information regarding adequate draft. Both excessive and sub-minimum draft can affect the efficiency of your wood heater. Excessive draft can lead to over-consumption of fuel, lower overall heating capacity of the stove and potential over firing. Low draft can result in inefficient burns, low heat output, expulsion of smoke into the living area when stove doors are opened and an increased potential for build-up of flammable materials in the flue.

Efficiency:

Efficiency was measured and weighted using EPA Method 28R and CSA B415-10 methodology. A weighted average was used to calculate the overall efficiency across all of the 4 burn rate categories using the higher heating value (HHV). The weighted average efficiency is 77.3% (HHV).

To maximize the efficiency of your wood stove make sure it is sized properly for the space you plan to heat. An oversized stove will often be forced to burn at a lower and dirtier burn rate. Consult with your dealer for sizing and correctly placing the stove in your home. An incorrectly placed stove can greatly reduce efficiency. Maximizing the efficiency of your stove will heat your house quickly, burn cleaner and use less wood.

Refer to the Choosing Firewood section of this manual for appropriate fuel selection. Seasoned firewood is typically at or near 20% moisture content. This can be measured with any number of hand-held moisture meters available through your local hearth shop. Follow instructions included with the meter you purchase to measure fuel wood moisture content. Burn only dry, seasoned wood as using wet wood will greatly reduce your efficiency.

CO Emissions:

The Castleton 8031 has the following CO emission rates by burn level: Category 1 (low) – .56 g/min., Category 2 (med. low) – .43 g/min., Category 3 (med. high) – .59 g/min. and Category 4 – .67 g/min. Wet wood or unapproved fuel described above can greatly affect the emissions of a wood burning stove.

Smoke/Fire/CO Detectors:

It is highly recommended that smoke and CO detectors be installed throughout the heated space when a wood burning heater is installed. Be certain to install these devices not only in the area where the wood appliance is located, but also in bedrooms, hallways leading to other areas of the house and all common areas of the heated space. Check the batteries in these devices and assure operation by performing whatever test operations are recommended by the manufacturer.

Table of Contents

INTRODUCTION

Thank you for purchasing a Castleton 8031 woodstove from Hearthstone Quality Home Heating Products. This stove will provide years of comfortable heat. This stove combines the warmth and comfort of soapstone and cast iron with the efficiency of advanced catalytic technology. The Castleton 8031 blends modern technology with the unique beauty and qualities of cast iron. We trust that you will appreciate the quality of this handcrafted product.

Your Castleton 8031 woodstove burns very efficiently, and produces a large amount of heat. However, you should not consider your Castleton 8031 the primary heat source for your home. The Castleton 8031's large glass window allows you to enjoy the fire from a variety of locations in the room.

Please read this manual in its entirety. Its purpose is to familiarize you with your stove's safe installation, proper break-in, operation and maintenance. It contains extremely important information so keep it handy and refer to it often.

A qualified heating technician may need this owner's manual as a reference when installing this stove in your home. There are national, state, and local building codes that direct the technician on how to install your stove. These codes stipulate the dimension of stovepipe and clearances to walls, ceilings, hearth, and other combustible surfaces. The codes exist to reduce the risk of fire. Failure to follow these instructions can result in fire, property damage, bodily injury, and even death.

Install the stove in a safe, open area, away from traffic flow, doors, and hallways. If possible, try to install the stove near an existing chimney and chimney connector. It is extremely important to install this stove with the proper clearance from combustible surfaces. You can purchase specific connector pipe and special wall coverings as specified by this manual and the NFPA 211 code to protect combustible surfaces. As a general rule, keep furniture, drapes, curtains, wood, paper, and other combustibles at least 36 inches (92 cm) away from the stove. Never install the stove in or near a storage location for gasoline, kerosene, charcoal lighter fluid or any other flammable liquids.

Install the stove in your central living area to allow heat to radiate naturally to distant rooms. Do not install your stove in a poorly insulated area. This is inefficient and would likely result in higher fuel usage.

- **SAFETY NOTICE:**

  AN IMPROPERLY INSTALLED STOVE CAN RESULT IN A HOUSE FIRE. FOR YOUR SAFETY, CAREFULLY FOLLOW THE INSTALLATION DIRECTIONS. CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA.

The safety of your stove will depend on many factors, some of which include: distance to combustible objects, correct venting, and adequate chimney maintenance. Should you have any questions, do not hesitate to contact your dealer for additional information.

Contact your dealer for any necessary warranty service.

This Castleton 8031 stove is warranted by:

Hearthstone *Quality Home Heating Products, Inc®*
317 Stafford Ave.
Morrisville, Vermont 05661, USA
www.Hearthstonestoves.com

CODES

When you install your Castleton 8031 woodstove, it is imperative that you adhere to all Federal and local codes. Obtain these codes from either of the following sources:

American National Standards Institute, Inc. (ANSI)
1430 Broadway
New York, NY 10018
www.ansi.org

National Fire Protection Association, Inc. (NFPA)
Battery March Park
Quincy, MA 02269
www.nfpa.org

If you are installing your Castleton 8031 in a mobile or manufactured home, follow the guidelines described in the Manufactured Home Construction and Safety Standard, Title 24 CFR, Part 3280 (United States).

SAFETY INFORMATION

Read and understand this Owner's Manual thoroughly before installing and using this stove.

Make sure to install your stove:

- According to the manufacturer's recommendations
- In accordance with all applicable codes
- With the proper sized chimney

When using your stove, follow these safety precautions:

- **Never** modify this stove in any way.
- **Never** burn kiln dried, painted or treated wood in this stove.
- **DO NOT BURN GARBAGE. Never** burn garbage or trash, colored or glossy paper, solvents, plywood, artificial logs, cardboard, or driftwood, in this stove.
- **Never** burn coal in this stove.
- **DO NOT BURN FLAMMABLE FLUIDS.**
- **DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE. Never** use gasoline, kerosene, charcoal lighter fluid, or other flammable fluids to start or invigorate the fire. These fuels will cause dangerous burning conditions in the stove. Keep all such materials away from the stove.
- **Never** use a wood grate or other device to elevate the fire.
- **Never** allow logs in the firebox to hit the glass when the door is closed.
- **Never** slam the door or use the door to force wood in to the stove.
- **Never** over-fire your stove. (See page 24)
- **Never** put articles of clothing or candles on a hot stove.
- **Never** connect the stove to a flue used by another appliance.

Other safety guidelines:

- Keep all combustible items such as furniture, drapes, clothing, and other items, at least 36" (0.92 m) from the stove (See page 8)
- Install a smoke detector, preferably in an area away from your wood stove.
- Keep a fire extinguisher handy. We recommend the type rated "A B C."
- Dispose of ashes properly (See page 23).
- Keep children and pets away from the stove when it is burning; they could be seriously injured by touching a hot stove.
- Clean your chimney system as needed. (See page 29)
- Outside combustion air may be required if:
  1. This solid-fuel-fired appliance does not draw steadily, smoke rollout occurs, fuel burns poorly, or back-drafts occur whether or not there is combustion present.
  2. Existing fuel-fired equipment in the house, such as fireplaces or other heating appliances, smell, do not operate properly, suffer smoke roll-out when opened, or back-draft whether or not there is combustion present.
  3. Opening a window slightly on a calm (windless) day alleviates any of the above symptoms.
  4. The house is equipped with a well-sealed vapor barrier and tight fitting windows and/or has any powered devices that exhaust house air.
  5. There is excessive condensation on windows in the winter.
  6. A ventilation system is installed in the house.

If these or other indications suggest that infiltration air is inadequate, additional combustion air should be provided from the outdoors. Outside combustion air can be provided to the appliance by using the optional outside air kit #90-53300

PERIODIC CHECKLIST

Perform each of these tasks at the specified intervals.

At the End of Every Week:

- Empty ashes from the firebox, sooner if the firebox is full.

At the Beginning of Every Other Month:

- Depending upon your use of the stove, visually inspect the chimney connector and chimney for creosote. (see page 29)
- Check door seals using the "dollar bill test." - When the stove is cool, shut the door on a dollar bill. If the bill pulls out without any resistance, then your stove's door is not sealing properly. To tighten the seal, adjust the door latch mechanism or change the door gasket. (Refer to page 29.)

- Inspect the face of the catalytic combustor for fly ash and soot. Use a soft-bristled brush to remove if present. It is recommended to visually inspect the catalytic combustor at least 3 times during the heating season, or every 2-3 months.

At the End of Every Season:

- Dismantle the chimney connector and clean it thoroughly. Replace any pieces that show signs of rust or deterioration.
- Inspect and, if necessary, clean your chimney.
- Clean out the inside of the stove thoroughly.
- Check and clean the catalytic combustor, if necessary
- Inspect all door gasket material and replace if worn, frayed, cracked or extremely hard.

EMERGENCY PROCEDURES

Establish a routine for the fuel, wood burner and firing technique. Check daily for creosote build-up until experience shows how often you need to clean to be safe. Be aware that the hotter the fire the less creosote is deposited, and weekly cleaning may be necessary in mild weather even though monthly cleaning may be enough in the coldest months. Contact your local municipal or provincial fire authority for information on how to handle a chimney fire. Have a clearly understood plan to handle a chimney fire

If you have a stovepipe or chimney fire, follow these instructions:

1. If the fire is too threatening, leave the area and call the fire department immediately! If not, perform the next three steps.
2. Close the primary air control.
3. Close the stovepipe damper (if present).
4. Close the bypass damper
5. Keep the stove front door closed!

- **WARNING: DO NOT ATTEMPT TO PUT OUT A STOVEPIPE OR CHIMNEY FIRE BY THROWING WATER ONTO THE STOVE, STOVEPIPE, OR CHIMNEY. THE EXTREMELY HIGH TEMPERATURE OF SUCH FIRES CAN CAUSE INSTANTANEOUS STEAM AND SERIOUS BODILY HARM.**

Once the chimney fire expires, leave the primary air control and bypass handle closed and let the fire in the stove die out completely. Inspect the stove, stovepipe, and chimney thoroughly for any sign of damage before firing the stove again. You must correct any damage before using your stove again.

SPECIFICATIONS

Maximum Heat Output:
45,000 BTUs per hour of cordwood (based on independent laboratory test results).

Floor Size of Heated Area:
Up to a maximum of 1,500 square feet. Factors unique to your home can reduce the square footage the stove will heat. Home insulation value, number and efficiency of windows, floor plan, stove placement, quality of the fuel and other conditions may limit the heating ability of the stove.

Firebox Capacity:
1.9 cubic feet.

Maximum Log Length: Up To 18" (45.7cm).

Emissions: 0.98 g/hr.

Burn Time: Up to 20+ hrs. (*Heat Life*™: Up to 24 hours) Note: The amount and weight of wood contained per cubic foot of firebox volume can vary from 10 to 25 lbs. per cubic foot depending on type of wood, moisture content, packing density and other factors.

Stove Dimensions:

Height:	27 1/2" (69.8cm)
Width:	25 1/2" (64.7cm)
Depth:	21 7/8" (55.5cm)
Weight:	520 lbs. (235 kg)

Connector Size:	6" (152 mm) diameter
Metal Chimney:	6" (152 mm) inside diameter
Masonry Chimney:	6" (152 mm) inside diameter (round flue), 8" x 8" (203 x 203 mm) (square flue)

Crate Dimensions: H-39" W-29" L-36" or 99x73.7x 91.5cm (add 4" or 10.2cm for pallet).

Optional Equipment:

Outside Air Kit	90-53300
Blower	90-57210
Rear Heat Shield	90-68300

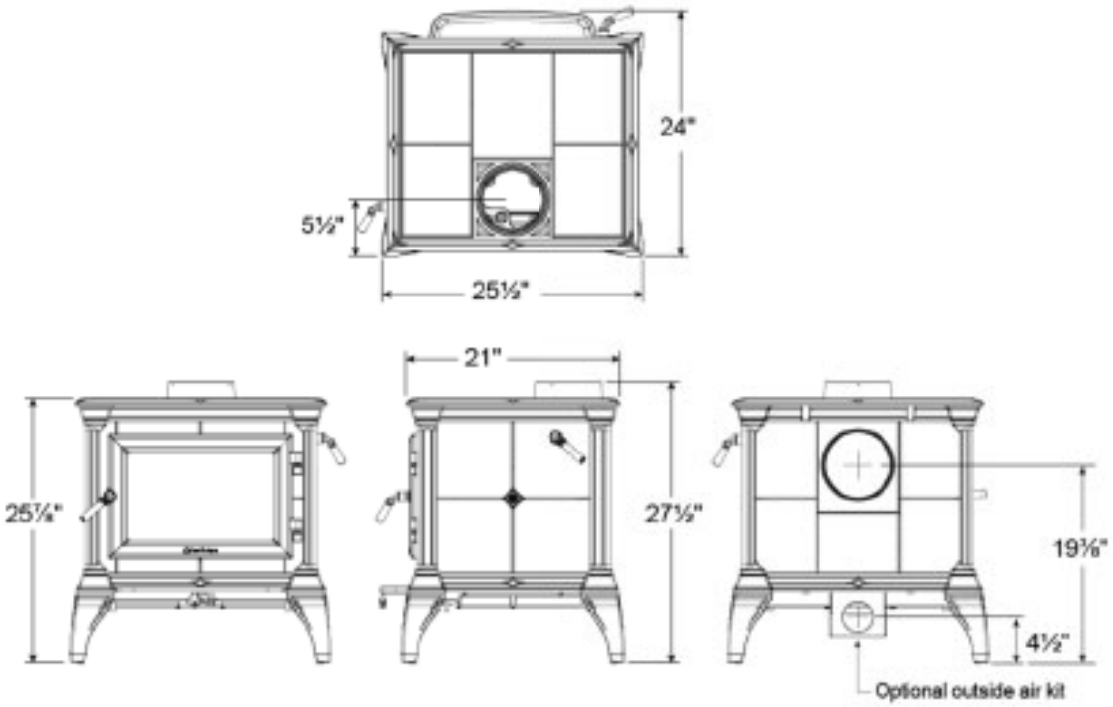


Figure 1 – Castleton 8031 Dimensions

INSTALLATION

UNPACKING

Hearthstone packages your Castleton 8031 woodstove with the greatest care so that it ships safely. Under certain circumstances, however, damage may occur during transit and handling. When you receive the Castleton 8031, carefully unpack and inspect the stove and all accompanying parts. Ensure that all parts are included in the ash pan. If any parts are damaged or missing, please contact your authorized Hearthstone dealer immediately.

The catalysts are secured in the stove with packaging material for shipping. This material does not need to be removed and will burn off during your first fire.

PACK LIST

Castleton 8031 Woodstove
Owner's Manual Wood Handles, Screws, And Washers (See Illustration 1 on page 8 for installation)
Canadian Handle Kit 90-71310 (Where Applicable)

The door and bypass handles are shipped inside the stove to protect them during shipping and installation. It is best not to install them until after stove is moved into its final location. **For US installations**, the handles can be installed directly on the stove. **For Canadian installations**, use the removable Canadian Handle Kit 90-71310 supplied with stove and DO NOT permanently install handles directly to stove.

The label is attached by a cable to the bottom of the stove. Take care when lifting the stove not to damage the label or cable. After final positioning of the stove, the label may be stored in the holding clip on the bottom shield of the stove.

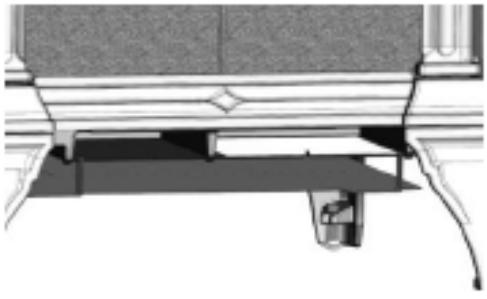


Figure 2 - Label Location

Installing Your Stove

Choose a place to install your Castleton 8031 woodstove. Consider the location of your stove for optimum heating efficiency. In general, it is better to place your stove in a main living area, rather than in a basement or other confined space.

Inspect this location to make sure that the stove and stovepipes will have the required clearance from combustible materials that are near the stove. Combustibles include walls, floor, ceiling, and chimney chase. You must carefully consider the clearances to all of these combustibles before actually connecting your stove.

If the floor is made of combustible material, then a non-combustible floor protector is required between the floor and the stove. An example of a non-combustible floor protector is a hearth constructed with a continuous layer of tile, brick, slate, glass or another non-combustible facing. There is no R-value requirement.

If you lift your stove from underneath, **be sure to temporarily remove the lower heat shield to avoid damage. Once the stove is installed in position, replace the lower heat shield.** The lower heat shield is required for safe operation.

If you use a rear connector pipe, ensure it is listed with Underwriter's Laboratories. Check the listing of your pipe with UL for the correct clearances.

The diagrams in this manual represent typical installations, but are specific to the Simpson Dura-Vent DVL brand.

Clearances to NFPA Code 211 Protected Surfaces

You can reduce the clearances to combustible surfaces by using any National Fire Protection Agency (NFPA) approved wall protection system with additional approval of the regulatory authority having jurisdiction in your area.. Please refer to NFPA Code 211 for specifications and complete details. You can obtain this information directly from the NFPA

National Fire Protection Agency
Batterymarch Park
Quincy, MA 02269
1-800-344-3555
1-617-770-3000
www.nfpa.org

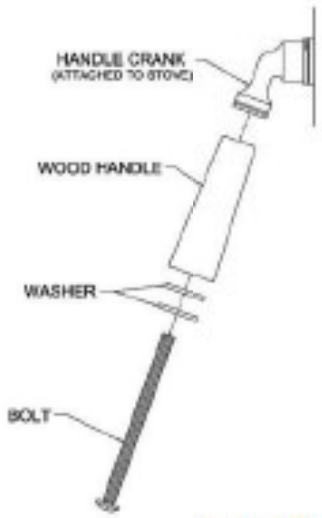


Illustration 1 – Handle Installation (US)

HEARTH REQUIREMENTS & FLOOR PROTECTION

Ensure you protect combustible flooring with a covering of noncombustible material. The Castleton 8031 does not require an insulated hearth pad. The minimum floor protection must be met under the stove and extend beyond the stove as follows:

The minimum floor protection for US installations is 37in x 31-1/2in.
The minimum floor protection for installations in Canada is 47in x 41in.

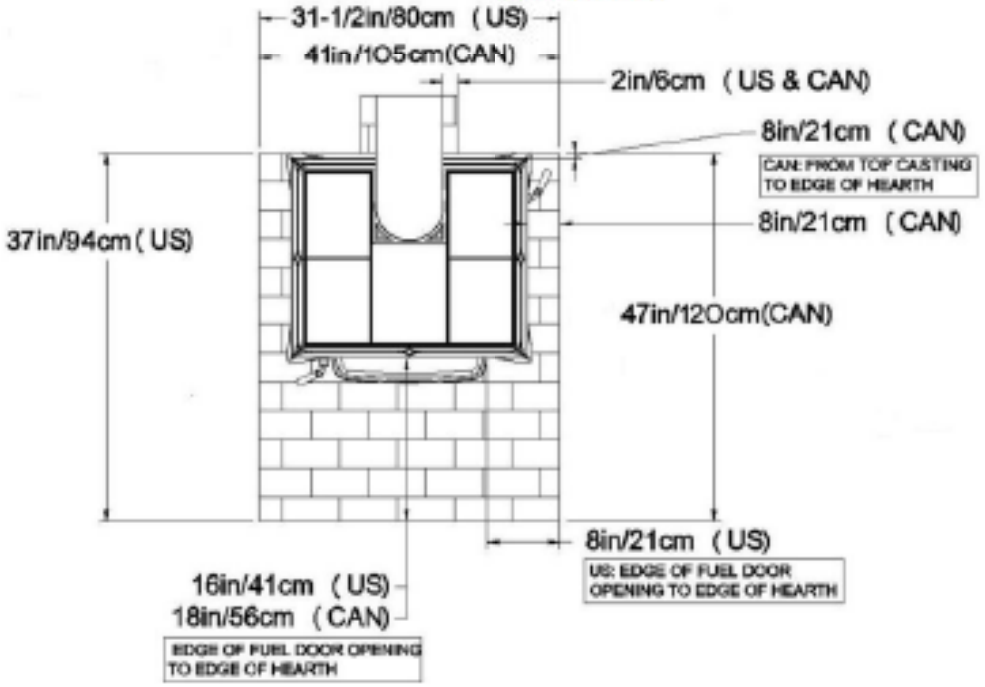


Figure 3 – Hearth Dimensions

Installing the stove in a room with Luxury Vinyl Plank (LVP) or Luxury Vinyl Tile (LVT) flooring requires a minimum clearance from the stove to the LVP or LVT flooring. LVP and LVT flooring begins to warp at 110 degrees Fahrenheit. The minimum required clearance for the LVP or LVT flooring to the front glass of the stove is 55".

COMBUSTIBLE SURFACE REQUIRED CLEARANCES

Note: Dimensions shown in the following figures are from the top casting of the stove unless otherwise indicated.

It is very important to follow minimum clearances for chimney connectors to combustibles such as walls and ceilings when installing the stove near combustible surfaces.

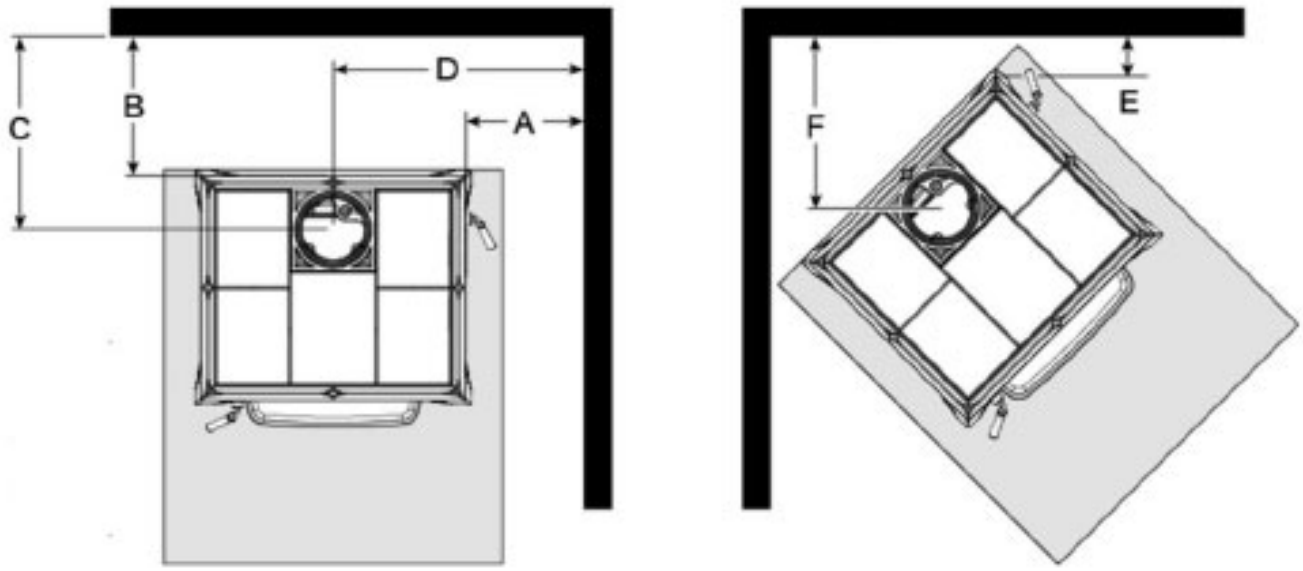


Figure 4 – Clearance to Combustibles

	Parallel				Corner	Corner
Clearances	A	B	C	D	E	F
Single wall Connector – No Rear Heat Shield	17"-44cm	15"-39cm	20"-51cm	29.25"-75cm	8"-21cm	20.5"-53cm
Single Wall Connector – With Rear Heat Shield	17"-44cm	9"-23cm	14"-36cm	29.25"-75cm	8"-21cm	20.5"-53cm
Double Wall Connector – No Rear Heat Shield	17"-44cm	15"-39cm	20"-51cm	29.25"-75cm	8"-21cm	20.5"-53cm
Double Wall Connector – With Rear Heat Shield	17"-44cm	8"-21cm	13"-33cm	29.25"-75cm	8"-21cm	20.5"-53cm
Alcove W/Single Wall Conn – No Rear Heat Shield	17"-44cm	16"-41cm	21"-54cm	29.25"-75cm	8"-21cm	20.5"-53cm
Alcove W/Single Wall Conn – With Rear Heat Shield	17"-44cm	16"-41cm	21"-54cm	29.25"-75cm	8"-21cm	20.5"-53cm
Alcove W/Dbl Wall Conn – No Rear Heat Shield	17"-44cm	16"-41cm	21"-54cm	29.25"-75cm	8"-21cm	20.5"-53cm
Alcove W/Dbl Wall Conn – With Rear Heat Shield	17"-44cm	16"-41cm	21"-54cm	29.25"-75cm	8"-21cm	20.5"-53cm

Alcove Clearances (inches)	Unprotected Surfaces	Protected Surfaces (NFPA-211)
Minimum alcove width	59" – 149.9cm	See NFPA-211
Maximum alcove depth	52" – 132.0cm	See NFPA-211
Min. Alcove ceiling from floor with single wall connector	60" – 152.4cm	See NFPA-211
Min. Alcove ceiling from floor with double wall connector	60" – 152.4cm	See NFPA-211

FOR REAR HEAT SHIELD, USE KIT #90-68300

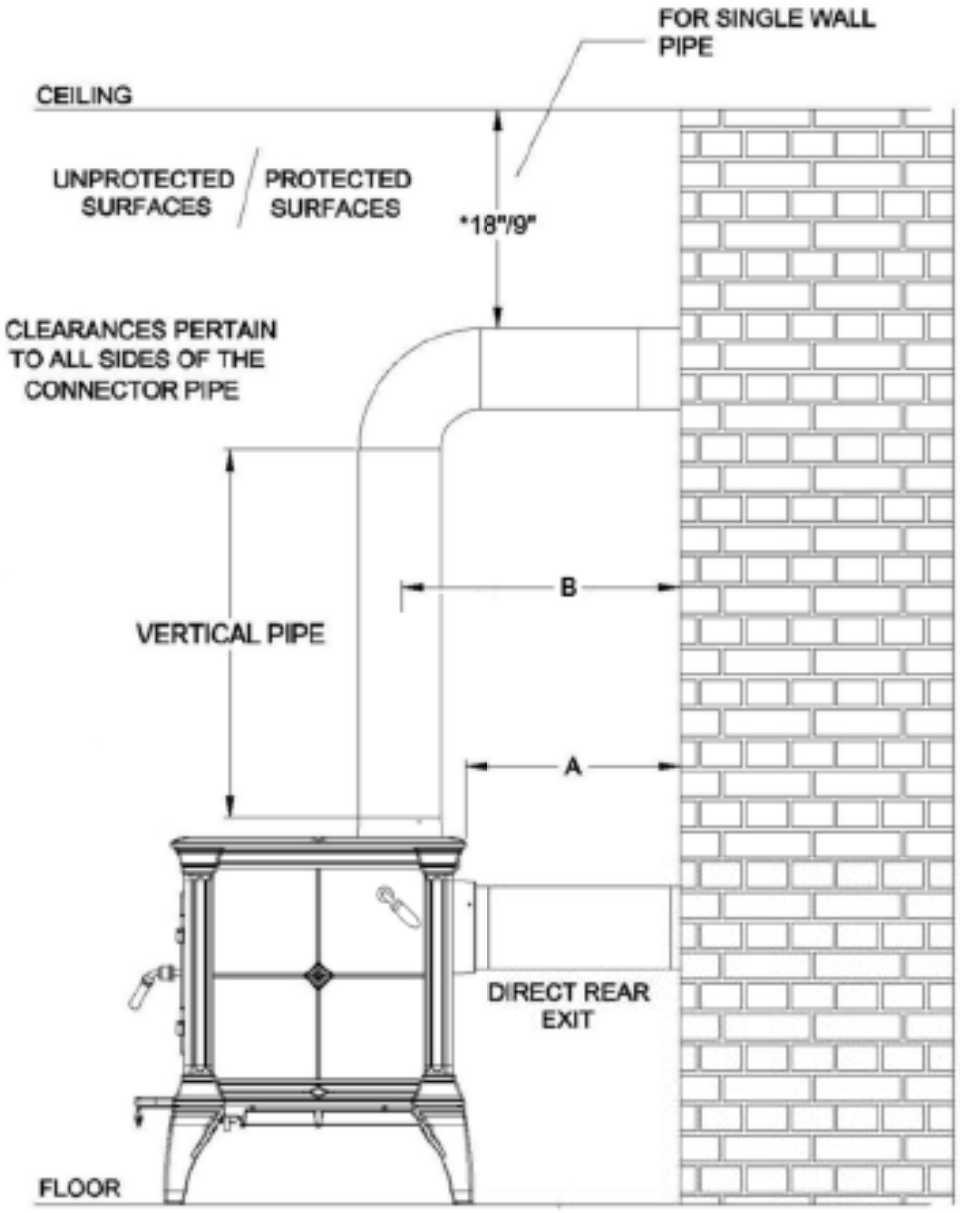
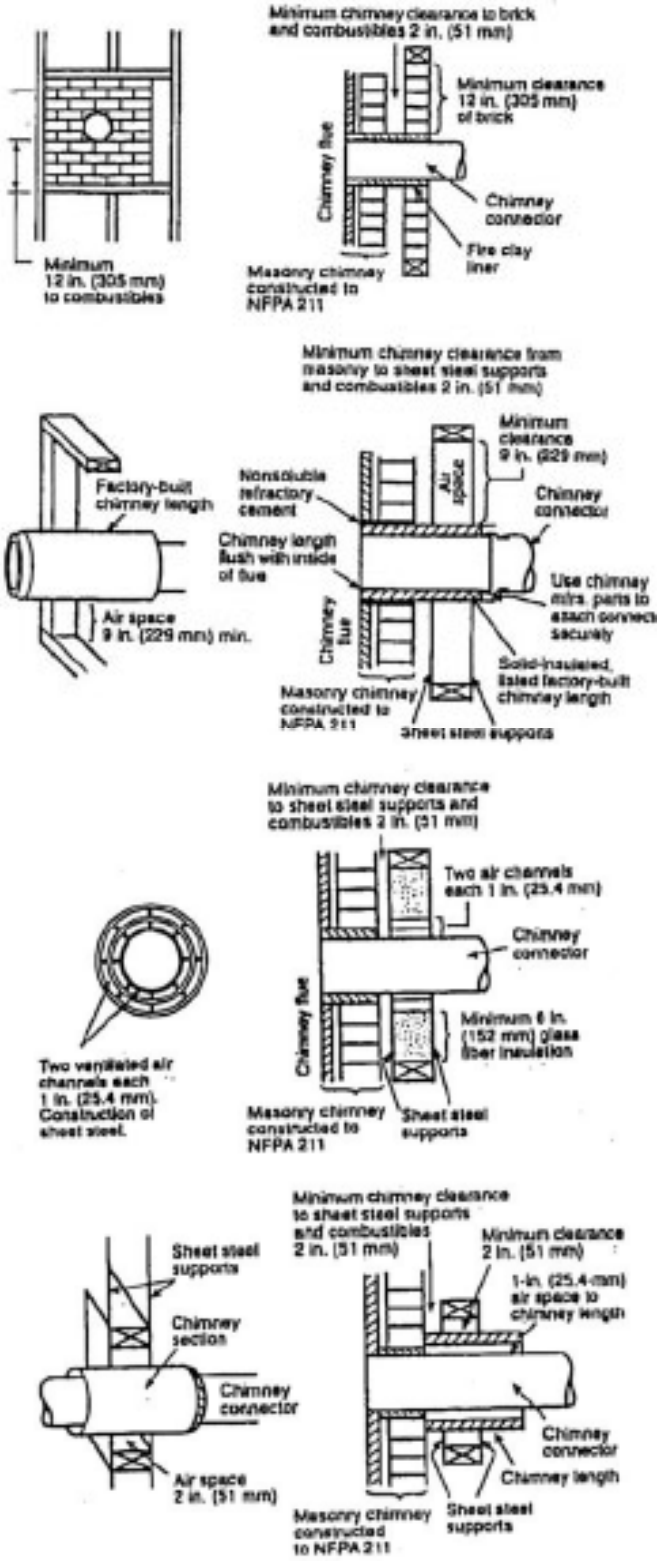


Figure 5 Chimney Connector Clearances

	Single Wall Pipe		Double Wall Pipe	
Through the wall top flue or direct rear exit	With Heat Shield**	Without Heat Shield**	With Heat Shield**	Without Heat Shield**
A	11" (27.94cm)	17" (43.2cm)	10" (25.4cm)	17" (43.2cm)
B	16" (40.6cm)	22" (55.9cm)	15" (38.1cm)	22" (55.9cm)

***For double wall pipe clearance to ceiling, refer to pipe manufacturer specifications.**

** Rear Heatshield, kit #90-68300



See Parallel Clearance to Combustibles for clearances to the sides of the stove.

CHIMNEY CONNECTOR SYSTEMS AND CLEARANCES FROM COMBUSTIBLE WALLS FOR RESIDENTIAL HEATING APPLIANCES

A. Minimum 3.5in thick brick masonry all framed into combustible wall with a minimum of 12in. brick separation from clay liner to combustibles. The fire clay liner shall run from outer surface of brick wall to, but not beyond, the inner surface of chimney flue liner and shall be firmly cemented in place.

B. Solid-insulated, listed factory-built chimney length of the same inside diameter as the chimney connector and having 1in. or more of insulation with a minimum 9in. air space between the outer wall of the chimney length and combustibles.

C. Sheet steel chimney connector, minimum 24 gauge in thickness, with a ventilated thimble, minimum 24 gauge in thickness, having two 1in. air channels, separated from combustibles by a minimum of 6in of glass fiber insulation. Opening shall be covered, and thimble supported with a sheet steel support, minimum 24 gauge in thickness.

D. Solid insulated, listed factory-built chimney length with an inside diameter 2in. larger than the chimney connector and having 1in. or more of insulation, serving as a pass-through for a single wall sheet steel chimney connector of minimum 24 gauge thickness, with a minimum 2in. air space between the outer wall of chimney section and combustibles. Minimum length of chimney section shall be 12in. chimney section spaced 1in. away from connector using sheet steel support plates on both ends of chimney section. Opening shall be covered, and chimney section supported on both sides with sheet steel supports securely fastened to wall surfaces of minimum 24-gauge thickness. Fasteners used to secure chimney section shall not penetrate chimney flue liner.

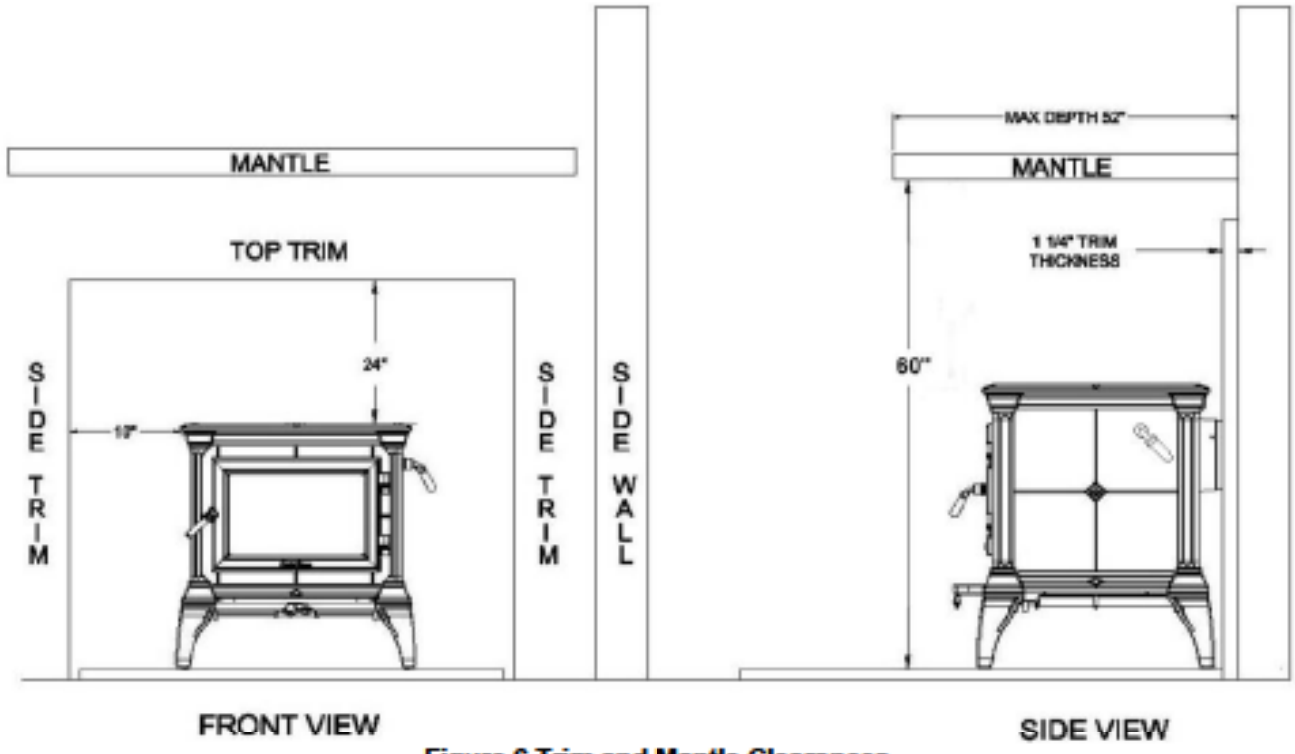


Figure 6 Trim and Mantle Clearances

OUTSIDE AIR SUPPLY

(Optional Kit #90-53300)

You can connect an outside air source directly to this stove using an optional outside air kit. The advantage of providing outside air directly to the stove is that the air used by the stove for combustion is taken from outside the residence rather than from within the room where the stove is located.

The outside air kit for this stove allows for the direct connection of the stove's air intake to a minimum 3" (76 mm) diameter duct (supplied by others)* which leads to the outside of the house. When considering placement of the duct from the outside of the house to the hearth, keep in mind the need to avoid structural members of the house. The outside air kit attaches to the underside of the stove. Refer to the instructions provided with the kit for installation.

*An adaptor for 4" duct is available if needed. KIT #90-53308

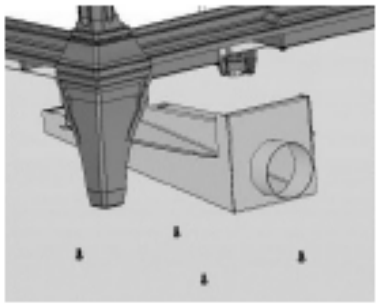


Figure 7 – Outside Air Kit Detail

The International Residential Code (IRC) does not allow the outside air duct to terminate higher than the appliance. Some building officials restrict vertical rise in the duct's termination. Hearthstone recommends the termination be at the same level, or lower than the air intake on the stove.

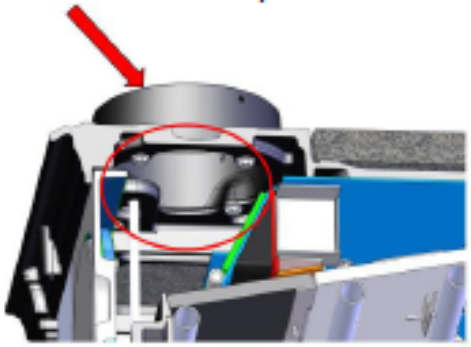
Locate the termination of the duct on the outside wall of the home in such a manner to avoid the possibility of obstruction by snow, leaves or other material. Screen the termination using ¼" x ¼" mesh rodent screen and cover it with a rain/wind proof hood (flex pipe, outside termination, mesh, and hood supplied by others) Contact your dealer for availability.

TOP TO REAR VENTING CONVERSION

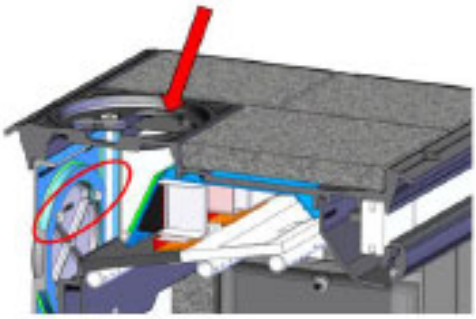
When installing your stove, you have the option to vent out the rear of the stove. To convert your stove from venting out the top to vent out the rear, follow the steps below:

1. Locate the single rear 3/8" threaded rod that runs from the bottom of the stove to the top Using a 9/16" wrench, loosen the 3/8" nut on the bottom of the stove, but do not remove it. This will allow you to turn the rod out by reaching in through the flue collar and turning it out with vise-grips or pliers. **Note**: With this rod dropped out of place, you have more room to work in the flue collar area.

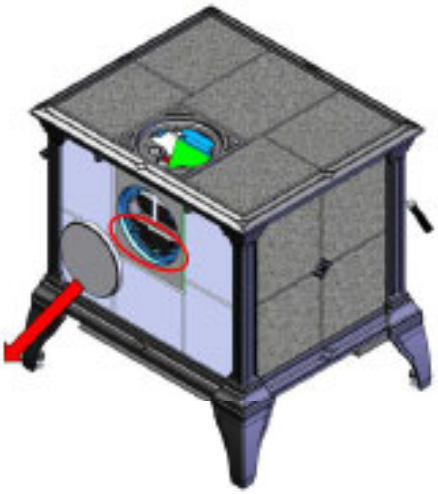
2. Using a 7/16" wrench, remove the four bolts that hold the top flue collar to the top cast. Be careful not to drop the bolt and washers into the stove. Remove the flue collar and place off to the side.



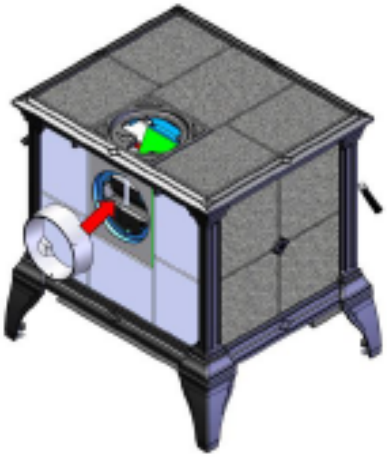
3. Using a 7/16" wrench, reach through the top opening where the flue collar was removed from and remove the top two bolts and washers holding the rear flue plate in and place off to the side.



4. Loosen the bottom two bolts and washers out of rear flue plate until the plate is free. Remove rear flue plate and place to side. Leave bottom two bolts in place.



5. Hold bottom two bolts in place and position flue collar into rear exit position. Hand tighten bottom two bolts slightly, do not fully tighten yet.

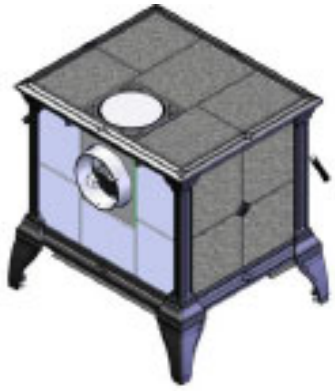


6. Insert top two bolts with washers into top two threaded holes of flue plate. Fully tighten all four bolts.

7. Before placing the flue plate onto the top of the stove, fold a paper towel into an approximately

1-1/2" x 1-1/2" square. Place this wad of paper towel on top of the cone nut shown. When the flue plate in placed on the top, this wad of paper towel will hold the cone nut in place. Place the flue plate onto the top of the stove and turn in the four bolts. Tighten the four bolts with the 7/16" wrench.

8. With the rod lowered under the stove using the lock pliers hold the rod and back the nut off 3 full turns. Lift the 3/8" rod up and line it up with the cone nut (be sure the wadded paper towel is still holding the cone nut in place). Using the vise-grips or pliers, tighten it into threads of the cone nut (about 5 full turns) reaching through the now rear flue collar (if you have an extra 3/8-20 nut you can "double nut" and tighten the rod that way). Finally, with the 9/16" wrench tighten the 3/8" nut loosened in step 1.



VENTING COMPONENTS & CONFIGURATION REQUIREMENTS

- **DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE USED BY ANOTHER APPLIANCE**

- Single wall connector that is at least 24 MSG or 25 MSG blued steel stovepipe.

- Double wall connector (Rear pipe) which is used with a listed, factory-built "Type HT" chimney or with a masonry chimney to reduce clearances, is available from several manufacturers, your dealer can help you choose. Some air insulated connector pipe models available are Simpson Dura Vent DVL and Metalbestos DS. Security, GSW and Ameritec also have acceptable Rear connector pipe.

- When used in a mobile home, a spark arrester is required. (See page 18)

- The chimney connector cannot pass through a floor or ceiling, nor any attic or roof space, closet or similar concealed space. Where venting requires passage through a wall or partition of combustible construction, the installation must conform to NFPA Code 211 or CAN/CSA - B365.

- It is very important to follow minimum clearances for chimney connectors to combustibles such as walls and ceilings when installing the stove. Typical chimney connector clearances are outlined below. The single wall clearances are generic; the double wall clearances shown are specifically for Simpson DuraVent DVL and may vary with other brands. ***Check the specifications from the manufacturer of your connector.***

COMPONENTS OF A VENTING SYSTEM

The complete venting system consists of several components: chimney connector, wall thimble, wall pass-through, chimney, and liner. It is *absolutely necessary* that you install all of these components and maintain the clearances to combustibles discussed earlier to ensure a safe stove installation. Failure to follow these instructions and specified components or using make-shift compromises can result in fire, property damage, bodily injury, and even death. Be sure to follow the manufacturer's instructions to maintain an effective vapor barrier at the location where the chimney of other component penetrates the exterior of the structure.

To protect against the possibility of a house fire, you *must properly install and constantly maintain the venting system in good condition.* Be sure to inspect the chimney connector and keep it clean. Upon inspection, immediately replace rusted, cracked, or broken components.

- The *chimney connector* is the stovepipe from the woodstove to the chimney. The chimney connector stovepipe is 6" (152 mm) diameter, 24 MSG or 25 MSG blued steel connector pipe. *Do not use aluminum or galvanized steel pipe* - they cannot withstand the extreme temperatures of a wood fire.
- The *thimble* is a manufactured (or site-constructed) device installed in combustible walls through which the chimney connector passes to the chimney. It keeps the walls from igniting. You must use a wall

thimble when installing a chimney connector through a combustible wall to the chimney.

- A *wall pass-through* (or chimney support package) also keeps the walls from igniting. You must use one when connecting through a wall or ceiling to a prefabricated chimney.

- Only install this stove to a *lined masonry chimney* or an *approved high temperature prefabricated residential* type building heating appliance chimney. *Do not* connect this stove to a chimney serving another appliance; you will compromise the safe operation of both the wood stove and the connected appliance.

- A *liner* is the UL 1777 or ULC S635 (for factory built fireplace or masonry) chimney.

You must connect your stove to a chimney comparable to those recommended in this manual. *Do not use stovepipe as a chimney*. Use stovepipe for freestanding installations only to connect the stove to a proper chimney.

- **WARNING: DO NOT CONNECT THIS APPLIANCE TO ANY AIR DISTRIBUTION DUCT OR SYSTEM.**

INSTALLING A VENTING SYSTEM

Attach stovepipe sections to the flue collar and to each other with the crimped end toward the stove. If creosote builds up, this allows the creosote to run into the stove and not on the outside of the stovepipe or onto the stove.

Secure all joints, including attaching the stovepipe to the stove's flue collar, with three sheet metal screws. Install #10 x 1/2" (3 mm x 13 mm) sheet metal screws into the holes pre-drilled in the flue collar. Disregarding the screws can cause joints to separate from the vibrations that result from a creosote chimney fire.

You can simplify connecting stovepipe by using additional accessories such as telescoping pipes, slip-connectors or clean-out tees. These accessories ease the periodic inspection of your chimney, as well as allow you to dismantle the stovepipe easily (without moving the stove).

Install the stove as close as practical to the chimney, while maintaining all proper clearances. Install stovepipe that is as short and as straight as possible. Horizontal runs of stovepipe must always rise away from the stove at a minimum of 1/4" per foot (21mm/m).

We do not recommend long runs of stovepipe to increase heat dispersal. Longer lengths of stovepipe, or more connecting elbows, than necessary increase the chances of draft resistance and the accumulation of creosote buildup.

In general, you do not need to install a stovepipe damper with the Castleton 8031. Some installations, however, could benefit from a stovepipe damper, such as a tall chimney which can create a higher than normal draft. In such cases, a damper can help regulate the draft. The Castleton 8031 requires a draft between 0.06" and 0.1" WC. For drafts above 0.1" WC, install a stovepipe damper. Check the draft at stove installation time.

Remember, the NFPA recommends minimum clearances for chimney connectors to combustibles such as walls and ceilings. Once the stove is installed at safe distances from these combustible surfaces, it is also important to maintain these connector clearances for the remainder of the installation.

CONNECTING THE STOVE TO A CHIMNEY

You can install your Castleton 8031 to a prefabricated metal chimney, or to a masonry chimney.

This room heater must be connected to (1) a listed Type HT (2100° F) chimney per UL 103 or ULC S629, or (2) a code-approved masonry chimney with a flue liner. The chimney size should not be less than the flue collar, or more than three times greater than the cross-sectional area of the flue collar.

We recommend installing a cleanout tee where possible to simplify chimney cleaning and maintenance.

Connecting to a Prefabricated Metal Chimney

There are two ways to install a prefabricated metal chimney:

- An *interior* installation where the chimney passes inside the residence through the ceiling and roof.

- An *exterior* installation where the chimney passes through the wall behind the stove then up the outside of the residence.

Whenever possible, choose an interior chimney. An interior chimney heats up quickly and retains its heat; thus promotes a better draft and discourages the formation of creosote. An exterior chimney does not benefit from the warmth of the building, so it typically operates at lower flue temperatures than an interior chimney and may experience increased creosote accumulation.

When connecting the Castleton 8031 to a prefabricated metal chimney, you must follow, precisely, the manufacturer's installation instructions. Use only Type HT (2100° F), prefabricated metal chimneys listed per UL 103 or ULC S629 standards.

Ensure the size of the prefabricated chimney's flue is appropriate for the Castleton 8031. The Castleton 8031 requires a 6" (152 mm) inside diameter flue for new installations. A 6" diameter flue provides adequate draft and performance. You can use an 8" (203 mm) diameter existing flue with a reducer. An oversized flue contributes to creosote accumulation. (In this case, bigger is NOT better.)

When purchasing a prefabricated chimney to install with your stove, Ensure you also purchase from the same manufacturer the wall pass-through (or ceiling support package), "T" section package, fire-stops (when needed), insulation shield, roof flashing, chimney cap, and any other required accessories. Follow the manufacturer's instructions when installing the chimney and accessories. In addition, ensure you maintain all manufacturers' recommendations for the proper clearances to the chimney.

Connection to a Masonry Chimney

Consider two primary elements when connecting your stove to a masonry chimney: the chimney itself and the thimble where the stovepipe connects to the chimney. **Use only code approved masonry chimneys containing a proper flue liner.**

Before connecting to a masonry chimney, hire a professional to examine the chimney for cracks, loose mortar, and other signs of deterioration and blockage. If the chimney needs repair, complete them before installing and using your stove. Do not install your stove until the chimney is safe for use.

Ensure the chimney's cleanout is complete and working properly. To avoid a loss of draft, the cleanout door must close completely and provide a tight seal. If the cleanout door leaks, the chimney will cool, your stove will perform poorly, and creosote can form.

Ensure the size of the chimney's flue is appropriate for this stove and that it is not too large. Use a masonry chimney with a maximum 6" Diameter or 8" x 8" (203 mm x 203 mm) tile size for best results. An oversized flue contributes to the accumulation of creosote.

Use the following checklist to ensure that your masonry chimney meets these minimum requirements:

MASONRY CHIMNEY WALL CONSTRUCTION:

- Mortared brick or modular block at least 4" (102 mm) thick – must use liner
- A mortared rubble or stone wall – must use liner

FLUE LINER OPTIONS:

- Tile - minimum wall thickness of 5/8" (16 mm), installed with refractory mortar, and with at least 1" (25 mm) air space around the liner
- Stainless steel - UL listed 6" diameter, insulated or wrapped liner, or the space around the liner filled with vermiculite or suitable material (these keep the liner warmer for better performance)
- Ensure any equivalent flue liner is a listed chimney liner system meeting type HT requirements or other approved material.

INTERIOR CHIMNEY REQUIREMENTS:

- Must have at least 2" (51 mm) clearance to combustible materials
- Must install fire stops at the spaces where the chimney passes through floors and/or ceiling
- Any insulation material must be at least 2" (51 mm) from the chimney

EXTERIOR CHIMNEY REQUIREMENTS:

- At least 1" (25 mm) clearance to combustible materials

CHIMNEY HEIGHT REQUIREMENTS (SEE *FIGURE 9*):

- At least 3 feet (0.9 m) higher than the highest part of the roof opening through which it passes.
- At least 2 feet (0.6 m) higher than any part of the roof within 10 feet (3 m) measured horizontally from the top of the chimney.

The recommended minimum chimney height for top of stove installation is 16 feet (4.9 m) off the floor or 13 feet 10 1/8 inches (4.3 m) from the top of the stove. For rear exit connection, the recommended minimum chimney height is 19 feet (5.8m) off the floor or 16 feet 10 1/8 inches (5.2m) from the top of the stove. The recommended maximum chimney height is 30 feet (9m).The Castleton 8031 requires a draft between 0.06" and 0.1" water column. Ensure your chimney is long enough to provide the minimum draft, and use a damper if your installation has a required chimney height that provides too much draft.

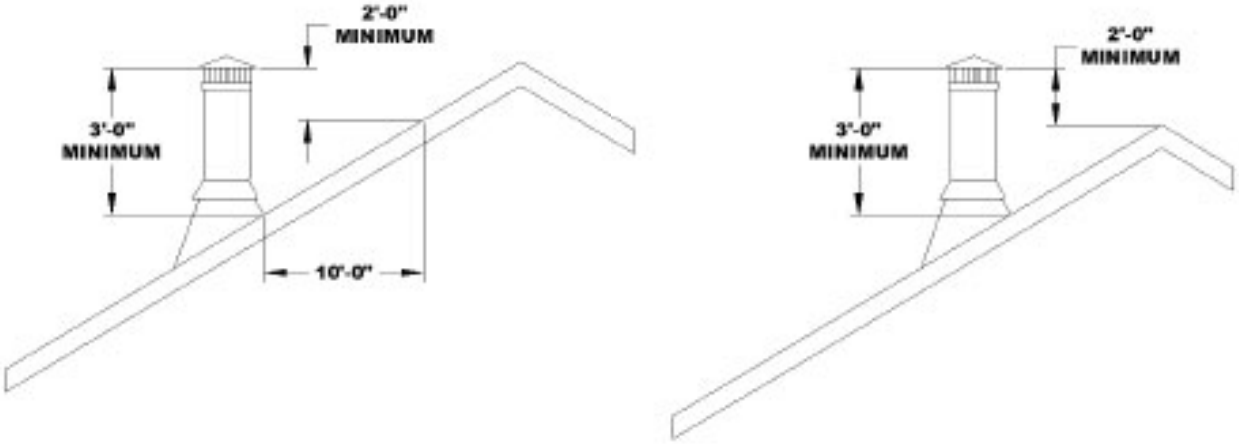
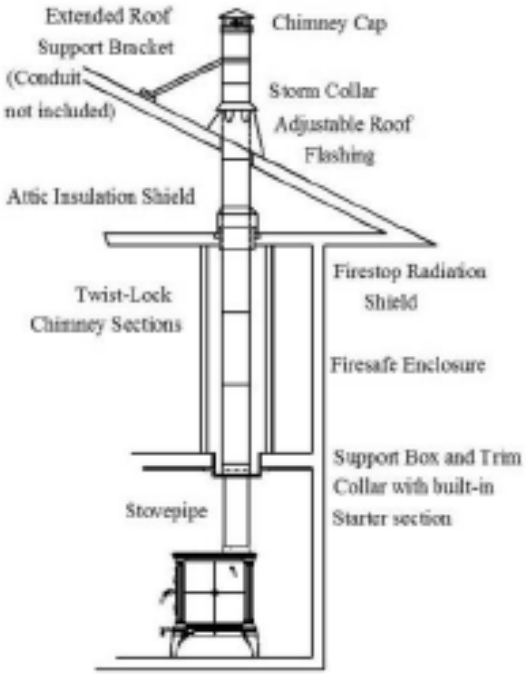
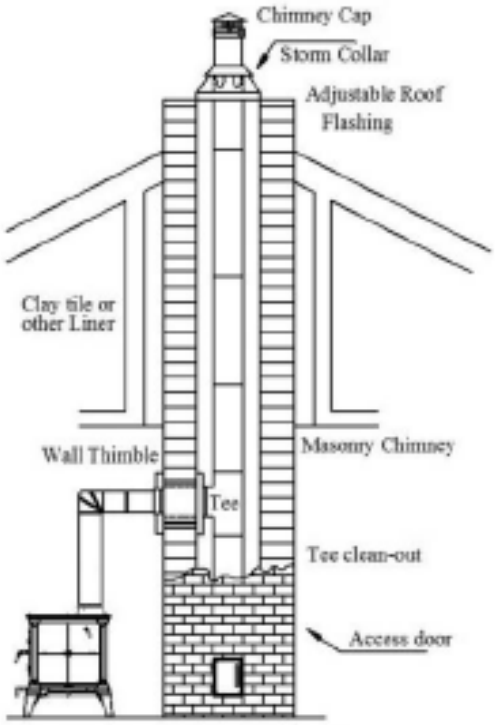


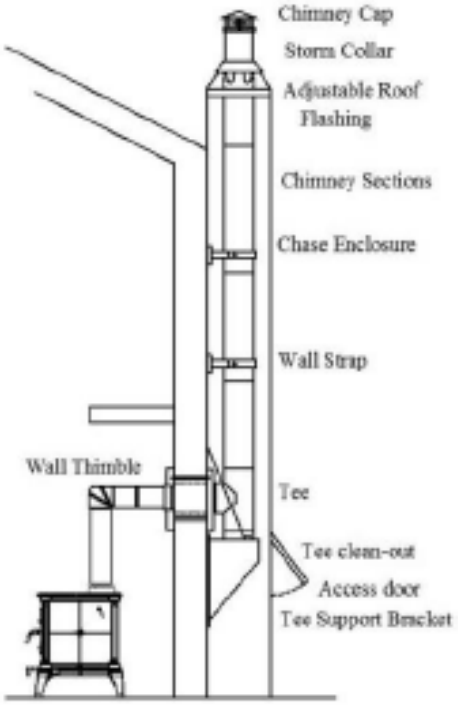
Figure 8 – Chimney Height Requirements



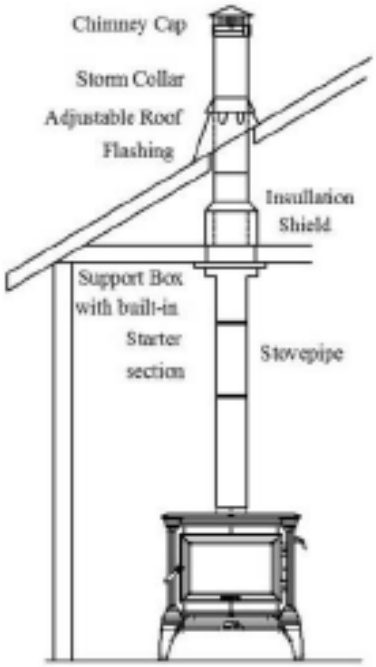
Two story house installation with attic.



Chimney pipe through Clay tile
or other Lined Masonry Chimney



Chimney through outer wall with enclosed chase.
Chimney is supported by Tee Support Bracket.



One story house installation with attic.
Chimney is supported by Ceiling.

Figure 9 – Typical Chimney Configuration

INSTALLING IN A MOBILE HOME

Follow these special requirements for installing your stove in a mobile home.

- Install the stove in accordance with 24 CFR, Part 3280 (HUD)
- An outside air kit must be used in all mobile home installations. See page 12 for details.
- Permanently attach the stove to your mobile home's floor. Use the shipping clips that came with the stove and fasteners long enough to attach securely to the subfloor. (The clips and fastener heads may be painted to minimize visibility).

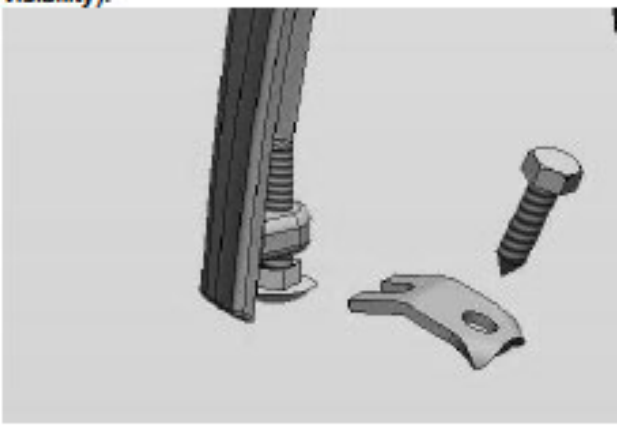
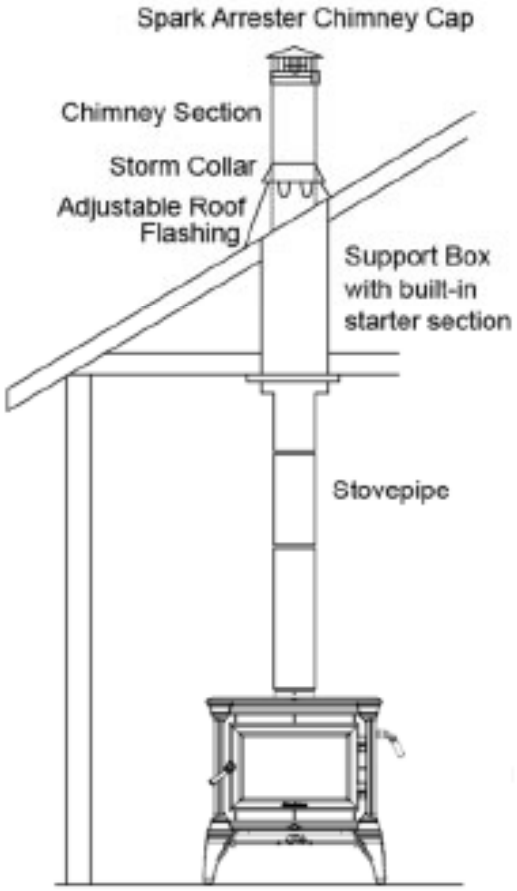


Figure 10 - Lock Down Detail

- Install a Mobile Home Chimney & Connector Kit conforming to US/UL103 or CAN/ULC-S629, Standard for Factory-Built Chimneys. The system must be removable for transportation and meet all applicable local and federal guidelines for termination height.

  Each kit must include:

  Stainless spark arrester cap, storm collar, Adjustable vented flashing – 0/12 – 6/12, Two 24" chimney pipes, 24" support box with built-in starter section and trim.
- Failure to follow these instructions and specified components or using make-shift compromises can result in fire, property damage, bodily injury, and even death.
- **WARNING: DO NOT INSTALL IN A SLEEPING ROOM IN A MOBILE HOME.**
- **CAUTION: MAINTAIN THE STRUCTURAL INTEGRITY OF THE MOBILE HOME WALLS, FLOOR, CEILING, AND ROOF WHEN INSTALLING AND USING YOUR STOVE.**
- **Burning any fuel other than wood in this unit could generate dangerous levels of carbon monoxide within the living space.**
- **THE FRONT DOOR MUST REMAIN CLOSED WHEN IN OPERATION EXCEPT FOR START UP AND LOADING. Leaving the door open during use could cause any smoke or fire detectors in the home to be set off or a fire could escape the firebox and start the room on fire.**
- **If this unit is installed in a mobile home, care must be taken to ensure adequate air is available. If not enough air is available it could starve the room of all the oxygen. (See page 27 for more details)**
- **CAUTION: REMOVE THE CHIMNEY WHEN TRANSPORTING THE MOBILE HOME!**
- Be sure to follow the manufacturer's instructions to maintain an effective vapor barrier at the location where the chimney of other component penetrates the exterior of the structure.



Mobile home installation.
One story house installation with attic.
Chimney is supported by Ceiling.

Figure 11 – Mobile Home Installation

OPERATION

Once your Castleton 8031 is installed, you are ready to light a fire.

Every installation, season's firewood, and operator's technique varies. Learn how to use your stove most efficiently for your installation. We can give you the basic principles, but only you can ensure maximizing the potential of your stove while also operating it safely.

- **WARNING: HOT WHILE IN OPERATION! KEEP CHILDREN, PETS, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS.**

Read this entire chapter before lighting your first fire. It explains the controls and features of your wood stove, how to choose firewood, and how to use your stove on a daily basis.

CONTROLS AND FEATURES

Before lighting any fires, become familiar with the location and operation of your stove's controls and features and learn how to use them (*See Figure 12*). For your own safety, do not modify these features in any way. We recommend you use fireplace gloves when the stove is in operation and hot.

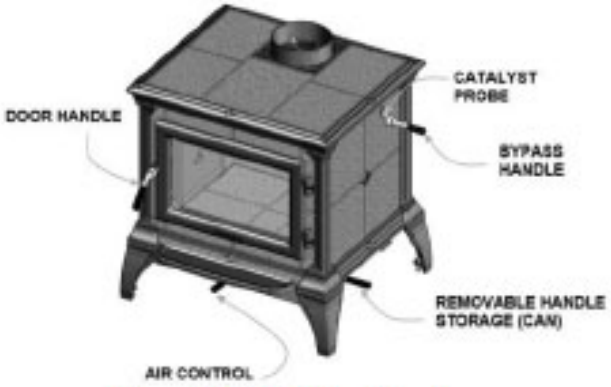


Figure 8 - Controls & Features

FRONT DOOR HANDLE: The firebox door allows you to load wood into your stove; a wood handle operates the door. To open the door, pull up on the handle and swing the door away from the stove. To latch the door, push the door tightly towards the firebox then continue to push the handle in and down until it latches shut. Gently pull on the door handle to make sure it is properly latched.

PRIMARY AIR CONTROL: The primary air control lever is located under the ash lip. The primary air control allows you to regulate the amount of air entering the firebox. Generally, the more air allowed into the firebox, the faster the rate of burn and the higher the heat output; conversely, less air creates a slower burn, with lower heat output. For maximum airflow, move the lever left as far as possible; move the lever right as far as possible for minimum airflow (does not close completely).

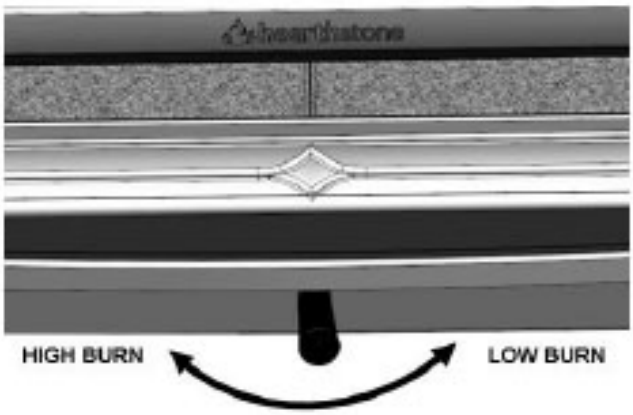


Figure 9 – Air Control

BYPASS HANDLE: The bypass handle controls the bypass door inside the stove. When the handle is pointed towards the front of the stove, the bypass door is open, and when the handle is pointed towards the rear of the stove, the bypass door is closed. The bypass door directs the flow of combustion products through or around the catalytic combustor. When the bypass handle is open, combustion products are directed around the catalytic combustor. The bypass handle should be open when first staring a fire until the catalytic combustor heats up to activation temperature, and whenever opening the front door to load the stove. When the bypass handle is closed, combustion products are directed through the catalytic combustor. The bypass handle should be closed once the catalytic combustor heats up to activation temperature, and remain closed whenever the stove is burning and in the active temperature range.

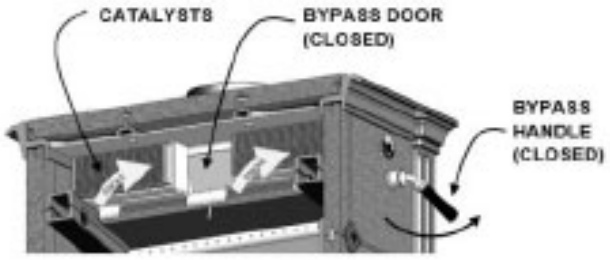


Figure 14 – Bypass Closed

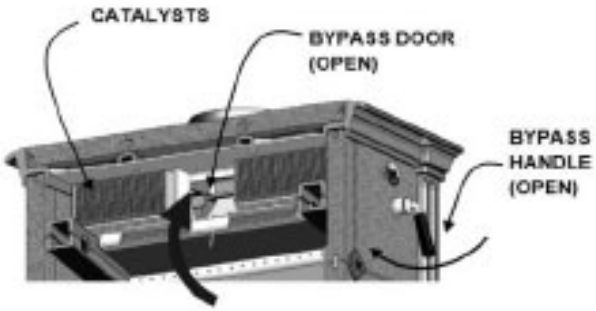


Figure 15 – Bypass Open

CATALYST PROBE: The catalyst probe monitors the downstream temperature of the catalyst, and indicates when the stove is in the active range for the catalyst. When the stove is in the "active" range, the bypass handle should be closed. When the stove is in the "Inactive" range, the bypass handle should be opened until the stove heats up. If the probe is in the "Too Hot" range, keep the door closed, fully close the air control, and allow the stove to cool down until the probe falls into the "Active" Range. Once the catalyst probe has reached the active range, heat generated from burning smoke keeps the catalyst warm and active as long as fuel remains in the stove. The Castleton 8031 typically operates in the 800 °F to 1300 °F range.

Figure 16 – Catalyst Probe

CHOOSING FIREWOOD

Burn only natural firewood (known as cordwood) in the Castleton 8031 Wood Heater. This stove is not designed to burn other fuels.

- **CAUTION: DO NOT USE CHEMICALS OR FLAMMABLE FLUIDS TO START THE FIRE. DO NOT USE CHARCOAL, PELLETS, COAL, ARTIFICIAL LOGS OR ANY OTHER MATERIALS AS FUEL; THEY ARE NOT SAFE. DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS.**
- **THE USE OF UNAUTHORIZED FUEL SUCH AS COAL COULD PRODUCE HIGH LEVELS OF CARBON DIOXIDE IN THE LIVING SPACE. AT HIGH LEVELS CARBON DIOXIDE COULD RESULT IN PERSONAL INJURY OR DEATH.**

The quality of your firewood directly affects heat output, duration of burn and performance of your stove. Softwoods generally burn hotter and faster, while hardwoods burn longer and produce better coals. Density and moisture content are two critical factors to consider when purchasing wood for your stove.

The following is a list of some wood species and their relative BTU (British Thermal Unit) content. The higher the BTU content, the longer the burn. Firewood with higher BTUs is generally ideal for a wood stove

Wood Heat Value: Sorted By Btu Content

Common Name	Lb/ cord	MBTU/ cord
High		
Osage Orange (Hedge)	4,728	32.9
Hickory, Shagbark	4,327	27.7
Hop Hornbeam (Ironwood)	4,267	27.3
Beech, Blue (Ironwood)	3,890	26.8
Birch, Black	3,890	26.8
Locust, Black	3,890	26.8
Hickory, Bitternut	3,832	26.7
Locust, Honey	3,832	26.7
Apple	4,100	26.5
Mulberry	3,712	25.8
Oak, White	4,012	25.7
Medium High		
Beech, European	3,757	24
Maple, Sugar	3,757	24
Oak, Red	3,757	24
Ash, White	3,689	23.6
Birch, Yellow	3,689	23.6

Medium		
Juniper, Rocky Mtn	3,150	21.8
Elm, Red	3,112	21.6
Coffee tree, Kentucky	3,112	21.6
Hackberry	3,247	20.8
Tamarack	3,247	20.8
Birch, Gray	3,179	20.3
Birch, White (Paper)	3,179	20.3
Walnut, Black	3,192	20.2
Cherry	3,120	20
Ash, Green	2,880	19.9
Cherry, Black	2,880	19.9
Elm, American	3,052	19.5
Elm, White	3,052	19.5
Sycamore	2,808	19.5
Ash, Black	2,992	19.1
Maple, Red	2,924	18.7
Fir, Douglas	2,900	18.1
Medium Low		
Boxelder	2,797	17.9
Alder, Red	2,710	17.2
Pine, Jack	2,669	17.1
Pine, Norway (Red Pine)	2,669	17.1
Pine, Pitch	2,669	17.1
Catalpa	2,360	16.4
Hemlock	2,482	15.9
Spruce, Black	2,482	15.9
Pine, Ponderosa	2,380	15.2
Low		
Aspen, American	2,290	14.7
Butternut (Walnut, White)	2,100	14.5
Spruce	2,100	14.5
Willow	2,100	14.5
Fir, Balsam	2,236	14.3
Pine, White (Eastern, Western)	2,236	14.3
Fir, Concolor (White)	2,104	14.1
Basswood (Linden)	2,108	13.8
Buckeye, Ohio	1,984	13.8
Cottonwood	2,108	13.5
Cedar, White	1,913	12.2

Moisture content also plays a key role in the performance of your stove. Wood freshly cut from a living tree (green wood) contains a great deal of moisture. As you might expect, green wood burns poorly. You must season green wood before using it in your wood stove. To season green wood properly, split, stack, and allow it to air dry for a period of one year. Green wood may provide less than 2000 Btu per pound, whereas dry wood can provide up to 7000 Btu per pound.

Stack the firewood on skids or blocks to keep it off the ground, cover only the top of the stack. Plastic or tarps that cover the sides of the woodpile trap moisture and prevent the wood from drying. As for stacking, an old Vermonter said, "The spaces between the logs should be large enough for a mouse to get through, but not for the cat that's chasing it."

- **CAUTION: DO NOT STORE FIREWOOD WITHIN THE STOVE'S SPECIFIED CLEARANCES TO COMBUSTIBLE MATERIALS.**

BUILDING A FIRE

Once you understand the controls of your wood stove and have the appropriate firewood, you are ready to start a fire.

- **WARNING: NEVER USE GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID, OR SIMILAR LIQUIDS TO START OR 'FRESHEN UP' A FIRE IN THIS HEATER. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE HEATER WHILE IT IS IN USE.**

BREAKING IN YOUR WOOD STOVE

It is imperative that your stove is "broken in" gradually. Soapstone must be "seasoned"; over-firing a new stove may cause soapstone to crack or may damage other stove parts. Natural moisture in the freshly quarried soapstone must be driven out slowly to minimize the "shock" to the stone of its first exposure to high firebox temperatures. In addition, the asbestos-free furnace cement must be cured slowly to ensure adequate sealing and bonding.

When you light your first fires, the woodstove will emit some smoke and fumes. This is normal "off-gassing" of the paints and oils used when manufacturing the woodstove. If you find it necessary, open a few windows to vent your room. The smoke and fumes will usually subside after 10 to 20 minutes of operation. The odor and smoke will end once the stove is "cured".

The first few fires of the season may produce other odors from impurities that exist in the area immediately surrounding the stove. Some potential impurities are cleaning solvents, paint solvents, cigarette smoke, and soot from scented candles, pet

hair, dust, adhesives, a new carpet, and new textiles. These odors will dissipate over time. You can alleviate these odors by opening a few windows or otherwise creating additional ventilation around your stove. If any odor persists, contact your dealer or an authorized service technician.

If you adhere to the operating procedures in this manual, the steel, cast iron, and soapstone components of your stove will give you many years of trouble-free use. With use, the color of the soapstone may change and small fractures may appear on the surface. These changes do not affect the function of the stove. If a panel breaks completely, it must be replaced

Avoid the following conditions that can cause the glass, soapstone, steel or cast iron pieces to break:

- Do not throw wood into the stove.
- Do not use the door as a lever to force wood into the stove.
- Do not load wood encrusted with ice into a burning stove - the thermal shock can cause damage.
- Do not use a manufactured log grate or otherwise support the fuel. Burn the fire directly on the floor of the firebox.

Building A Break In Fire

1) Open the bypass handle. Open the front door and place five or six double sheets of tightly twisted newspaper in the center of the firebox. Arrange kindling in a crisscross pattern over the newspaper. Kindling should be approximately ten pieces, 1/2" (13 mm) in diameter and 10" to 16" (254 mm to 457 mm) long.
2) Fully open the primary air control by pulling the control handle fully to the left stop.
3) Light the paper under the kindling. Leave the door slightly ajar momentarily until the kindling has started to burn and draft begins to pull.
4) Close the door and allow the fire to burn. Keep the door closed while the stove is in use.
5) KEEP A WATCHFUL EYE ON YOUR STOVE to maintain a steady, low-heat fire. Your first fire should make the stove warm but **not hot to the touch**. Visible steam, or boiling moisture and hissing indicate the soapstone is too hot. At most, a few small chunks of wood should be added to the fire to reach safe break-in temperatures.
6) Once the stove is warm but **not hot to the touch,** close the primary air control by pushing it fully inward toward the stove to allow the fire to die out completely.
7) Let the stove return to room temperature.

Your first fire and first fire each season thereafter should be built and maintained as outlined above. Your patience will be rewarded by a properly seasoned stove.

- NOTE: The cool flue gas temperatures present during the break-in procedure may cause rapid creosote build-up. The door glass may also get dirty. A good hot fire will clean it. We recommend a visual inspection (and cleaning if necessary) of your stovepipe and chimney once the break-in procedure is completed.

Normal Operation

Building A Fire For Everyday Use

1) Open the bypass handle. Open the front door and place five or six double sheets of tightly twisted newspaper in the center of the firebox. Arrange kindling in a tee-pee configuration over the newspaper. Use approximately 10 pieces of kindling, 1/2" (13 mm) in diameter and 10" to 16" (254 mm to 406 mm) long.
2) Fully open the primary air control by sliding it fully to the left.
3) Light the paper under the kindling. Leave the front door slightly ajar momentarily until the kindling begins to burn and draft begins to pull.
4) Close the door and allow the fire to burn.
5) Once the kindling is burning, open the front door and add logs, small at first, to build the fire up. Ensure you keep the logs away from the glass in front in order for the air-wash system to work properly. Keep the front door closed while the stove is in use.

CAUTION: DO NOT BUILD THE FIRE TOO CLOSE TO THE GLASS. KEEPING THE FIRE TOWARDS THE CENTER OF THE FIRE BOX WILL KEEP COALS FROM BUILDING UP AGAINST THE GLASS DURING RELOADING.

6) Once the fire is burning well, and the catalyst probe indicates that the stove is in the active range, close the bypass handle. Now the combustion products are passing through the catalytic combustor, and your stove will be burning at its optimal efficiency.
7) After closing the bypass door, allow the stove to run on a high setting for around 20 minutes to ensure the catalytic combustor stays in the active range. This will also allow the fire to burn off any residue on the door glass from any previous low-burn fires
8) Use the primary air control to regulate the desired rate of burn. Pull the handle towards you for a higher burn rate, and push the handle towards the

stove for a lower burn rate. The air control does not close completely.

Note: Always remember to open the bypass handle before opening the front door. When opening the front door to reload or re-arrange logs, it is advisable to open the door just a crack, pause for a moment then open the door completely. This procedure allows the firebox to clear of smoke before the door is open fully. In addition, reloading on a bed of hot, red coals reduces smoking time and brings fresh fuel up to a high temperature rapidly. During the refueling and rekindling of a cool fire, or a fire that has burned down to the charcoal phase, operate the stove at a medium to high firing rate for about 10 minutes to ensure that the catalyst reaches approximately 600 °F. Once catalyst reaches operating temperature, the bypass handle can be closed. When reloading the stove, try to keep an open path behind the Lower Primary Air Opening (LPAO). It is helpful to leave a small valley in the coal bed behind the LPAO to insure faster re-lighting.

CATALYTIC COMBUSTOR OPERATION

The Castleton 8031 uses a catalytic combustor to ensure highly clean and efficient burns. The catalytic combustor is made from a stainless steel corrugation that is coated with a catalytic material. The catalytic combustor becomes active around 500 °F (260°C), helping to burn up smoke and any remaining particles that were not fully burned in the firebox. During the startup of a cold stove, a medium to high firing rate must be maintained for about 20 minutes. This ensures that the stove, catalyst, and fuel are all stabilized and at proper operating temperatures. Even though it is possible to have gas temperatures reach 500 °F (260°C) within 2 to 3 minutes after a fire is started, if the fire is allowed to die down immediately, it may go out or the combustor may stop working. Once the stove and catalytic combustor heat up, heat generated from burning smoke keeps the catalyst warm and active as long as fuel remains in the stove. You stove will burn the cleanest and most efficiently when the catalyst is in the active range. There should be little to no visible smoke from your chimney when the catalyst is in the active zone and fully functional.

Burn Rate

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

LOW BURN: Move the air control lever all the way to the right. (*see figure 17*). This closes the air shutter to its minimum opening. A low burn rate over extended periods is not advisable as it can promote the accumulation of creosote. Inspect the venting system frequently if using low burn rates consistently.

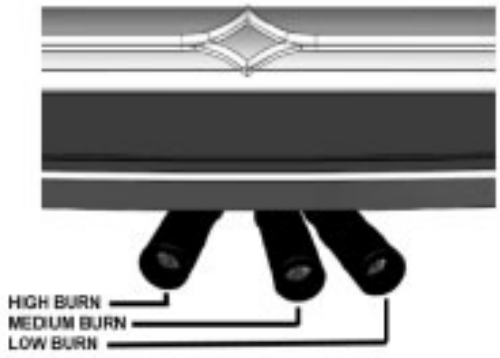


Figure 17 – Air Control Settings

MEDIUM BURN: Any setting from low to high will deliver varying rates of burn depending on the chimney setup, fuel and other local conditions. It is best to experiment to find the most comfortable setting for your situation.

HIGH BURN: Completely open the primary air control by moving it all the way to the left. Fully load the firebox with wood on a bed of hot coals or on an actively flaming fire. To minimize creosote accumulation, run the stove on high once or twice daily for 35 to 45 minutes to fully heat the stovepipe and chimney.

CAUTION: Do not burn fuel other than cord wood in your stove.

OVER-FIRE CAUTION

Over-firing means the stove is operating at temperatures above normal temperatures reached during High Burns outlined in the *BURN RATE* section. Carefully avoid over-firing, as it will damage the stove. Symptoms of chronic over-firing can include warped components, short burn times, a roaring sound in the stove or stovepipe, and discoloration of the stovepipe. A properly installed stove using fuel and following operating procedures as outlined in this manual should not over-fire.

Excessive draft, inappropriate fuel, and operator error can cause over-firing. Correct an over-fire situation as follows:

- **EXCESSIVE DRAFT**: Contact your local dealer to have a draft reading taken. Any draft in excess of 0.1 WC requires a damper in the stovepipe. Some installations may require more than one damper.
- **INAPPROPRIATE FUEL**: Do not burn coal; kiln dried lumber, wax logs, compressed wood, highly volatile fuel and combustible material or anything other than natural cordwood.

OPERATOR ERROR: Ensure all the gaskets are in good condition. Replace worn out or compressed gaskets. Only burn the stove with the firing and ash doors in the closed position.

If you suspect your stove is over-firing, discontinue use and contact your dealer immediately. **Damage caused by over-firing is not covered by your warranty**. Results of over-firing can include warped or burned out internal parts, cracked refractory panels, discolored or warped external parts, and damaged finish.

- **ANY SIGNS OF OVER-FIRING WILL VOID YOUR WARRANTY!**
- **THE FRONT DOOR MUST REMAIN CLOSED WHEN IN OPERATION**

Removal And Disposal Of Ashes

You can leave a thin layer of ashes in the firebox if preferred. Allow fire to die down or go out completely. It is important to prevent ashes from building up around the front door opening or they will spill out, or they can pack into the gasket channel and prevent proper sealing. To remove ashes, use a fireplace shovel. Avoid removing large live coals by pushing them to the side and removing only the finer ash with a shovel.

Disposal of ashes - Ashes should be placed directly into a **metal** container with a tight fitting lid. Do not place any other items or trash into the metal container. Do not pour water into the container. Replace the container's lid and allow the ashes to cool. Never place the ash disposal container on a combustible surface or vinyl flooring, as the container could be **hot**!

Pending disposal, place the closed ash container on a noncombustible floor or on the ground outside, well away from all combustible materials, liquid fuels, or vehicles. Retain ashes in the closed container until all coals thoroughly cool.

If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled.

NEVER place ashes in wooden or plastic containers, in trashcans with other trash, or in paper or plastic bags, no matter how long the fire has been out. Coals within a bed of ashes can remain hot for several days once removed from the firebox.

Maintenance

Catalytic Combustor Inspection and Replacement Procedures

- **WARNING: THIS WOOD HEATER CONTAINS CATALYTIC COMBUSTORS, WHICH NEED PERIODIC INSPECTION AND REPLACEMENT FOR PROPER OPERATION. IT IS AGAINST FEDERAL REGULATIONS TO OPERATE THIS WOOD HEATER IN A MANNER INCONSISTENT WITH OPERATING INSTRUCTIONS IN THIS MANUAL, OR IF THE CATALYTIC ELEMENTS ARE DEACTIVATED OR REMOVED. DO NOT OPERATE YOUR STOVE WITH THE CATALYTIC ELEMENTS REMOVED.**

It is important to periodically monitor the operation of the catalytic combustors to ensure that they are functioning properly and to determine when they need to be replaced. A non-functioning combustor will result in a loss of heating efficiency, and an increase in creosote and emissions. Following is a list of items that should be checked on a periodic basis

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

-This catalytic (or hybrid) heater is equipped with a temperature probe to monitor catalyst operation. Properly functioning combustors typically maintain temperatures in excess of 500 °F, and often reach temperatures in excess of 1,000 °F. If catalyst temperatures are not in excess of 500 °F, refer to Catalyst Troubleshooting section of this owner's manual.

-You can get an indication of whether the catalysts are working by comparing the amount of smoke leaving the chimney when the smoke is going through the combustor and catalyst light-off has been achieved, to the amount of smoke leaving the chimney when the smoke is not routed through the combustors (bypass mode).

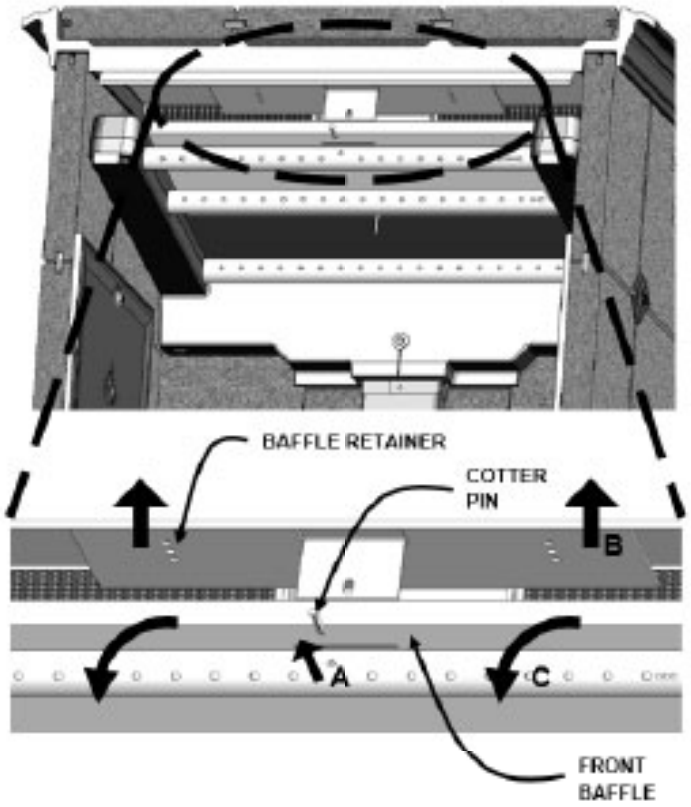
1. Light stove in accordance with instructions in section 3.3.5.
2. With smoke routed through the catalyst, go outside and observe the emissions leaving the chimney.
3. Engage the bypass mechanism and again observe the emissions leaving the chimney. Significantly more smoke will be seen when the exhaust is not routed through the combustor (bypass mode)

INSPECTING THE CATALYST AND REMOVING/REPLACING THE BAFFLE

1. Allow the stove and ashes to fully cool.
2. Remove the metal baffle retainer by removing the cotter pin (A) through the front air tube, and lifting the retainer upwards (B) away from the baffle.
3. Gently pull the front baffle towards the front of the stove (C), over the front tube, and out of the stove.

CAUTION - Do not force the baffle out of the stove. Gently adjust the baffle orientation until it can be removed freely from the stove.

4. The middle air tube may be removed for easier access to the catalysts, but it is not required



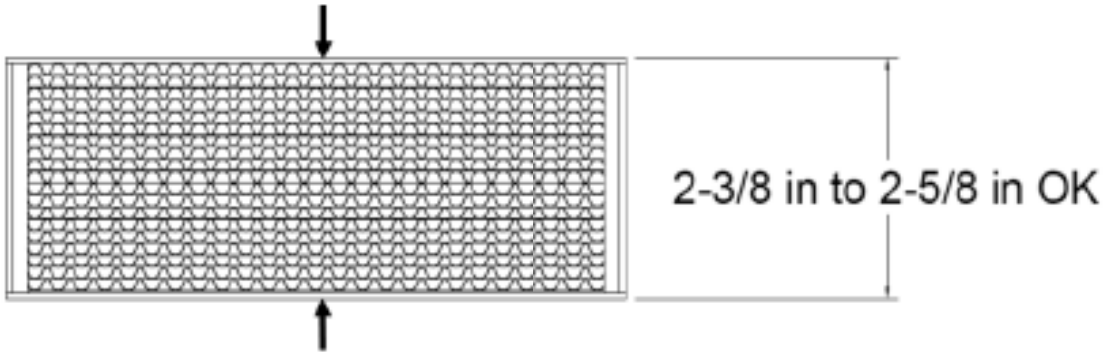
5. To remove the middle tube, remove the cotter pin on the right-hand side of the middle air tube, and push the tube to the right until the left end is free. Tip the left side of the tube downwards and pull the tube out of the stove
6. Use a small vacuum nozzle or soft bristled brush to remove any accumulated ash or soot on the face of the catalyst.
7. Inspect the catalyst for any unusual warping, corrosion, or plugged openings.
8. If any unusual conditions are found, remove the catalyst blocks – See replacing the catalysts.
9. Once the catalysts are inspected and cleaned, replace the middle air tube, baffle, and baffle retainer. Installation is the reverse of removal.

REMOVING OR REPLACING THE CATALYST

Refer to the Catalytic combustor warranty on page 35 for additional catalyst replacement information.

1. Allow the stove and ashes to fully cool.

Figure 19 – Removing the Middle Air Tube



2. Follow the procedures from "INSPECTING THE CATALYSTS AND REMOVING/REPLACING THE FRONT BAFFLE" to gain access to the catalysts.
3. Inspect the catalysts for visible damage or fly ash. If fly ash exists, gently brush the catalyst off with a narrow soft-bristle brush, or vacuum with a crevice tool.

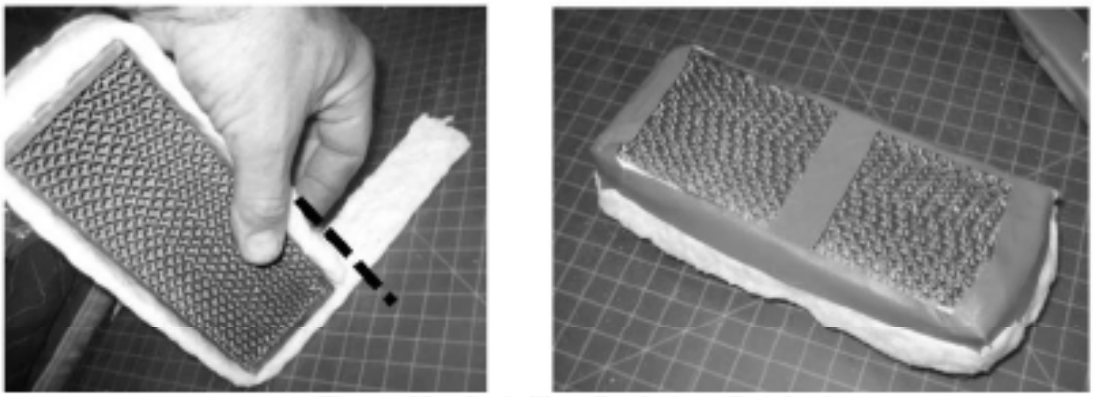


Figure 20 - Installing Gasket on Catalyst

4. If excessive fly ash exists, or if there is suspected catalyst performance issues, fully remove the catalysts by gently pulling the catalysts outwards towards the front of the stove. It may be necessary to gently rock the catalysts from side to side and top to bottom while pulling outwards to free the catalysts from the opening.
5. Remove any remaining gasket material from the openings and from the catalysts.
6. Inspect the catalysts for any fly ash or clogging, and remove with a soft bristled brush or vacuum crevice tool. If extra cleaning is needed, follow the guidelines below:
   -You may use compressed air under 35 psi, air only, no chemicals.
   -You may soak the catalysts in a hot water mix (not boiling), 4 parts water, 1 part vinegar. Rinse with cold water until vinegar smell is mostly gone.

Figure 2

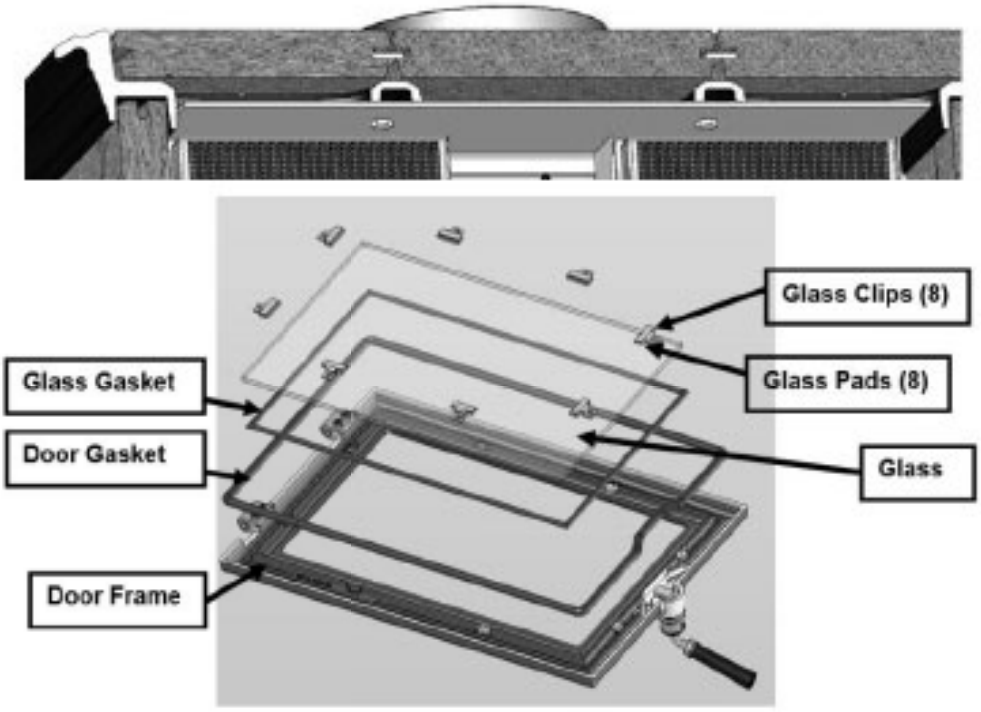
Finally add 3 smaller strips of tape as shown to hold gasket snug at ends and in the middle. This will reduce snagging and make it easier to reinstall the catalyst.

8. Only remove the catalysts if required. In general, the less you handle the catalysts, the better. If any unusual conditions are found, remove the catalyst blocks – See replacing the catalysts.
9. Some warping or bowing of the catalysts over time is acceptable, as long as the catalyst gasket continues to seal. Measure the catalyst in the middle section – if the dimensions are outside the range shown in Figure 21 above, replace the catalyst.
10. Once the gasket is installed on the catalysts, gently push the catalyst into the catalyst opening until the catalyst hits against the back wall of the cavity. Take care to ensure the gasket is not damaged.

REMOVING/REPLACING THE REAR BAFFLE

1. Allow the stove and ashes to fully cool.

2. Follow the procedures from "INSPECTING THE CATALYSTS AND REMOVING/REPLACING THE FRONT BAFFLE" to remove the front baffle.
3. Remove the cotter pin securing the rear baffle support to the catalyst housing (A). See Figure 22.
4. Support the rear baffle while pulling the rear baffle support outwards towards the front of the stove (B)
5. Remove the rear baffle.



6. Installation is the reverse of removal.
7. Allow the stove and ashes to fully cool.
8. Follow the procedures from "INSPECTING THE CATALYSTS AND REMOVING/REPLACING THE FRONT BAFFLE" to remove the front baffle.
9. Remove the cotter pin securing the rear baffle support to the catalyst housing (A)
10. Support the rear baffle while pulling the rear baffle support outwards towards the front of the stove (B)
11. Remove the rear baffle.
12. Installation is the reverse of removal.
13. Allow the stove and ashes to fully cool.
14. Follow the procedures from "INSPECTING THE CATALYSTS AND REMOVING/REPLACING THE FRONT BAFFLE" to remove the front baffle.
15. Remove the cotter pin securing the rear baffle support to the catalyst housing (A)
16. Support the rear baffle while pulling the rear baffle support outwards towards the front of the stove (B)
17. Remove the rear baffle.
18. Installation is the reverse of removal.

GLASS REPLACEMENT PROCEDURES

- **WARNING: DO NOT OPERATE THIS APPLIANCE WITH THE GLASS PANEL REMOVED, CRACKED, OR BROKEN. DO NOT SUBJECT THE DOOR TO**

ABUSE, SUCH AS STRIKING OR SLAMMING SHUT. ONLY A QUALIFIED SERVICE PERSON SHOULD REPLACE THE GLASS PANEL.

1. Follow the instructions included with the replacement glass kit.
2. Remove the door.
3. Remove the screws from the glass retainer (use penetrating oil if necessary) – lift the retainer off the glass. Set aside for reinstallation.
4. Carefully lift the damaged glass out of the door and discard.
5. Remove any remaining glass and old gasket material.
6. Clean the screw holes and place a small amount of anti-seize compound in each one.
7. Place the new glass onto the door. **Ensure sticker indicating the coated side is on the exterior face of the glass.**
8. **Important! Center the glass** and ensure that the edges of the glass are parallel with the edges of the opening.
9. Check glass position again (centered, and parallel), then screw the glass retainer clips with the glass pads back on the door using a crisscross pattern. Tighten the screws no more than 1/8th of a turn after they seat. The glass will break at this point if not positioned correctly.
10. Apply a light film of anti-seize lubricant on the door's hinge pins if needed.
11. Install the door.
12. After 5 or 6 fires, check the glass retainer screws, and retighten if necessary.

Required Glass Kit: Part Number: 90-58300. Use only 5mm x 241mm x 390mm Ceramic IR, or Neoceram IR glass. Contact your Hearthstone dealer.

CREOSOTE FORMATION & REMOVAL

When wood burns slowly at low temperatures, it may produce tar and other organic vapors, which combine with expelled moisture to form creosote. These creosote vapors condense 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, which may damage the chimney or even destroy the house. When burning wood, inspect the chimney connector and chimney at least once every two months during the heating season to determine if there is a creosote buildup.
If a creosote build-up occurs, inspect the stovepipe connector and chimney more often, at least monthly during the heating season to monitor the accumulation. If a creosote residue greater that 1/4" (6 mm) accumulates, remove it to reduce the risk of a chimney fire.

PREVENTION

Burn the stove with the primary air control fully open for 35 - 45 minutes daily to burn out creosote deposits from within the stove and the venting system.

After reloading with wood, burn the stove with the primary air control fully open for 15 to 20 minutes. This manner of operation ensures early engagement of the secondary combustion system that minimizes creosote buildup in the chimney.

If your glass always remains dirty, your operating temperatures are too low or your wood is wet; therefore, there is a higher risk of creosote buildup.

Inspect the venting system at the stove connection *and* at the chimney top. Cooler surfaces tend to build creosote deposits faster, so it is important to check the chimney at the top (where it is coolest) as well as from the bottom near the stove.

CLEANING

Remove accumulated creosote with a cleaning brush specifically designed for the type of chimney in use. We recommend you use a certified chimney sweep to perform this service. Contact your dealer for the name of a certified chimney sweep in your area (your dealer may be a certified sweep!).

We recommend that before each heating season you have the entire system professionally inspected, cleaned and repaired, if necessary.

GASKETS

Replace door gasket material every two to three seasons, or whenever it becomes deteriorated or loose, depending on stove use. If the door seal leaks, a new gasket will ensure a tight seal and improve stove performance.

We recommend you only use Hearthstone replacement gaskets when you need to replace your door gasket. Contact your dealer for a gasket kit that includes instructions, and the gasket for your stove.

GLASS

The glass used in our stoves is actually not plain glass, but a tough, clear ceramic material capable of operating at temperatures up to 2300° F. Do not operate the stove with a broken door glass. Do not abuse the front door by striking or slamming.

When necessary, clean the glass. For the inside surface of the glass, we recommend using a damp paper towel dipped in gray ash. Rub the inside of the glass with a circular motion. When all the deposits are removed, clean up with window cleaner or with commercial stove glass cleaners, which are available from your local dealer. Use this type of cleaner for the outside surface as well. Never attempt to clean the glass while the fire is burning or while the glass is hot. Remove deposits by following the instructions provided with the cleaner. Wipe the cleaner off with a soft cloth, or black & white newsprint.

> **Important**: scratching or etching the glass will weaken the integrity of the glass. Do not use a razor blade, steel wool, or any other abrasive material to clean the glass. Use a cleaner specifically manufactured for woodstoves only.

The front door glass is a ceramic, thermal shock-resistant glass, made specifically for use in woodstoves. Do not use any replacement glass other than the ceramic glass manufactured and supplied for use in this woodstove. Replacement glass is available through your local dealer.

Replace the door glass immediately if broken or chipped. Contact your local dealer for replacement glass. The glass kit includes instructions and everything needed for the repair. If you replace the glass yourself, wear work gloves and safety glasses.

Required Glass Kit: PN: 90-58300.

TROUBLESHOOTING

COMMON ISSUES

Virtually all woodstove operators experience basic common problems at one time or another. Most are correctable and generally require only a minor adjustment of the stove, installation, or operating technique. In cases where weather conditions dramatically affect stove performance, the problems are typically temporary and solve themselves once the weather changes.

If you question whether your stove is producing adequate heat, the best way to troubleshoot the problem is to monitor the temperature of the stack no more than 12 inches (30 cm) above the flue collar. A 400° F (200° C) stovepipe confirms the stove is supplying sufficient heat. Keep in mind that your house itself will regulate room/house temperatures. How well the walls, floors and ceilings are insulated, the number and size of windows, the tightness of outside doors, and the construction or style of your house (vaulted ceilings or other open spaces which collect large percentages of heat, ceiling fans, etc.) all are determining factors of room temperature.

Your stove's performance is also dependent on its installation. One common cause of poor performance is an oversized chimney flue. Oversized chimney flues result in decreased draft, which prevents the smoke from rising out the chimney. Oversized flues are also more difficult to heat effectively, especially when burning a high efficiency stove. Cool flue temperatures inhibit the establishment of a strong draft (and encourage the accumulation of creosote). The lack of a strong draft will cause the fire to die down and may even force smoke to pour into the room.

If your chimney is the proper size and a strong draft is not easily established, there is the possibility that the chimney is too cold. Again, hot chimneys promote stronger drafts. Opening a window briefly in the room while lighting the stove may help.

Other draft guidelines are as follows:

An **"AIRTIGHT" HOUSE**: The air supply (infiltration) to the interior of the house may be inadequate if your home is super-insulated or especially well sealed. This phenomenon of air starvation within the building is exacerbated if exhaust fans, such as clothes dryers, bathroom fans or cook stove exhaust fans, are in operation within the home. Outfitting your stove with the optional outside air adaptor connected to an air duct, which leads to the outside of the building, can correct this problem.

Tall Trees or Buildings: These obstructions, when located close to the top of the chimney can cause chronic or occasional downdrafts. When selecting a site for a new chimney, consider the placement of other objects near the proposed chimney location.

Wind Velocity: Generally, the stronger and steadier a wind, the stronger (better) the draft. However, "gusty" wind conditions can cause erratic downdrafts. For consistent problems, consider a high wind cap, such as the Vacu-Stack.

Barometric Pressure: Chimney drafts are typically sluggish on balmy, wet or muggy days (low barometric pressure). This is a weather-related phenomenon, which generally is self-correcting as the weather changes.

Briskness of Fire: The hotter the fire in your stove, the hotter your chimney and, therefore, the stronger the draft.

Breaks in the Venting System: An unsealed clean-out door at the bottom of the chimney, leaky stovepipe joints, a poor stovepipe-to-thimble connection,

missing caps, or a leaky chimney all can cause inadequate draft.

Seasonal Factors: Early fall and late spring are generally difficult seasons in which to establish proper drafts. The colder the outside air is relative to room temperature, the stronger the draft.

OPERATING THE STOVE

As outlined above, there are days when a good draft is just not easy to establish. The causes are usually seasonal factors or a cold chimney. Try starting the fire by using small kindling and fuel to obtain a quick, hot fire. Tend the fire frequently with small fuel until the chimney is hot and the draft is well established. Sometimes, partially opening a first floor window briefly will help quickly get draft established.

TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	SOLUTIONS
STOVE SMOKES	Operating Technique	Fully open the primary air control one minute before opening doors, and ensure the bypass is open before opening door.
	Cold Chimney or reverse draft	Preheat the chimney when first starting a fire. Briefly open a window in the room containing the stove.
	Blocked Chimney	Examine the chimney and stovepipe for blockage or creosote accumulations.
	Oversized Chimney	Reline the chimney to the appropriate diameter
	Undersized Chimney	Install a draft inducer or replace the chimney.
	Chimney Too Short	Lengthen the chimney.
	Air Infiltration Into The Chimney	Seal chimney connections and openings. Check clean-out doors.
	Bypass not closed	Ensure that the bypass door is closed when the catalyst is in the active range.
	Catalyst not functioning	Inspect catalyst for damage, ash build-up, or plugging. Brush catalyst with a soft-bristled brush, or vacuum lightly. Replace if required. Follow instructions to ensure catalyst light-off.
	Not burning proper fuel	Ensure cordwood is seasoned and dry.
	More Than One Appliance Connected to the Flue	Disconnect all other appliances and seal openings.
BACK-PUFFING OR GAS EXPLOSIONS	Operating Technique	Fully open the primary air control one minute before opening the door and keep it fully open for a few minutes after reloading. Ensure the bypass door is open before opening the door
	Extra Low Burn Rate	Burn the stove at a higher burn rate.
	Chimney Down-draft	Install a chimney cap.
	Excessive Ash Build-up	Empty the ash pan more frequently. Increase efficiency of burns, and avoid using poor quality or green wood.
UNCONTROLL-ED OR SHORT BURN	Unsealed or Open Door	Close the door tightly or replace the gaskets. Air leakage around glass gasket – replace gasket
	Excessive Draft	Check the installation. Operate at LOW BURN. Install stovepipe damper. Draft in excess of 0.1 wc should be corrected with a stovepipe damper(s)
	Extra Long Chimney	Shorten the chimney. Install stovepipe damper(s).
	Oversized Chimney	Reline the chimney to the proper diameter.
	High Winds or Hilltop Location:	Install a chimney cap.
INSUFFICIENT HEAT	Poor Quality, low Btu content, or Green Wood	Use only air-dried wood, preferably dried at least one year. Use a wood with a high Btu content if available.
	Low Burn Rate	Operate the stove at a higher burn rate.

	Cold Exterior Chimney	Reline or insulate the chimney.
	Leaky Stovepipe or Chimney	Check the installation. Replace with a pre-fabricated insulated chimney system or a properly sized masonry chimney.
	Too Much Heat Loss From House	Add insulation, use energy efficient windows, or caulk windows, and seal openings in home.
	Excessive Ash Build-up	Empty the ash pan more frequently. Increase efficiency of burns, and avoid using poor quality or green wood.
BLISTERING OF FINISH	Operating Technique	Do not over-fire the stove. Monitor stove temperatures. Use seasoned wood only.
	Excessive Draft	Check the DRAFT. A damper may be required. Operate the stove at a LOW BURN range.

ADDITIONAL CATALYST TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	SOLUTIONS
FLY ASH BUILD UP ON CATALYST	Catalyst has not maintained light-off temperature	Brush cold combustor with soft-bristled brush or vacuum lightly. Follow instructions in the manual for a proper catalyst light-off
	Burning materials that cause a lot of char and fly-ash	Don't burn cardboard, gift wrap paper, or garbage. Burn only dry, seasoned wood, per the owner's manual.
	Bypass closed too soon	Follow instructions in the manual for a proper catalyst light-off
CATALYST PLUGGING OR MASKING (SOOT/CRESO-TE)	Burning wet, pitchy woods, or burning large loads of small diameter wood with the combustor in the operating position without catalyst light off occurring	Burn dry seasoned wood. Follow instructions in the manual for a proper catalyst light-off, and ensure catalyst light-off as occurred before closing bypass damper. It may be possible to burn the soot or creosote off by building a hot fire, and allowing the stove to run until the catalyst is well within the operating range before closing the bypass. Continue to run the stove at a high temperature for one hour, while ensuring the catalyst stays in the upper operating range, but not too hot.
WARPING OR BOWING OF THE CATALYST	Excessive catalyst temperatures for long periods of time.	Ensure that the catalyst remains in the operating zone, and does not get to hot. Reduce air control settings for a lower burn rate to ensure catalyst temperatures do not exceed the operating range.

REPLACEMENT PARTS & OPTIONAL ACCESSORIES

PART #	DESCRIPTION
	Replacement Parts
5030-045	Hinge Bushing
5030-050	Hinge Pin Support
5030-055	Hinge Plate
5030-071	Secondary Combustion Tube #1
5031-072	Secondary Combustion Tube #2
5031-073	Secondary Combustion Tube #3
5210-2340	Tie Rod
7200-525	Catalyst Temperature Probe
	REPLACEMENT KITS AND ACCESSORIES
90-57210	BLOWER KIT
90-53300	OUTSIDE AIR KIT
90-68300	REAR HEAT SHIELD KIT
90-58300	GASKET KIT
90-58305	GLASS KIT
90-71100	DOOR HANDLE KIT
90-73212	DOOR LATCH KIT
90-76310	BAFFLE KIT
90-57310	CATALYST REPLACEMENT KIT

Refer to the Illustrated Parts list for further detail about stove components, available online at www.hearthstonestoves.com.

SAFETY LABEL

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

Listed Room Heater, Solid Fuel Type
Also Suitable for Mobile Home Installation Pursuant to (UM)84-HUD

C PFS US
PFS Corporation
Report: PH28652

Conforms to
UL STD 1482-2011 (R2015)

Certified to
ULC STD S627-00 (R2016)

Manufactured by:
hearthstone
317 Stafford Ave.
Morrisville, VT 05661

MODEL NAME: CASTLETON 1
MODEL NUMBER: 8031
SERIAL NUMBER:

CAUTION: HOT WHILE IN OPERATION.
DO NOT TOUCH. KEEP CHILDREN, CLOTHING, AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. SEE NAMEPLATE AND INSTRUCTIONS.
INSPECT AND CLEAN CHIMNEY AND CONNECTOR FREQUENTLY. UNDER CERTAIN CONDITIONS OF USE, CREOSOTE BUILDUP MAY OCCUR RAPIDLY.

WARNINGS

Do not use grate or provide fire. Build wood fire directly on hearth. Do not overfire. If the heater or chimney connector glows, you are overfiring. (See Operator's Manual)

OPERATE ONLY WITH DOORS CLOSED. DO NOT OBSTRUCT SPACE UNDER HEATER.

TYPE OF FUEL: CORD WOOD ONLY
BURNING FUELS OTHER THAN CORDWOOD MAY DAMAGE THE APPLIANCE

"PREVENT HOUSE FIRES"

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

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

NOTE: Replace glass only with 4mm ceramic glass.

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.

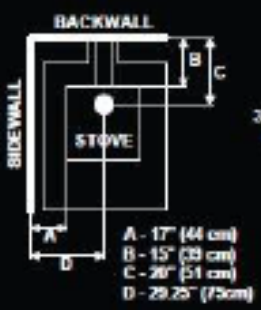
WARNING: (Mobile Home) An outside air inlet must be provided for combustion and be unrestricted while the unit is in use.

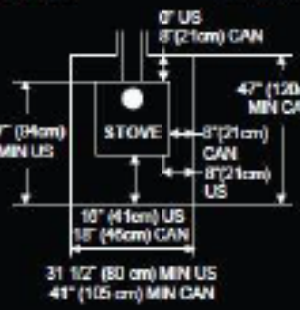
THIS APPLIANCE USES A CATALYTIC COMBUSTOR (P/N WP-4150001076)

The performance of the catalytic device or its durability has not been evaluated as part of the certification.

CAUTION: Burning materials other than the specified fuels may make the catalyst inactive

Minimum Clearance to Combustible Materials*





Floor Protection*

When installed on a combustible floor, non-combustible floor protection is required to cover the area beneath the heater, and extend at least 16"(41cm) (10" (40cm) CAN) to the front and 8"(21cm) beyond each side of the fuel loading and ash removal openings (side of stove is CAN). The floor protection must extend under the flue connector and extend 5" beyond each side of pipe.

VENT REQUIREMENTS: 6" diameter, single wall, minimum 24 MSG blue steel connector with tube factory seal Type HT chimney or masonry chimney.

OPTIONAL COMPONENTS:
Outside Air Part # 80-63069
Blower Kit Part # 80-67218
Rear Heat Shield Part # 80-63200

*Refer to the installation Manual for additional clearance information, installation instructions, and operating instructions.

U.S. ENVIRONMENTAL PROTECTION AGENCY
Particulate Emissions: .38 g/hr. Tested to: EPA Method 28R
Certified to comply with 2020 crib wood particulate emission standards.

Date of Manufacture

2023	2024	2025	2026	2027
■	■	■	■	■

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■

DO NOT REMOVE OR COVER THIS LABEL

MADE IN USA

8009-723 R0

LIMITED WARRANTY

These warranties give you specific legal rights. You may also have other rights, which vary from State to State.

Hearthstone Quality Home Heating Products, Inc. (Hearthstone) warrants to the original retail purchaser only (the "Original Purchaser") the new appliance manufactured by Hearthstone, purchased by the Original Purchaser and installed by an authorized Hearthstone dealer or their designated representative against any of the occurrences listed in this document that result from defects in material or workmanship. This warranty is not transferrable. All obligations of Hearthstone under this document commence on the date of the Original Invoice (the "Purchase Date"). The term "Limited Lifetime" is defined as 10 years from the beginning of warranty coverage.
Hearthstone appliances are designed to be operated only with the fuels listed in your owner's manual.

Catalytic combustor LIMITED LIFETIME WARRANTY: The catalytic combustors are covered directly by the combustor manufacturer, Applied Ceramics. Included with your stove you will find the LIMITED LIFETIME WARRANTY for the catalyst, as well as a warranty card.

Catalyst Model Number: ACI-6M2 Catalyst Manufacturer: APPLIED CERAMICS

APPLIED CERAMICS warrants to the consumer who purchases a FIRECAT STEEL COMBUSTOR as a component in an EPA certified solid fuel appliance, to replace at no charge to the consumer the FIRECAT STEEL COMBUSTOR that ceases to function with two (2) years from the date of purchase by the original consumer, provided that the following conditions are met:

(1) A copy of the original bill of sale that includes place and date of purchase must be submitted with the warranty claim.
(2) The original FIRECAT STEEL COMBUSTOR must be returned to APPLIED CERAMICS
(3) The FIRECAT STEEL COMBUSTOR must not have been mechanically abused, nor must the wrong fuels have been used in the appliance.

If after two years the FIRECAT STEEL COMBUSTOR fails to function, the prorated warranty will allow replacement at the following special price schedule:

Year 3	$130.00
Year 4	$140.00
Year 5	$150.00
Year 6	$160.00
Year 7 and after	at current retail price

Conditions 1, 2, and 3 also apply to the Prorated portion of the warranty. Any EPA certified solid fuel appliance will receive one replacement catalyst for each defective catalyst returned during the three year period. The consumer will be responsible for any removal, any servicing, and return of any items required for filing the warranty claim. This warranty is APPLIED CERAMIC'S exclusive warranty, and APPLIED CERAMICS, disclaims any other express or implied warranty for the FIRECAT STEEL COMBUSTOR, including any warranty or merchantability fitness for a particular use.

Ensure the catalyst is well wrapped and padded for shipment in bubble wrap, or similar material. Ship the catalyst with padding inside of a cardboard box.

All warranty claims must include $12.50 for postage and handling within the continental U.S. Alaska and Canada claims must include $35.00.

Please allow 2-3 weeks for delivery. Order online @ www.firecatcombustors.com

Please read and understand the full warranty. Please return the completed warranty card promptly to Applied Ceramics. The warranty card, and any warranty claims can be shipped to:
Applied Ceramics
55555 Pleasantdale Road
Doraville, GA, 30340

Stove components Limited Warranty

Warranty Period	Wood	Gas	Pellet	Covered Components
Limited Lifetime	X	X	X	Stone
	X	X	X	Cast iron not listed elsewhere
	X			Clean burning air supply system*
5 Year	X	X	X	Door handles and latches
	X	X	X	Steel Components and Firebox
		X		Burner and logs
3 Year			X	Burn Pot and Baffles
2 Year	X	X	X	Appliance Electrical and Gas Components
	X	X		Refractory, Vermiculite Panels, Baffles
1 Year	X	X	X	Enamel finish against peeling or fading
	X	X	X	Accessories
	X	X	X	Glass
	X			Ash Grate
	X	X	X	All components not listed elsewhere

Any parts repaired or replaced during the limited warranty period will be warranted under the terms of the limited warranty for a period not to exceed the remaining term of the original limited warranty or one year, whichever is longer.
Parts: Hearthstone will replace through an authorized dealer, defective parts covered by the foregoing warranty at no charge.
Labor: Within the first (1st) year after the Purchase Date, Hearthstone will pay for warranty labor performed by an authorized Dealer at Hearthstone's published labor rates in effect at the time the labor is performed only if the appliance is installed by an authorized dealer or their designated representative. Otherwise or thereafter, the Original Purchaser is responsible for the cost of labor.
Shipping cost for parts: Within the first ninety (90) days after the Purchase Date, Hearthstone will pay for the shipping of appliance parts covered by any of the foregoing warranties to and from Hearthstone or an authorized Dealer, as the case may be. Thereafter, the Original Purchaser is responsible for all shipping costs related to shipping appliance parts to and from Hearthstone or an authorized Dealer, as the case may be.
Shipping cost for the appliance: Within the first (1st) year after the Purchase Date, if the Original Purchaser is instructed to return the appliance to Hearthstone or an authorized Dealer for repair, Hearthstone will pay fifty percent (50%) and the Original Purchaser will pay fifty percent (50%) of the shipping costs related to shipping the appliance to and from Hearthstone or an authorized Dealer, as the case may be. Thereafter, the Original Purchaser is responsible for one hundred percent (100%) of all of the shipping costs related to shipping the appliance to and from Hearthstone or an authorized Dealer, as the case may be. Notwithstanding any other provision of this document, in no event will Hearthstone pay for any Dealer fees or other fees for pick up or delivery of the appliance returned for repair; the Original Purchaser shall be responsible for any such fees.

EXCLUSIONS & CONDITIONS
The warranties contained in this document do not cover, nor is Hearthstone responsible for:

1. Damages resulting from:
   a. Failure to install, operate, or maintain the appliance in accordance with the owner's manual, operating instructions, installation instructions, or safety rating label provided with the appliance.
   b. Over-firing the appliance. Over-firing can be identified by, but not limited to, warped cast iron or steel, rust colored cast iron, bubbling, cracking and discoloration of steel or enamel finishes.
   c. Failure to install the appliance in accordance with all national or local building codes.
   d. Shipping or improper handling.
   e. Improper operation, abuse, misuse, continued operation with damaged, corroded, or failed components, accident, or improper/incorrect service or repairs.
   f. Environmental conditions, inadequate ventilation, negative pressure, or improper drafting caused by tightly sealed constructions, insufficient make-up air supply, or air handling devices such as exhaust fans, forced air furnaces, or other such causes.
   g. Damage caused by direct exposure to water.
   h. Use of fuels other than those specified in the owner's manual.
   I. Installation or use of components not supplied with the appliance, or any other components not expressly authorized and approved by Hearthstone.
   J. Modifications of the appliance not expressly authorized and approved by Hearthstone in writing
   K. Interruptions or fluctuations of electrical power supplied to the appliance.
2. All stones are warranted against cracking or breakage due to thermal stress, excluding surface and hairline cracks and scratches that do not affect the operation, or safety of the appliance.
3. Repair or replacement of wear parts. Such parts that are subject to normal wear and tear during the warranty period such as paint, gaskets, baffles, refractory materials, ash grates, and glass.
4. Damage resulting from installation, modification, alteration, repair or service of the appliance by any party other than an authorized Hearthstone dealer (a "Dealer") or their designated representative, or Hearthstone.
5. Damage due to water or condensation due to installation of the appliance in a high moisture area.
6. Damage due to installation of the appliance in an atmosphere contaminated by damaging chemicals, including but not limited to chlorine, fluorine or salts.
7. Scratches on glass, enameled surfaces or stones due to mechanical abrasion.
8. Noise caused by expansion or contraction caused by the heating and cooling of the appliance.
9. Odors caused by the heating of the appliance, or surrounding materials
10. Consequential damage caused by leaking of condensate during startup
11. A defect in any part of the appliance if the Original Purchaser fails to comply with Hearthstone's or a Dealer's request to ship the part or the appliance to Hearthstone or a Dealer, as the case may be.
12. Replacement stones and enameled parts are taken from current stock, and may not match originals in color, grain, or pattern. Hearthstone will supply replacement parts for discontinued parts in finishes or colors as available, or at their discretion.
13. Hearthstone's obligation under this warranty does not extend to the appliance's ability to heat the desired space. Information is provided to assist the customer and the dealer in selecting the appropriate appliance for the application. Consideration must be given to appliance location and configuration, environmental conditions, insulation and air tightness of the structure.

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QUALIFYING FOR WARRANTY COVERAGE

To obtain performance of any obligation under this document, the Original Purchaser must, within the applicable warranty time period, contact their original Hearthstone dealer, or the current responsible local Hearthstone dealer, for instructions regarding the return of defective parts for repair, the return of the appliance for repair, or to schedule a Dealer service call. The Original Purchaser should refer to the Dealer Network search engine contained on Hearthstone's Web site (www.hearthstonestoves.com) if the original dealer is not available, to find a Hearthstone dealer nearest to the Original Purchaser's location.

REMEDY

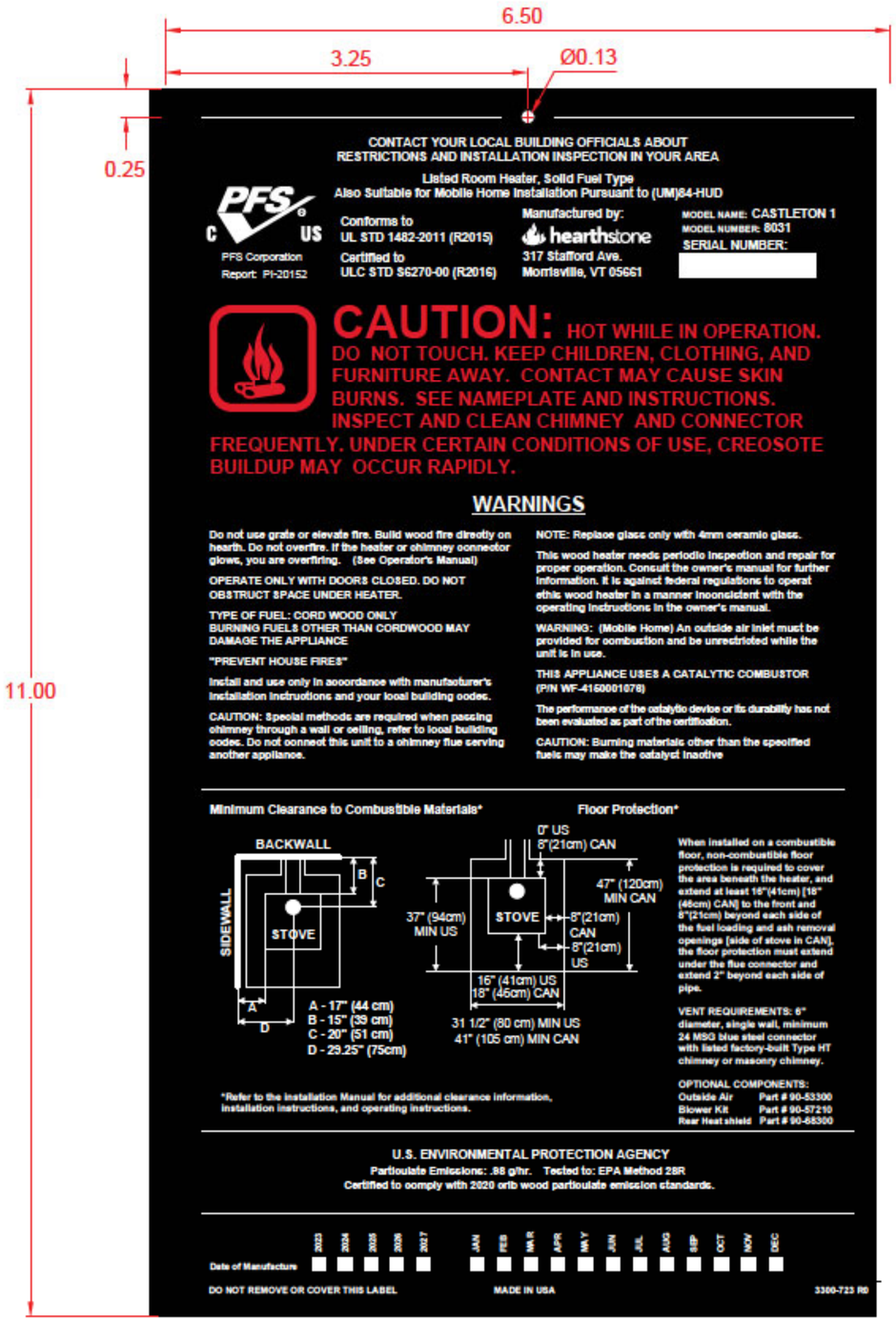
The remedy for any breach of the foregoing warranties will consist of repair or replacement, at Hearthstone's option, of any covered defect in the appliance. When the Original Purchaser contacts a Hearthstone Dealer, the Dealer on behalf of Hearthstone, as the case may be, will instruct the Original Purchaser to either return the defective part, or the entire appliance (if requested), to the Dealer or Hearthstone or allow a Dealer to make a service call at the place where the appliance is located. Hearthstone may require that a digital picture be provided to support the claim. Notwithstanding any other provision of this document, the Original Purchaser shall pay for any fees and service charges related to a Dealer's service call or the shipping charges associated with the return.

WARRANTY REGISTRATION

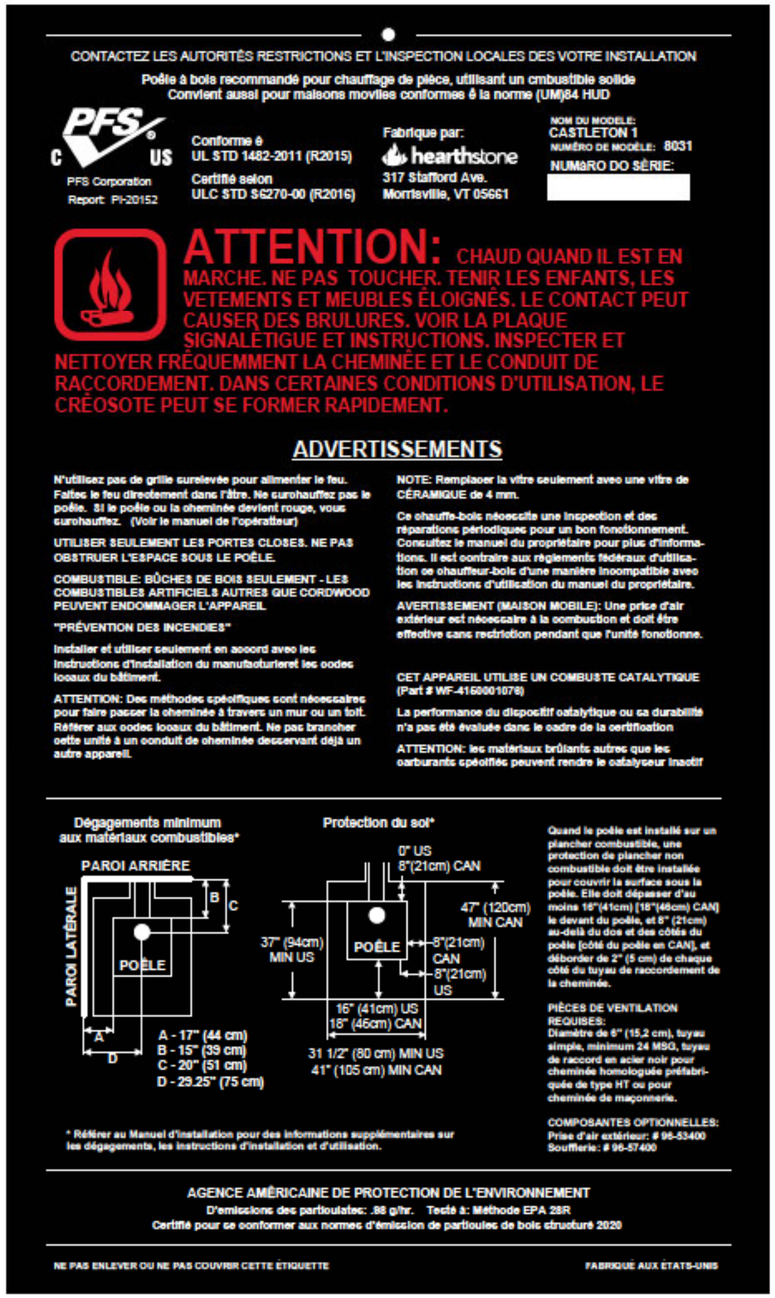
The Original Purchaser can complete their warranty registration on our website at www.hearthstonestoves.com, or send a completed and signed Warranty Registration Form, which is enclosed in the appliance document packet, to the following address:

Hearthstone Quality Home Heating Products, Inc.
Warranty Department
317 Stafford Avenue
Morrisville, VT 05661

NOTE: SENDING IN THE SIGNED WARRANTY REGISTRATION FORM IS *NOT REQUIRED* AS A CONDITION OF WARRANTY COVERAGE OR HEARTHSTONE'S PERFORMANCE.



FRONT / ENGLISH



BACK / FRENCH

NOTES:
1. MATERIAL: .020 ALUMINUM
2. PRINTING: BLACK LABEL WITH SILVER/RED LETTERS

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
	0	INITIAL RELEASE FOR NEW CERTIFICATION	8/3/22	SPS

VIEWS ARE THIRD ANGLE

This document submitted by Hearthstone is the property of Hearthstone and may contain information of a proprietary nature and shall not be copied or duplicated in whole or in part or used in whole or in part for any purpose other than that which is necessary for the preparation of bids or fabrication. Please return to Hearthstone.

UNLESS OTHERWISE SPECIFIED:
TOLERANCES ARE:
FRACTIONS ± 1/64 DECIMALS .XX± .015 ANGLES ± 1/4°
.XXX± .005
1.) DIMENSIONS ARE IN INCHES / MM.
2.) ALL MACHINED SURFACES TO BE DEBURRED AND SMOOTHED.
MATERIAL: SEE NOTES
FINISH: SEE NOTES

CAD GENERATED DRAWING. DO NOT MANUALLY UPDATE

APPROVALS	DATE
DRAWN TWV	5/14/2020
CHECKED	
ENG APPR.	
MFG APPR.	
QUAL APPR.	

hearthstone

LABEL: SAFETY

CASTLETON 8031, 1/23 AND ON

SIZE B | HEARTHSTONE DWG. NO. 3300-679 | REV. 0

SCALE: 1:1 | WEIGHT: | DWG. NO. | SHEET 1 OF 2

APPENDIX 8: Photographs of test set up

POLYTESTS
TESTING THROUGH YOUR REALITY

Dilution picture Dia 8 no. EG-029

Polytests Services Inc. 695 B rue Gaudette,St-Jean-sur-Richelieu Québec, Canada, J3B 7S7

Velocity ports at 90 degrees and tunnel temperature sensor location

Particulate sample extraction ports located 48 inches under (requirement 4D=32 inches minimum) velocity ports and 18 inches above downstream Tee. (Requirement 2D=16 inches minimum)

Adjustable damper for flow adjustments

Extraction blower

POLYTESTS
TESTING THROUGH YOUR REALITY

Total length between hood and sampling port: 23 feet.

POLYTESTS
TESTING THROUGH YOUR REALITY

Two 8 inches elbow with horizontal mixing section.

60 inches horizontal run between two elbows. Mixing section, No mixing baffle. 8 inches diameter pipe

Hood diameter 32 (requirement 4D=32 inches minimum) inches and height of 24 inches (requirement 3D=24 inches minimum)

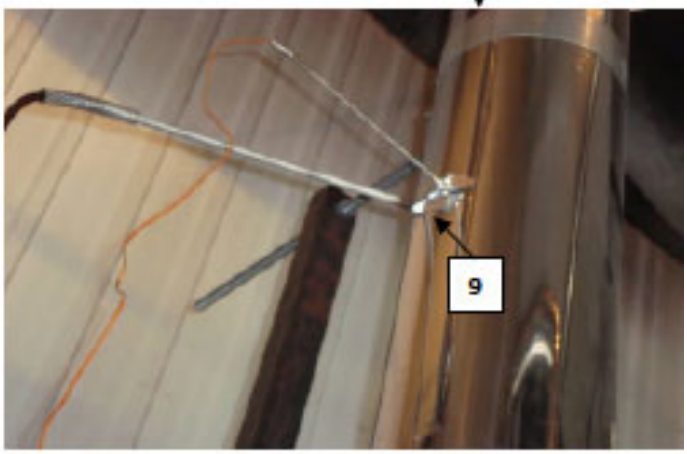
All pipe joints are sealed.

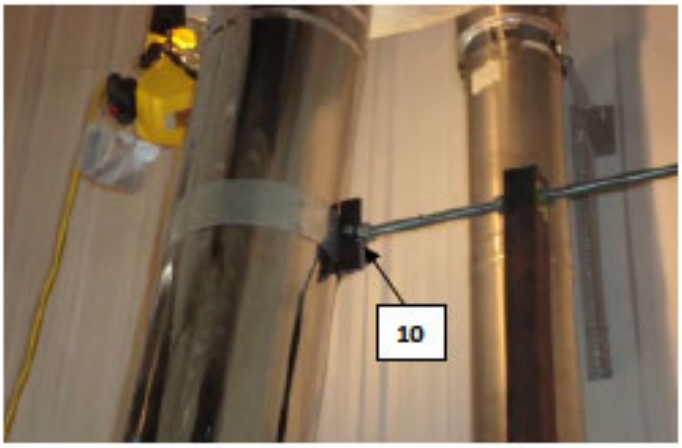
POLYTESTS
TESTING THROUGH YOUR REALITY

Stack sampling

Gas analysis and temperature probe

chimney support

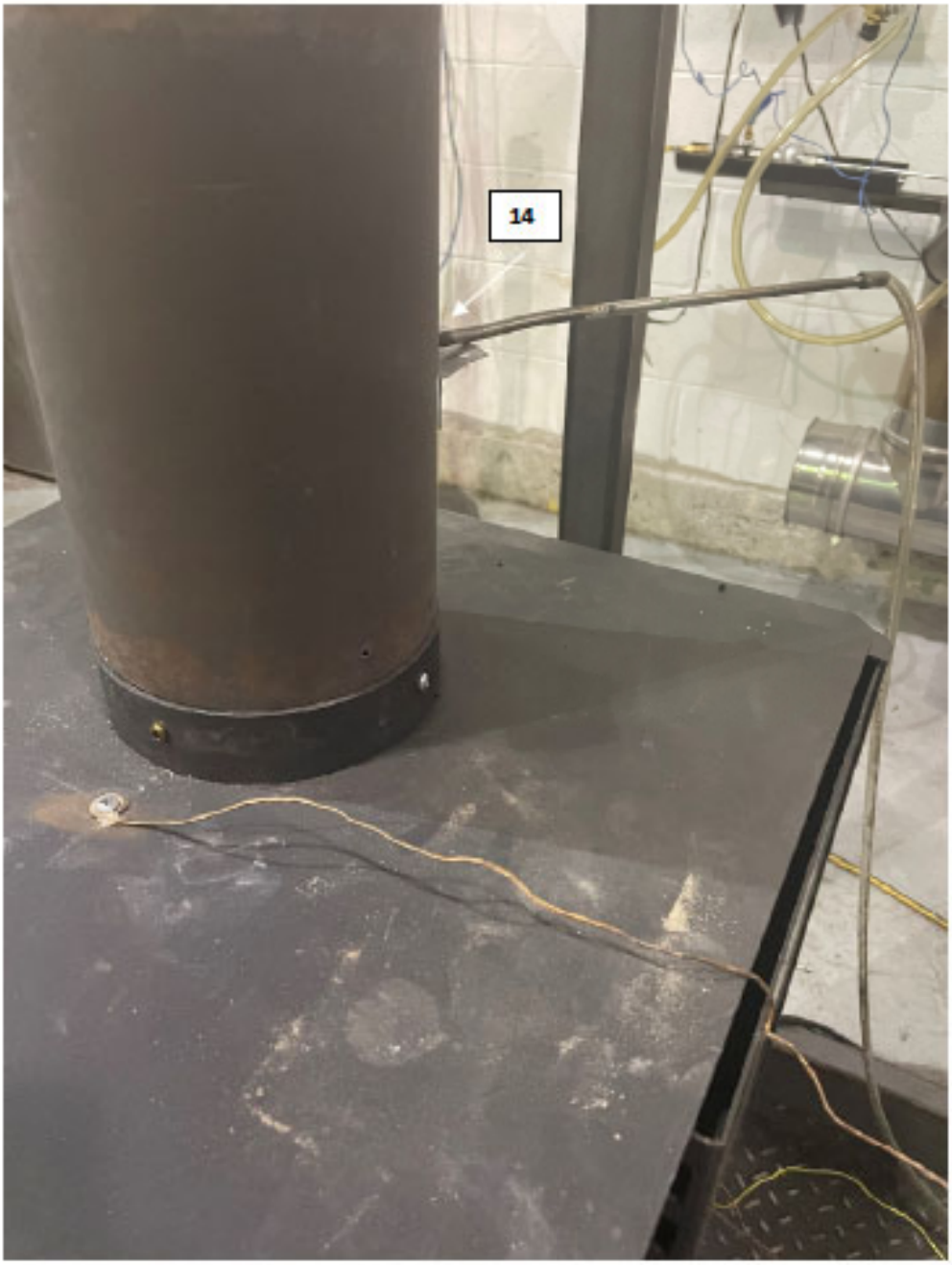




9 : Temperature and gas analyser sampling ports located 9 feet above platform

10 : Exhaust system support bracket

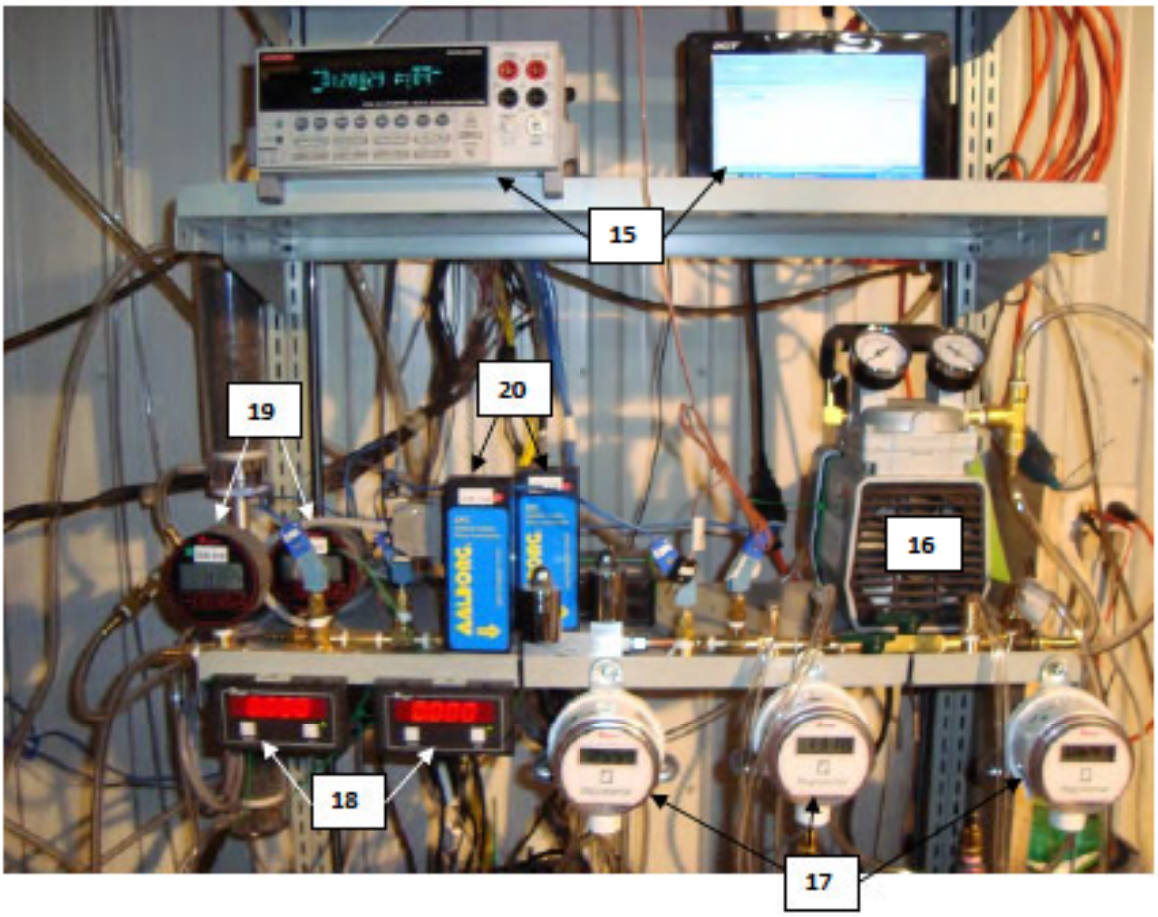
Draft sampling



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

POLYTESTS
TESTING THROUGH YOUR REALITY

Equipment's

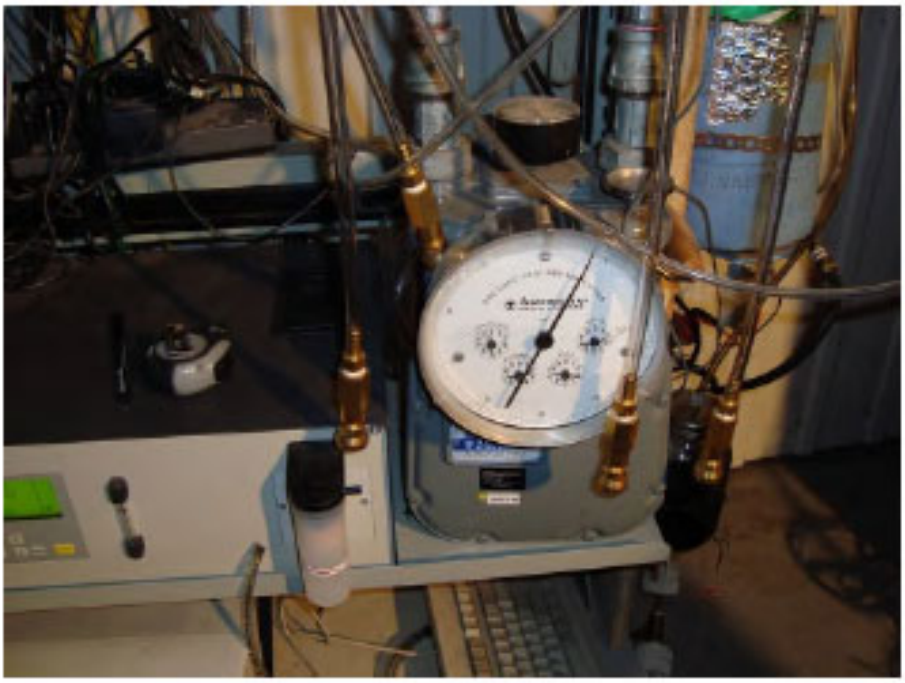


15	: Acquisition system
16	: Vacuum pump
17	: Digital manometer
18	: Digital read out for mass flow meter
19	: Digital vacuum gage
20	: Mass flow meter

POLYTESTS
TESTING THROUGH YOUR REALITY

Gaz analyser

Reference dry gas meter

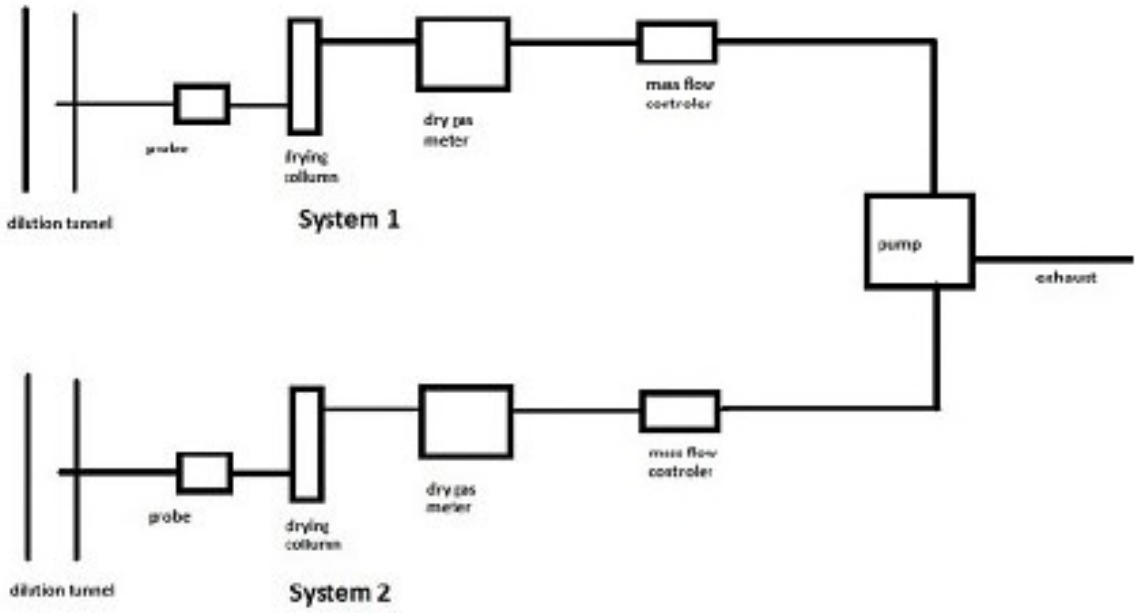


POLYTESTS
TESTING THROUGH YOUR REALITY

Dry gas meter for train 1, train 2 and room filter.

POLYTESTS
TESTING THROUGH YOUR REALITY

Dilution tunnel sample system



POLYTESTS
TESTING THROUGH YOUR REALITY

Dilution tunnel

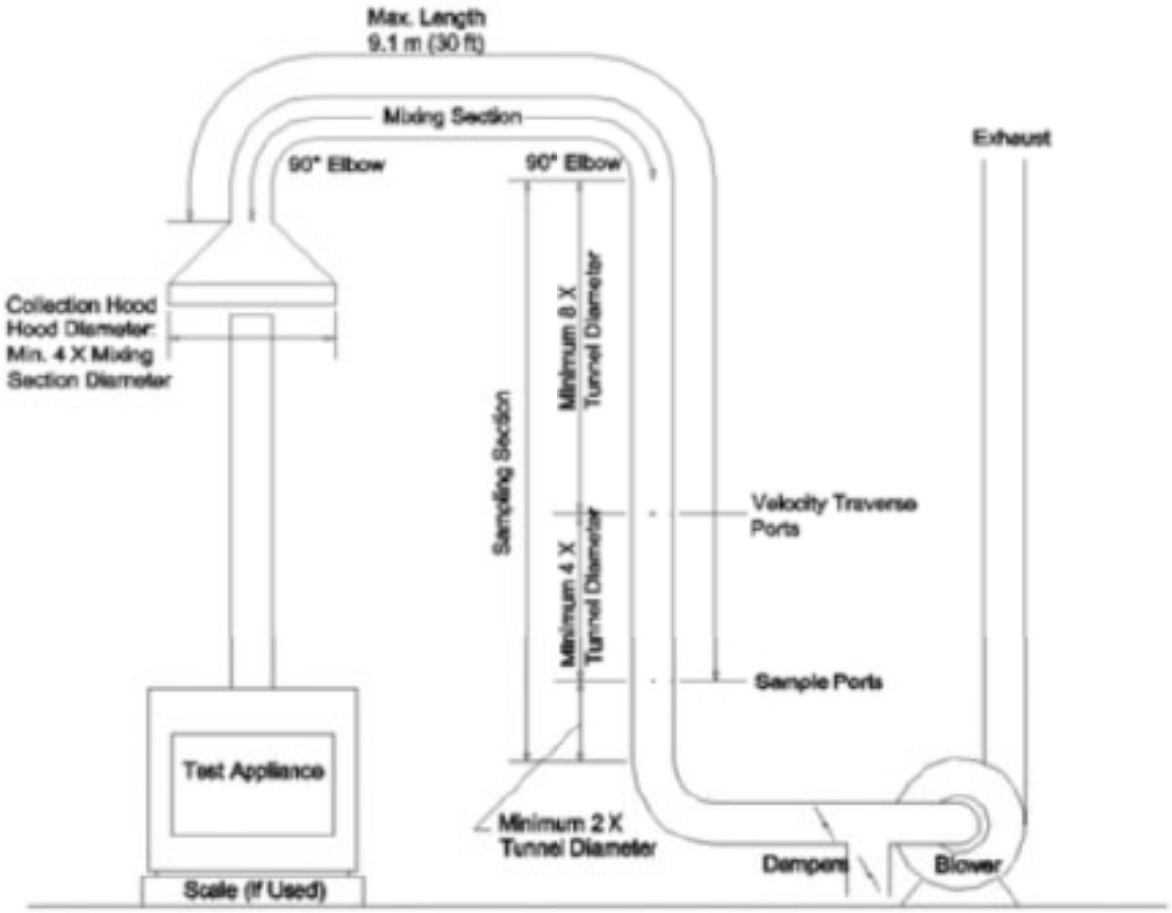


FIG. 3 Steel-Constructed Dilution Tunnel Apparatus

APPENDIX 9: Test load photographs

POLYTESTS
TESTING THROUGH YOUR REALITY

Run 1 June 6th 2022

Kindling

Front view

Coal bed for Load

Load in the stove

POLYTESTS
TESTING THROUGH YOUR REALITY

Run 2 June 7th 2022

Kindling

Pre-burn load

Coal bed for Load

Load in the stove

POLYTESTS
TESTING THROUGH YOUR REALITY

Run 3 June 8th 2022

Kindling

Pre-burn load

Coal bed for Load

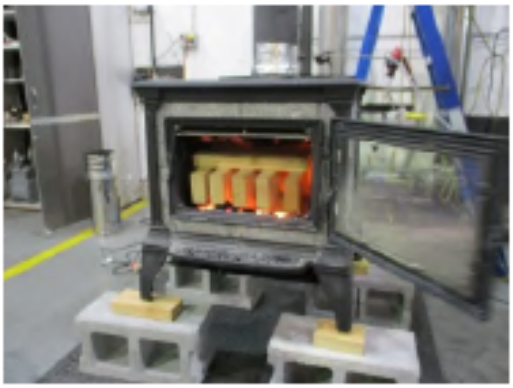
Load in the stove

POLYTESTS
TESTING THROUGH YOUR REALITY

Run 4 June 9th 2022

Kindling

Pre-burn load



Coal bed for Load

Load in the stove

POLYTESTS
TESTING THROUGH YOUR REALITY

Run 5 June 13th 2022

Kindling

Preburn load

Coal bed for Load

Load in the stove

POLYTESTS
TESTING THROUGH YOUR REALITY

Run 6 June 20th 2022

Kindling

Preburn load

Coal bed for Load

Load in the stove

POLYTESTS
TESTING THROUGH YOUR REALITY

Run 6 June 21st 2022

Kindling 	Preburn load 
Coal bed for Load 	Load in the stove 

POLYTESTS
TESTING THROUGH YOUR REALITY

Side view

Front view

Side view

Back view

APPENDIX 10: Laboratory Operating Procedures

POLYTESTS Services inc.

SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

INTRODUCTION

This document provides a step-by-step guide for the technician conducting tests to EPA standard requirements. Procedures outlined here, when followed, will result in tests in conformance with EPA Methods 28R, ASTME2780, ASTME2515, ASTM E2618, Method 28WHH, Method 28 PTS, Method ALT-125, ASMTE 3053, ALT-134, ASTME2779

The primary measurements to be made are particulate emissions rates. The technician's duties include the following steps.

1. Incoming inspection of test units.
2. Set-up of test units.
3. Preliminary testing to establish unit operating procedures and familiarity with operating controls.
4. Calibration of test equipment.
5. Set-up, checking and operation of sampling apparatus.
6. Conduct of tests including complete record keeping and data recording for non-automated functions.
7. Operation of hardware and software included in automatic data acquisition system.
8. Review and analysis of data at test completion to ensure test validity.

The technician running this test must be familiar with the following documents, which are to be kept in the laboratory at all, times.

EPA METHODS

1. EPA METHODS 28R
2. ASTME2780
3. ASTME2515
4. ASTM E2618
5. METHOD 28WHH
6. METHOD 28 PTS
7. ALT-125
8. ASMTE 3053
9. ALT-134
10. ASTME2779

I. APPLIANCE INSPECTION AND SET-UP

A. INCOMING INSPECTION

1. Check for completeness of unit including parts, accessories, installation and operating instructions, drawings and specifications etc. Note any discrepancies or missing parts or information.
2. Check for shipping damage. If damage has occurred, notify the laboratory manager. In some cases, repairs may be made, provided the manufacturer and laboratory manager concur that repairs will not affect the unit's performance. If damage is irrepairable, a new unit will need to be obtained.
3. Note whether unit is catalytic of non-catalytic.
4. Mark unit with manufacturer's name, model number, work order number and date received.
5. If unit is safety listed, note label data including listing agency and serial number. If unit is not listed, mark all data sheets "UNLISTED". Test results will not be released until unit passes safety tests without modification unless authorized by laboratory manager.

B. UNIT SET-UP

1. All new units must be operated for a breaking in period as follows.

    a) Fifty (50) hours at medium burn rate with Douglas Fir scrap or cordwood. Between 18% and 25% MC.

During these break-in runs the unit may be connected to a lab chimney and fuel additions noted into the corresponding data acquisition file. For catalytic units, a thermocouple must be installed in the catalyst.

Record catalyst temperature at 1-hour intervals or on chart recorder. Operating should continue until data shows at least fifty (50) hours of operation with catalyst temperature in excess of 500 degrees Fahrenheit (active range).

For non-catalytic units a stack thermocouple should be installed and stack temperature recorded at 1-hour intervals. 50 hours minimum burn time with a stack temperature of at least 250 degrees Fahrenheit is required.

Once break-in is completed, allow unit to cool. Clean unit thoroughly.

2. Unit is to be placed on scale for testing. Prior to proceeding with verification process, scale should be turned on and allowed to warm up for one (1) hour minimum. Zero scale and check calibration with standard weights. One (1) 1 kg weight and one (1) 2 kg weight are provided for this purpose. Use scale verification test form no. EPA-7-TP to record results. If scale fails to reproduce weights within tolerance, check with laboratory manager before proceeding.
3. If scale checks out, place unit on scale and align so chimney will be centered in hood.
4. Attach chimney connector and chimney. Be sure all joints are sealed below sampling points. Chimney and connector should be cleaned with a wire brush. Be sure chimney connector terminates and chimney starts at proper level above scale platform. Chimney must be supported from scale so that it does not touch test enclosure or hood walls.
5. Thermocouples should be attached to surfaces of unit prior to testing. EPA requires a thermocouple on the bottom of the firebox. This must be installed prior to putting the unit on the scale. In some cases, the required thermocouple locations will be inaccessible on finished units. These units should have thermocouples installed by the manufacturer during construction. Check with the laboratory manager if problems are encountered in proper thermocouple attachment.
6. Measure firebox dimensions and record on data forms nos. EPA-2-TP. Make a three-dimensional sketch of the firebox including firebrick, baffles and obstructions. Calculate firebox volume in cubic feet with both addition and subtraction methods using forms nos. EPA-3-TP and EPA-4-TP. See Section 6.2.4 of EPA Method 28 for details of firebox volume determination.
7. If unit is catalytically equipped, additional thermocouples must be installed upstream and downstream of catalyst. Thermocouples should also be placed in the primary and secondary combustion chambers of all units.
8. Plug thermocouples into data acquisition system jacks making a check of locations and jack numbers for each test on data form no. EPA-5-TP.
9. Note that inserts are tested as if they are freestanding stoves.
10. Dilution tunnel should be cleaned prior to each certification test series and at anytime a higher burn rate follows a lower test burn rate.

II. SAMPLING SYSTEM – SET-UP

A. GAS ANALYSIS

1. Instruments should be turned on and allowed to warm up for one (1) hour minimum.

2. Calibrate analyzers as follows:

   NOTE: Prior to proceeding with calibration, make sure to use NIST traceable calibration gas bottles. Adjust flow meter, if necessary, at each instrument to required flow value.

   a) Using span gas, adjust span control to values specified on calibration gas label.
   b) Using nitrogene, adjust zero controls to provide a 0.00 analyzer readout.
   c) Repeat a) and b) until no further adjustment is required.
   d) Check readout vs. calibration gases (2) labels.

   The CO_2 and CO analyzers are "ZEROED" on nitrogen. The O_2 analyzer is spanned on air and set for 20.9%. It is zeroed on nitrogen as well.

3. Check for response time synchronization.

   a) With no fire in unit, allow reading to stabilize (O_2 should be 20.93, CO and CO_2 should equal O).
   b) Flow the calibration gas in the unit and start stop watch. Note the time required for each unit to reach .90 of the calibration gas bottle value. If all three analyzers reach this value within 15 seconds of each other, synchronization is adequate. If not, contact the laboratory manager. Synchronization is adjusted by internal instrument setting.

4. Set-up sample clean-up and water collection train as follows.

   a) Load impingers as follows:
   Impinger #1: 100 ml distilled water and 5 ml H_2SO_4
   Impinger #2: 100 ml distilled water and 5 ml H_2SO_4
   Impinger #3: Empty
   Impinger #4: 200 – 300 grams silica gel (dry)

   b) Place impingers in container and connect with "U TUBES". Grease carefully on bottom half of ball joint so that grease will not get into tubes.

c) Connect filter to first impinger and sample line to last impinger.

e. Leak check system as follows.

1) Plug probe.
2) Turn on sample system.
3) Observe sample flow rotometer and vacuum gauge. If necessary, use vacuum; adjust valve to set vacuum to the maximum inches Hg.
4) If the float in rotometer does not stabilize below 10 on scale, system must be resealed.
5) Repeat leak check procedure until satisfactory results are obtained.

f) Just prior to starting test, fill impinger container with water and ice and record ambiant conditions on data form no. EPA-8-TP.

B. DILUTION TUNNEL SAMPLE TRAIN SET-UP

1. Filters and holders.

a) Clean probes and filter holder front housings carefully and desiccate for at least 48 hours prior to use.
b) Filters should be numbered and filter and probe combinations labeled prior to use.
c) Weigh desiccated filters and probe-filter units on analytical balance. Record weights data form no. EPA-10-TP. Note that probe and front half of front filter are to be weighed as a unit.
d) Carefully assemble filter holder units and connect to sampling systems. Check "DRIERITE" columns for adequate dry absorbent (blue).

2. Leak checking.

a) Each sample system is to be checked for leakage prior to inserting probes in tunnel.
b) Plug probes and start samplers, adjust pump bypass valve to produce a vacuum reading of 10 inches Hg. (NOTE: During test, vacuum must not exceed 10 inches unless posttest leak check shows acceptable results.)
c) Allow vacuum indication to stabilize for two (2) minutes, then record time and dry gas (DGM_1) and (DGM_2) meter readings. Wait ten (10) minutes and record dry gas meter readings again (DGM_3, DGM_4).

NOTE: If mark, system is leaking too much and all seals should be checked.

d) Calculate leakage rate as follows.

1) System 1: $\frac{(DGM_3 - DGM_1)}{10} = CFM_1$

2) System 2: $\frac{(DGM_4 - DGM_2)}{10} = CFM_2$

If CFM_1 or CFM_2 is greater than .02 CFM, leakage is unacceptable and system must be resealed.

If CFM_1 or CFM_2 is greater than 0.04 X sample rate, leakage is unacceptable. For most tests, the sample rate will be about 0.15 CFM, thus leakage rates in excess of 0.04 X 0.15 = 0.006 CFM are not acceptable. Record leakage rates on form no. EPA-5-TP

e) Once leakage check is satisfactory, unplug probe and set flow to appropriate rate for test. This should be done in the minimum amount of time necessary and with the probes in ambient air. Do not insert probes in tunnel until the start of the test run. When flow is established, replug probes to prevent contamination.

III. TEST CONDUCT

A. FUEL LOAD

1. Determine optimum load weight by multiplying firebox volume in cubic feet by 7 or (10 and 12 for cordwood method). This is the load weight on an as-fired basis.
2. Determine piece size to obtain the requested load configuration and meet the test load weight criteria. The load should consist of the following: **TO BE DETERMINED**
3. Weigh out test load and adjust weight by shortening all pieces equally if necessary. Record individual piece load on form no. EPA-11-TP.

4. Measure and record moisture content of each fuel piece using Delmhorst moisture meter. Determine if fuel load moisture content is in required range. If not, construct new load using wood with required moisture content. All wood in the humidity chamber should be within range. Contact project manager if you cannot find suitable pieces. Record moisture of each individual piece load on form no. EPA-11-TP.

B. UNIT START-UP

1. Before lighting a fire, turn on dilution tunnel and set tunnel velocity to 500ft/min Record readings on data form no. EPA-9-TP.
2. Check draft imposed on cold stove with all inlets closed and a draft gauge in the chimney. If draft is greater than 0.005 inches water column, adjust tunnel to stack gap until draft is less than 0.005.
3. Check for ambient airflow around unit with hot wire anomometer. Must be less than 50 ft/min.
4. Check all equipment for proper operation. Analyzers should be on and in sample mode. Computer should be loaded with test program and awaiting test start command.
5. Zero scale and start fire with uncolored newspaper and kindling representing 10 % of test load with the same type of fuel.
6. Once kindling is burning well after 5 minutes, add splitted pieces having a bottom surface around 4 sq. inches and representing 25% of test load weight. Operate at high fire for 15 minutes. Then adjust settings to intended test run levels as per the manufacturers.
7. Following addition of pretest fuel load (splitted pieces), start computer for data logging.
8. All fuel additions, air intake settings and operational characteristics shall be noted with associated time stamp on form no. EPA-1-TP.

C. TEST RUN

1. Once the targeted test fuel bed weight is obtained, the test is to be started as follows:

   a) Insert the sample probes into the tunnel being careful not to hit sides of tunnel with probe tip.
   b) Check tunnel pitot tube for proper position. (Pitot should be carefully cleaned prior to each test.)
   c) Turn on probe sample systems and stack sampler.
   d) Open stove door, rake coals and load stove as follows: **TO BE DETERMINED**
   e) Close door or follow manufacturer's start-up procedures. (Five (5) minutes maximum time before all doors and controls must be set to final positions for duration of test. 15 minutes or 15% of lad burned allowed for ALT-125 method))
   f) An alarm will sound an audible signal at the (10) minutes intervals. This signals a reading interval. You must verify at each interval that the following readings are correctly logged by the data acquisition system and make observations of any unusual or non-routine events that could occur.

      1) Rotometer readings.
      2) Tunnel pitot tube reading.

(Zero regularly between readings)

      3) Gas meter readings.
      4) Temperature readings.
      5) Draft reading
      6) Test laod weight
      7) CO, CO_2 and O_2 readings
      8) Observations of any unusual or non-routine events.

   g) During the test, any condition approaching unacceptable limits will be noted. The filter probes and housings are installed in small holders just outside the tunnel. If the filter temperature gets too high, you will have to increase the water flow through the cooling unit until acceptable temperatures are obtained. In between readings, check on other equipment. Be sure dryers and filters are working and monitor impinger train for proper water and ice levels etc.

   h) When the fuel charge is consumed, it will signal end of test and shut down the sampling systems. When this occurs,

remove filter holder and probes from tunnel and impingers from sample line.

IV. POST TEST PROCEDURES

A. SAMPLE RECOVERY – FILTER TRAINS

1. Carefully clean outside of probes and filter housings with alcohol.
2. Disassemble filter holder and transfer filters to clean petri dish. Scrape gasket with scalpel and collect any loose material on filters.
3. Place probe and front half of first filter holders (still assembled) and filters in desiccator. Allow 48-hour desiccation before weighing.
4. Weigh probe filter holder units and filters at six (6) hour intervals minimum until weight change between weightings is less than 0.2 mg. Record all weights taken on data form no. EPA-10-TP.

B. CALCULATION OF RESULTS

The computer program carries out all final calculations. When run, it will ask for data from forms used during the test. Enter data as called for.

GENERAL

This guide cannot cover every possible contingency, which may develop during a particular test program. Many questions, which may arise, can be answered by a complete understanding of the test standards and their intent. When in doubt on any detail, check with the laboratory manager and be sure you understand the procedures involved.

It is critical that all spaces on the data forms be properly filled in. Each test must be represented by a complete record of what was done and when.

APPENDIX 11: Sample calculations

Validation du fichier de calcul avec les équations provenant des normes:
ASTM E2515-11
ASTME2618

Dry burn rate (BR)

Equation used

B415.1, 13.4

$$BR = \left[\frac{60W_{WD}}{\theta}\right]\left[\frac{100 - \%M_W}{100}\right]$$

Nomenclature

BR	Dry wood burn rate, kg/hr (lb/hr)
W_{WD}	Total mass of wood burned (wet basis) during the test run, kg (lb)
θ	Total time of test run, minutes
$\%M_W$	Average moisture in test fuel charge, wet basis, %
	To convert from dry basis to wet basis: % moisture wet basis =

Sample calculation

Data

W_{WD}	13,68 lbs
θ	276 min
$\%M_W$	17,73 %

Calculation

BR	1,110 Dry kg/hr

Volume of gas sample corrected to dry standard conditions ($V_{m(std)}$)

Equation used

ASTM 2515, equation 6

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

Nomenclature

$V_{m\,(std)}$	Volume of gas sample , corrected to standard conditions, dscm^3 (dscf)
K_1	17.64 R/in Hg
V_m	Volume of gas sample
Y	DGM calibration factor
P_{bar}	Barometric pressure mmHg (in Hg)
ΔH	Average pressure at the outlet of the dry gas meter mm water (in. Water)
T_m	Absolute average dry gas meter temperature K (R)

Sample calculation

Data

V_m	55,13 dcf
Y	1,005445
P_{bar}	29,97 in Hg
ΔH	-0,7372 in Hg
T_m	542,9 R

Calculation

$V_{m(std)}$	52,66 dscf

Total amount of particulate matter collected (m_n)

Equation used

ASTM 2515, equation 12

$$m_n = F_1 + F_2 + \Delta PF$$

Nomenclature

m_n	Total amount of particulate matter collected, mg
F_1	Particulate matter collected on front filter, mg
F_2	Particulate matter collected on second filter, mg
ΔPF	Post-test weight gain of probe and filter holder assembly, mg

Sample calculation

Data

F_1	0,0005 g
F_2	0,000 g
ΔPF	0,001 g

Calculation

m_n 1,400 mg

Calculation based of train 2 data

Particulate concentration (C_S)

Equation used

ASTM 2515, equation 13

$$C_S = (0{,}001\ g/mg) \times \left(\frac{m_n}{V_{m(std)}}\right)$$

Nomenclature

C_S	Concentration of particulate matter in stack gas or dilution tunnel, dry basis, corrected to standard conditions, g/dsm^3 (g/dscf)
m_n	Total amount of particulate matter collected in the sampling train, mg
$V_{m(std)}$	Volume of gas sample measured corrected to dry standard conditions, dsm^3 (dscf)

Sample calculation

Data

m_n	1,400 mg
$V_{m(std)}$	52,66 dscf

Calculation

C_s	0,000027 g/dscf

Calculation based of train 2 data

Particulate concentration for room air (C_r)

Equation used

ASTM 2515, equation 14

$$C_r = (0{,}001\ g/mg) \times \left(\frac{m_r}{V_{mr\,(std)}}\right)$$

Nomenclature

C_r	Concentration of particulate matter in room air, dry basis, corrected to standard conditions, g/dsm^3 (g/dscf)
m_r	Total amount of particulate matter collected in the sampling train, mg
$V_{mr(std)}$	Volume of room air sample measured corrected to dry standard conditions, dsm^3 (dsc

Sample calculation

Data

m_r	0,100 mg
$V_{mr(std)}$	45,16 dscf

Calculation

C_r 0,000002 g/dscf

Calculation based of train 2 data

Adjustment factor for alternative pitot tube placement (FP)

Equation used

ASTM 2515, equation 1

$$F_P = \frac{V_{strav}}{V_{scent}}$$

Nomenclature

V_{strav}	Average gas velocity caclulated after the Pitot tube traverse
V_{scent}	Average gas velocity at the center of the dilution tunnel cacluated after the multi-point Pitot traverse
F_P	Adjustment factor for center of tunnel pitot tube placement

Sample calculation

Data

V_{strav}	0,251288223
V_{scent}	0,263826821

Calculation

F_P	0,953197

Average dilution tunnel gas velocity (V_S)

Equation used

ASTM 2515, equation 9

$$V_S = F_p K_p C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_S}{P_S M_S}}$$

Nomenclature

V_S	Average dilution tunnel gas velocity, m/s (ft/s)
K_p	Pitot tube constant For the metric units: $34.97\ m/sec \left[\frac{\left(\frac{g}{g-mole}\right)(mm\ Hg)}{(°K)(mm\ H_2O)}\right]^{1/2}$ For English units: $85.49\ ft/sec \left[\frac{\left(\frac{lb}{lb-mole}\right)(in\ Hg)}{(°R)(in\ H_2O)}\right]^{1/2}$
C_p	Pitot tube coefficient (use 0.99 for standard pitot tube, 0.84 may be used for S-type tubes constructed according to Method 2 specifications)
F_p	Pitot tube correction factor
$\left(\sqrt{\Delta P}\right)_{avg}$	Average square root of each individual velocity head (ΔP)
P_{bar}	Barometric pressure at measurement site, mm H_2O (in. H_2O)
P_g	Stack static pressure, mm Hg (in. Hg)
P_S	Absolute dilution tunnel static gas pressure, mm Hg (in. Hg), or $P_{bar} + P_g$
M_S	Molecular weight of dilution tunnel gas, wet basis, g/g-mole (lb/lb-mol) may be assumed to be 28.78 or 29 for CSA B415
t_S	Dilution tunnel temperature, °C (°F)
T_S	Absolute dilution tunnel temperature, °K (°R), or 273 + t_s for metric units, 460 + t_s for English units

Sample calculation

Data

K_p	85,49
C_p	0,99
F_p	0,953
$\left(\sqrt{\Delta P}\right)_{avg}$	0,2739 in $H_20^{1/2}$
P_{bar}	29,97 in Hg
P_g	0,27 in H_20
P_S	29,99 in Hg
M_S	29 lb/lb-mol
t_S	86,45 F
T_S	546,45 R

Calculation

V_S	17,5171 ft/s

Average dilution tunnel gas flow rate (Qstd)

Equation used

ASTM 2515, equation 3

$$Q_{std} = 60(1 - B_{WS})V_S A\left(\frac{T_{std}}{T_S}\right)\left(\frac{P_S}{P_{std}}\right)$$

Nomenclature

Q_{std}	Total gas flow rate corrected to dry standard conditions, dsm^3/min (dscf/min)
60	Conversion factor minutes per hour
B_{WS}	Water vapour in the dilution tunnel stream, proportion by volume (may be assumed to be 2%)
V_S	Average dilution tunnel gas velocity, m/s (ft/s)
A	Cross-sectional area of dilution tunnel, m^2 (ft^2)
T_{std}	Standard absolute temperature, 293 °K (528°R)
T_S	Absolute average dilution tunnel temperature, °K (°R), or 273 + t_s for metric units, 460 + t_s for English units
t_S	Dilution tunnel temperature, °C (°F)
P_S	Absolute dilution tunnel static gas pressure, mm Hg (in. Hg), or $P_{bar} + P_g$
P_{bar}	Barometric pressure at measurement site, mm Hg (in. Hg)
P_g	Dilution tunnel static pressure, mm Hg (in. Hg)
P_{std}	Standard absolute pressure, 760 mm Hg (29.92 in. Hg)

Sample calculation

Data

B_{WS}	0,02
V_S	17,517
A	0,349 ft^2
T_{std}	528 R
T_S	546,45 R
P_S	29,993 in Hg
P_{std}	29,92 in Hg

Calculation

Q_{std}	348,25 dscf/min

Particulate emission rate (E)

Equation used

$$E = (C_S - C_r)Q_{std}$$

Nomenclature

E	Particulate emission rate, g/hr
C_S	Concentration of particulate matter in stack gas or dilution tunnel gas, dry basis corrected to standard conditions, g/dscm^3 (g/dscf)
C_r	Concentration of particulate matter in room air, g/dscm^3 (g/dscf)
Q_{std}	Total gas flow rate, dry basis corrected to standard conditions, dsm^3/min (dscf/min)

Sample calculation

Data

C_S	0,000027 g/dscf
C_r	0,000002 g/dscf
Q_{std}	348,25 dscf/min

Calculation

E	0,01 g/min
E	0,51 g/h

Calculation based on train 2 data.

Total particulate emission rate (E_T)

Equation used

ASTM 2515, equation 15

$$E_T = (C_S - C_r)Q_{std}\theta$$

Nomenclature

E_T	Total particulate emission, g
C_S	Concentration of particulate matter in stack gas or dilution tunnel gas, dry basis corrected to standard conditions, g/dscm^3 (g/dscf)
C_r	Concentration of particulate matter in room air, g/dscm^3 (g/dscf)
Q_{std}	Total gas flow rate, dry basis corrected to standard conditions, dsm^3/min (dscf/min)
θ	Total sampling time, min

Sample calculation

Data

C_S	0,000027 g/dscf
C_r	0,000002 g/dscf
Q_{std}	348,25 dscf/min
θ	276 min

Calculation

E	2,34 g

Calculation based on train 2 data.

Average gas velocity in dilution tunnel during each min interval, i, of the test run

Equation used

ASTM 2515, equation 10

$$v_{si} = F_p K_p C_p \sqrt{\Delta p_i} \sqrt{\frac{T_{si}}{P_s M_s}}$$

Nomenclature

v_{si}	Average gas velocity in dilution tunnel during each min interval, i of the test run m/sec (ft/sec)
F_p	Pitot tube correction factor
K_p	Pitot tube constant For the metric units: $34.97\ m/sec \left[\frac{\left(\frac{g}{g\text{-}mole}\right)(mm\ Hg)}{(°K)(mm\ H_2O)}\right]^{1/2}$ For English units: $85.49\ ft/sec \left[\frac{\left(\frac{lb}{lb\text{-}mole}\right)(in\ Hg)}{(°R)(in\ H_2O)}\right]^{1/2}$
C_p	Pitot tube coefficient (use 0.99 for standard pitot tube, 0.84 may be used for S-type tubes constructed according to Method 2 specifications)
Δp_i	interval, i, of the test run
T_{si}	Absolute average gas temperature in the dilution tunnel during the i^{th} minutes
P_s	Absolute dilution tunnel static gas pressure, mm Hg (in. Hg), or $P_{bar} + P_g$
M_s	Molecular weight of dilution tunnel gas, wet basis, g/g-mole (lb/lb-mol) may be assumed to be 28.78

Sample calculation

Data

i=1		i=2	
F_p	0,953	F_p	0,953
K_p	85,49	K_p	85,49
C_p	0,99	C_p	0,99
Δp_i	0,073 in H_2O	Δp_i	0,074 in H_2O
T_{si}	548,2 R	T_{si}	547,3 R
P_s	29,99 in Hg	P_s	29,99 in Hg
M_s	29 lb/lb-mol	M_s	29 lb/lb-mol

Calculation

i=1		i=2	
v_{si}	17,34 ft/sec	v_{si}	17,42 ft/sec

Percent of proportional sampling rate (PR)

Equation used

B415, equation 13.1

$$PR = \left(\frac{\theta V_{mi\,(std)} V_S T_m T_{SI}}{\theta_i V_m V_{St} T_{mi} T_S} \right) \times 100$$

Nomenclature

PR	Percent of proportional sampling rate (%)
θ	Total sampling time, min
θ_i	Time of interval, 1 min
V_m	Volume of gas sample measured by the DGM, dsm^3 (dscf)
$V_{mi(std)}$	Volume of gas sample measured by the digital mass flow controller during the i^{th} 1 minutes interval, dsm^3 (dscf)
V_S	Average gas velocity in the dilution tunnel, ft/min
V_{Si}	Average gas velocity in the dilution tunnel during the i^{th} 10 minutes interval, ft/min
T_m	Absolute average digital mass flow controller temperature, K (R)
T_{mi}	Absolute average digital mass flow controller temperature during the i^{th} 1 minutes
T_S	Absolute average gas temperature in the dilution tunnel, K (R)
T_{Si}	Absolute average gas temperature in the dilution tunnel during the i^{th} 1 minutes

Sample calculation

Data

train =1			train =2		
θ	276	min	θ	276	min
θ_i	1	min	θ_i	1	min
V_m	54,19	dcf	V_m	52,68	dcf
$V_{mi(std)}$	0,194	cuft	$V_{mi(std)}$	0,1901	cuft
V_S	17,53	ft/sec	V_S	17,53	ft/sec
V_{Si}	17,352	ft/sec	V_{Si}	17,352	ft/sec
T_m	538,1	R	T_m	542,9	R
T_{mi}	535,58	R	T_{mi}	536,32	R
T_S	546,45	R	T_S	546,45	R
T_{Si}	548,2	R	T_{Si}	548,2	R

Calculation

train=1		train=2	
PR	100,6 %	PR	102,2 %

Filter face velocity check

Equation used

$$FV_{max} = \frac{V_{mL}}{1} \times \frac{1}{F_A}$$

Nomenclature

FV_{max}	Maximum filter face velocity during the test run, m/min (ft/min)
V_{mL}	Largest 1 minute interval metered gas volume value recorded during the test run, dm^3 (dcf)
F_A	Filter area exposed to gas sample during train operation, m2 (ft^2)

Sample calculation

Data

V_{mL}	0,189 dcf
F_A	0,0116 ft^2

Calculation

FV_{max}	16,26 ft/min

Dual train precision

Equation used

$$\frac{Train\ 1 - average\ train\ 1\ and\ train\ 2}{average\ train\ 1\ and\ train\ 2} \times 100 \leq 7.5\%$$

Nomenclature

Dual train precision	Deviation between emission's train 1 and 2
Train 1	Total emission for train 1
Train 2	Total emission for train 2

Sample calculation

Data

Train 1	2,27 g
Train 2	2,34 g

Calculation

Dual train precision	1,54 %

Analyzer drift checks

Equation used

$$Drift = \frac{\Delta R}{span} \times 100$$

Nomenclature

Drift	The change in analyzer response to calibration gas over the duration of the test run
ΔR	The difference between the analyzer response at the end of the test run and the
Span	The upper limit of the instrument range, ppmv or %

Sample calculation

Data

ΔR	0,015 %
Span	5 %

Calculation

Drift	0,30 %

Calculated with CO concentration values.

APPENDIX 12: Volume calculations

hearthstone

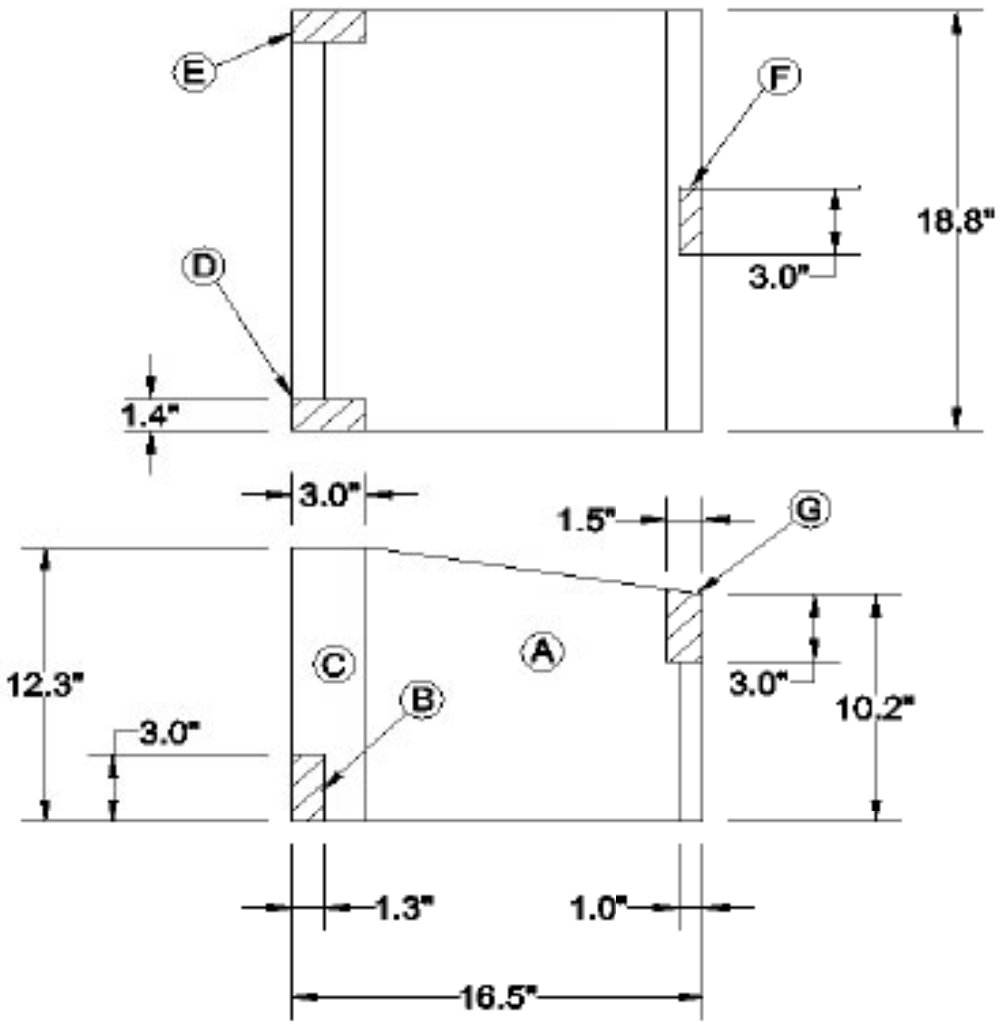
Model: 8031

Date: 6/28/2017

Test Engineer: JWHITE

Firebox Volume and Fuel Load Calculation

Firebox Volume Sketch



NOT TO SCALE

Area	Add/Subtract (+/-)	Height (in)	Width (in)	Length (in)	Volume (cuft)
A	+	11.3	13.5	18.8	1.6597
B	-	3	1.3	16	-0.0361
C	+	12.3	3	18.8	0.4015
D	-	12.3	3	1.4	-0.0299
E	-	12.3	3	1.4	-0.0299
F	-	7.2	1	3	-0.0125
G	-	3	1.5	18.8	-0.0490
H					0.0000
I					0.0000
J					0.0000

	Test Fuel Load (lbs)		
Total Firebox Volume (cuft)	Lower (lbs)	Ideal (lbs)	Upper (lbs)
1.9038	11.99	13.33	14.66

Crib Construction	2 X 4 and 4 X 4

Firebox Length:	18.80	in
Door Opening Width	15.40	in
Nominal Test Fuel Piece Length (5/6 of Firebox Length):	15.67	in
Actual Piece Length Used:	14.00	in

APPENDIX 13: Operating instruction

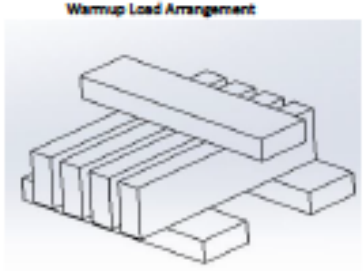
hearthstone

MODEL: 8001
DATE: 5/15/2017
TEST ENGINEER: WE

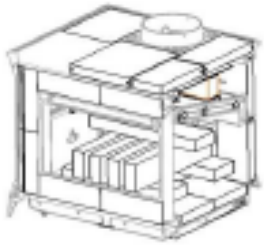
WOOD STOVE OPERATING INSTRUCTIONS

BURN RATE CATEGORY	KINDLING	FIRST WARM UP	SECOND WARM UP AND PREBURN	PREBURN START	AIR SETTINGS	TEST FAN SETTING	COAL BED PREP	TEST LOAD	START OF TEST
LOW .8KGH	3 LBS, BURN TO ABOUT 1.25 LBS	12-14" LG 2X4 @ 11.9 TO 14.5 LBS KEEP DOOR OPENED UNTIL ALL WOOD IS FULLY INVOLED, BURN TO 3 LBS	12-14" LG 2X4 @ 11.9 TO 14.5 LBS KEEP DOOR OPENED UNTIL ALL WOOD IS FULLY INVOLED, BURN TO UP COAL BED RANGE	.9LBS ABOVE COAL BED RANGE (UP RANGE), CLOSE BYPASS, SET PRIMARY AIR TO TEST SETTING	WARMUP SET AIR TO FULL OPEN, AT PREBURN START SET AIR TO "LOW"	FAN OFF FOR WARMUP, FAN ON LOW FOR PREBURN AND TEST	BREAK UP COALS AND LEVEL, TO **MAX** HEIGHT OF DOOR SILL, MAKE EVEN DENSITY AND HIGHT, FRONT TO BACK AND SIDE TO SIDE 2 MIN BEFORE START OF TEST	3 PCS 2X4 AND 2 PCS 4X4 CUT 15" LG (14.7" MIN) @11.9 TO 14.6LBS WITH 13.3LBS IDEAL	AT AVG TEMP OF APROX 415F AND OR MIN 1 HR, OPEN BYPASS AND PRIMARY, INSERT WOOD, CLOSE LOAD DOOR. @ 5 MIN CLOSE BYPASS AND SET PRIMARY TO "LOW", KEEP LPAO CLEAR TO TEST LOAD
MED LOW .9KGH	3 LBS, BURN TO ABOUT 1.25 LBS	12-14" LG 2X4 @ 11.9 TO 14.5 LBS KEEP DOOR OPENED UNTIL ALL WOOD IS FULLY INVOLED, BURN TO 3 LBS	12-14" LG 2X4 @ 11.9 TO 14.5 LBS KEEP DOOR OPENED UNTIL ALL WOOD IS FULLY INVOLED, BURN TO UP COAL BED RANGE	.8LBS ABOVE COAL BED RANGE (UP RANGE), CLOSE BYPASS, SET PRIMARY AIR TO TEST SETTING	WARMUP SET AIR TO FULL OPEN, AT PREBURN START SET AIR TO 3/8"	FAN OFF FOR WARMUP, FAN ON LOW FOR PREBURN AND TEST	BREAK UP COALS AND LEVEL, TO **MAX** HEIGHT OF DOOR SILL, MAKE EVEN DENSITY AND HIGHT, FRONT TO BACK AND SIDE TO SIDE 2 MIN BEFORE START OF TEST	3 PCS 2X4 AND 2 PCS 4X4 CUT 15" LG (14.7" MIN) @11.9 TO 14.6LBS WITH 13.3LBS IDEAL	AT AVG TEMP OF APROX 430F AND OR MIN 1 HR OPEN BYPASS AND PRIMARY, INSERT WOOD, CLOSE LOAD DOOR. @ 5 MIN CLOSE BYPASS AND SET PRIMARY TO 3/8", KEEP LPAO CLEAR OF COALS IN FRONT OF TEST LOAD
MED HIGH 1.4KGH	3 LBS, BURN TO ABOUT 1.25 LBS	12-14" LG 2X4 @ 11.9 TO 14.5 LBS KEEP DOOR OPENED UNTIL ALL WOOD IS FULLY INVOLED, BURN TO 3 LBS	12-14" LG 2X4 @ 11.9 TO 14.5 LBS KEEP DOOR OPENED UNTIL ALL WOOD IS FULLY INVOLED, BURN TO UP COAL BED RANGE	1.4LBS ABOVE COAL BED RANGE (UP RANGE), CLOSE BYPASS, SET PRIMARY AIR TO TEST SETTING	WARMUP SET AIR TO FULL OPEN, AT PREBURN START SET AIR TO 3/4"	FAN OFF FOR WARMUP, FAN ON LOW FOR PREBURN AND TEST	BREAK UP COALS AND LEVEL, TO **MAX** HEIGHT OF DOOR SILL, MAKE EVEN DENSITY AND HIGHT, FRONT TO BACK AND SIDE TO SIDE 2 MIN BEFORE START OF TEST	3 PCS 2X4 AND 2 PCS 4X4 CUT 15" LG (14.7" MIN) @11.9 TO 14.6LBS WITH 13.3LBS IDEAL	OPEN BYPASS AND PRIMARY, INSERT WOOD, CLOSE LOAD DOOR. CLOSE BYPASS @ 5 MIN SET PRIMARY TO 3/4", KEEP LPAO CLEAR OF COALS IN FRONT OF TEST LOAD
HIGH 1.9KGH	3 LBS, BURN TO ABOUT 1.25 LBS	12-14" LG 2X4 @ 11.9 TO 14.5 LBS KEEP DOOR OPENED UNTILL ALL WOOD IS FULLY INVOLED, BURN TO 3 LBS	12-14" LG 2X4 @ 11.9 TO 14.5 LBS KEEP DOOR OPENED UNTIL ALL WOOD IS FULLY INVOLED, START PREBURN	START WHEN SECOND WARMUP LOAD IS ADDED,CLOSE BYPASS, SET PRIMARY AIR TO TEST SETTING	WARMUP SET AIR TO FULL OPEN, AT PREBURN START SET AIR TO "FULL OPEN"	FAN OFF FOR WARMUP, FAN ON HIGH FOR PREBURN AND TEST	BREAK UP COALS AND LEVEL, TO **MAX** HEIGHT OF DOOR SILL, MAKE EVEN DENSITY AND HIGHT, FRONT TO BACK AND SIDE TO SIDE 2 MIN BEFORE START OF TEST	3 PCS 2X4 AND 2 PCS 4X4 CUT 15" LG (14.7" MIN) @11.9 TO 14.6LBS WITH 13.3LBS IDEAL	OPEN BYPASS AND PRIMARY, INSERT WOOD, CLOSE LOAD DOOR. CLOSE BYPASS AND SET PRIMARY TO "FULL OPEN", KEEP LPAO CLEAR OF COALS IN FRONT OF TEST LOAD

Warmup Load Arrangement

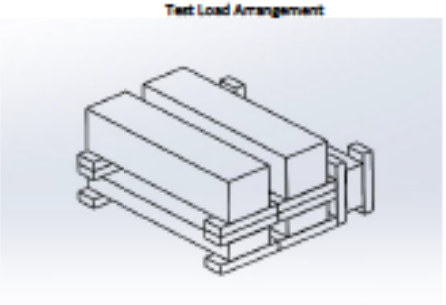


Warmup Load In Stove

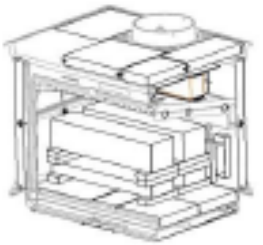


LONGEST PICES ON BOTTOM, TOP AND SIDES OF RISER TUBE SET WOOD LOAD TO BACK OF STOVE WITH PIECES ON EDGE SPACED 1/2" TO 3/4" APART AND CENTERED. PLACE UP TO 6 PCS ON EDGE, REMAINING PCS ON TOP

Test Load Arrangement

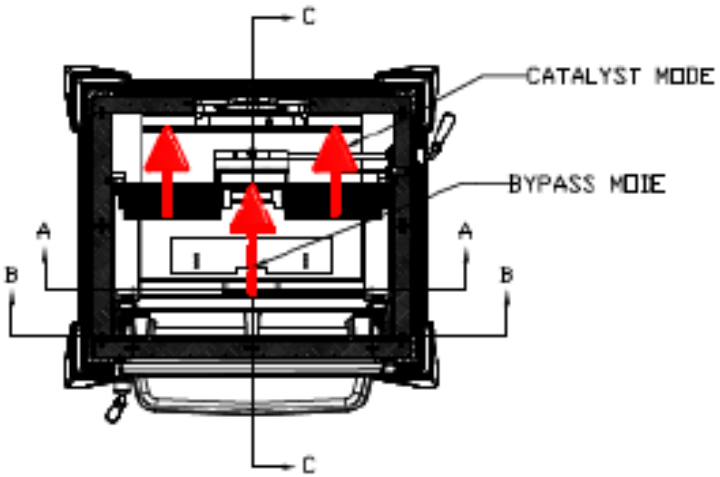


Test Load In Stove



SET WOOD LOAD TO BACK OF STOVE
DO NOT CRUSH COAL BED

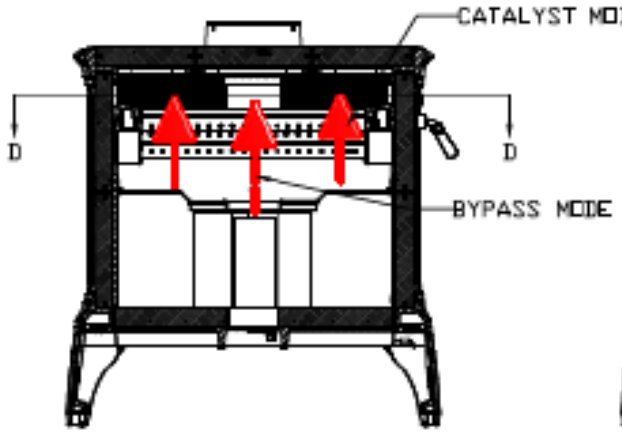
APPENDIX 14: Drawing Air flow pattern



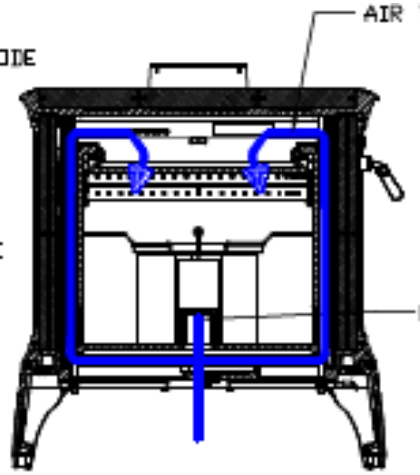
SECTION D

INLET

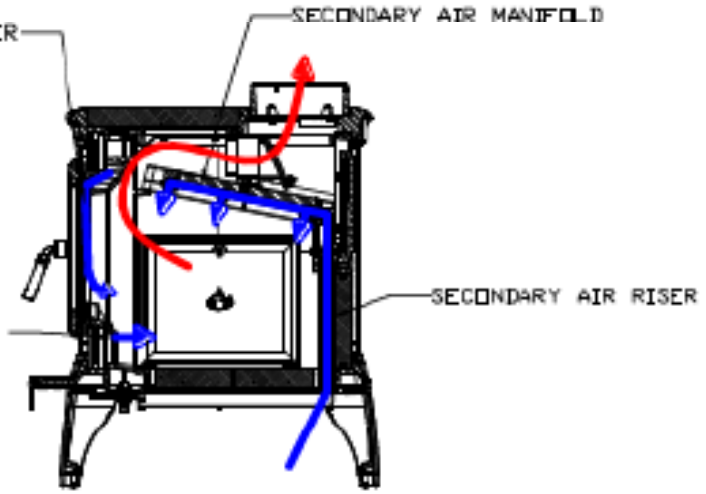
OUTLET



SECTION A



SECTION B



SECTION C

APPENDIX 15: Notice, CoC, WHA, others

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
30-DAY NOTIFICATION FORM
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

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 and 60.5475. 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.

- **The manufacturer of an affected wood/pellet heater/central heater model line must notify the Administrator of the date that certification testing is scheduled to begin by email to WoodHeaterReports@epa.gov.**
- **This notice must be received by the EPA at least 30 days before the start of testing.**

GENERAL INFORMATION						
Manufacturer's Name: Hearthstone QHHP						
Appliance 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 Type:	☒ Crib	☐ Pellet	☐ Cordwood	☐ Other:		
Model Name and Number: Castleton 8031						
Catalyst: ☒ **Yes** ☐ **No**						
Mailing Address: 317 Stafford Ave						
Street Address: 317 Stafford Ave						
City: Morrisville	**State:** VT	**ZIP Code:** 05661				
Phone: 802 851 4044	**Fax:** N/A	**Web Site:** www.hearthstonestoves.com				
Address of Manufacturing Facility: 317 Stafford Ave						
City: Morrisville	**State:** VT	**ZIP Code:** 05661				
EPA APPROVED TEST LABORATORY						
Name and Title of Authorized Representative: Danick Power						
Company: Services Polytests inc.						

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
30-DAY NOTIFICATION FORM
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

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- **This notice must be received by the EPA at least 30 days before the start of testing.**

Phone: 450 741-3636	**E-mail: Dpower@polytests.com**	**Fax: NA**
City: St-jean-sur-richelieu	**State: Canada, Quebec**	**ZIP Code: J3B 7S7**

EPA APPROVED THIRD-PARTY CERTIFIER

Name and Title of Authorized Representative: John Steinert, General Manager, Portland Laboratory

Company: PFS-TECO, Inc.

Phone: 580 650 0088	**E-mail:** john.steinert@pfsteco.com	**Fax:** N/A
City: Clackamas	**State:** OR	**ZIP Code:** 97015

COMPLIANCE TEST INFORMATION

Test Method(s): EPA Method 28R, ASTM E2515-11, ASTM E2780, CSA B415.1-10 **RECERTIFICAITON TEST and CATALYST EQUIVALENCY TESTING**

Date(s) of Proposed Test: June 6th through June 17th 2022

Testing Location:

Polytests Services Inc.
695 B rue Gaudette,
St-Jean-sur-Richelieu
Québec, Canada, J3B 7S7
450.741.3636

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
30-DAY NOTIFICATION FORM
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

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 and 60.5475. 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.

- **The manufacturer of an affected wood/pellet heater/central heater model line must notify the Administrator of the date that certification testing is scheduled to begin by email to WoodHeaterReports@epa.gov.**
- **This notice must be received by the EPA at least 30 days before the start of testing.**

Simon Booth, Engineering Lab Manager
Print Name and Title of Authorized Official

Simon Booth
Signature

4/26/2022
Date

Remarks:

The Castleton 8031 is a "Hybrid"-type appliance, incorporating both a secondary combustion system and a catalyst, and should be listed as such.

This testing is to recertify the Castleton 8031 before it's expiration of the current certification letter number 107-17. Additionally the recertification testing is to address deficiencies identified by ADEC, and to satisfy their requirement for retest to gain inclusion to the ADEC list of approved devices for special attainment zones.

This testing is also to certify an alternative catalyst.

v1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

OFFICE OF
COMPLIANCE

DEC 15 2016

Chris Neufeld
Vice President
Blaze King Industries, Inc.
146 A Street
Walla Walla, Washington 99362

RE: Blaze King Industries, Inc. (Blaze King) Request for Catalyst Suitable Replacement Procedures

Dear Mr. Neufeld:

This letter is in response to the February 3, 2016, Blaze King letter requesting the United States Environmental Protection Agency (EPA) implement a program to allow catalyst equipped wood heater manufacturers and suppliers to seek suitable replacement status during the life cycle of the product. As discussed below, replacement catalysts may be used if equivalency is properly demonstrated.

To have a catalyst deemed suitable for replacement, equivalency testing must be conducted by an EPA-approved test laboratory. Consistent with the 2015 Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces (Subpart AAA) (2015 Standards), the manufacturer must notify the EPA of the date that certification testing (catalyst equivalency testing) is scheduled to begin as stated in Section 60.534(g). This notice must be received by the EPA at least 30 days before the start of testing. EPA will consider the following steps to be adequate to demonstrate replacement catalyst equivalency:

1) The manufacturer uses the same test method as the original certification test was conducted. If the original certification test method is no longer valid, the manufacturer requests an alternative test method prior to testing.

2) The replacement catalyst is aged 50 hours prior to catalytic equivalency testing. The catalyst is tested in the same model or model line unit in which the original catalyst was tested.

3) Both a Category 1 run and Category 4 run are conducted by an EPA-approved test laboratory.

4) The new Category 1 run is compared to the original Category 1 run, and the new Category 4 run is compared to the original Category 4 run. The new runs are not more than 0.5 grams/hour greater than the original certification test results for each run. They are compared separately, with no averaging. In equation form:

Replacement catalyst category 1 ≤ (original catalyst category 1 + 0.5g/hr)

AND

Replacement catalyst category 4 ≤ (original catalyst category 4 + 0.5g/hr)

As noted in Section 60.533(k)(4)[1], the EPA Administrator must approve the change in the catalyst in advance, with proper documentation of the equivalency testing. This documentation consists of the original certification test report category 1 and 4 data and the new category 1 and 4 test data results. All demonstration test data must be sent to WoodHeaterReports@epa.gov within 60 days after the date of completing the test. EPA considers the catalyst equivalency testing to be a form of certification testing governed by the provisions in Section 60.534.

The EPA finds the request outside the scope of an applicability determination. The term "applicability determination" is limited to the Agency's formal decisions, issued in response to a non-hypothetical and site-specific request about the applicability of a specific rule to a specific facility. Therefore, the EPA considers this response to be a regulatory interpretation to a source request for clarification.[2]

This response has been prepared in consultation with the Office of Air Quality, Planning, and Standards, and the Office of General Counsel. If you have any questions, please contact Rafael Sanchez of my staff at 202-564-7028 or email at sanchez.rafael@epa.gov.

Sincerely,

Edward J. Messina

Edward J. Messina, Director
Monitoring, Assistance, and Media Programs Division
Office of Compliance

[1] A change in the make, model or composition of a catalyst is presumed to affect particulate matter and carbon monoxide emissions and efficiency, unless the change has been requested by the heater manufacturer and has been approved in advance by the Administrator, based on test data that demonstrate that the replacement catalyst is equivalent to or better than the original catalyst in terms of particulate matter emission reduction.
[2] This regulatory interpretation updates EPA Applicability Determination WDS-138 (July 6, 1990).

cc: Amanda Aldridge, OAQPS
Adam Baumgart-Getz, OAQPS
Mike Toney, OAQPS
Scott Jordan, OGC
Sara Ayres, OC

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

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2015 STANDARDS OF PERFORMANCE FOR NEW RESIDENTIAL WOOD HEATERS, NEW RESIDENTIAL HYDRONIC HEATERS AND FORCED-AIR FURNACES

GENERAL INFORMATION

Manufacturer's Name: Hearthstone Quality Home Heating Products

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) ASTM E2780-10 ; ASTM E2515-11 methods 28R as referred into 40 CFR

Catalyst: Yes

Model Name and Design Number (The model name and design number must clearly distinguish one model from another. The name and design number cannot include the EPA symbol or logo or name or derivatives such as "EPA):
Castleton 8031

Physical Address (Street number and Address, not P.O. Box): **317 Stafford Ave**	**Mailing Address:** **317 Stafford Ave**	
City: Morrisville	**State: VT**	**ZIP Code: 05661**
Phone:1-802-851-4044	**Email:** **warm@hearthstonestoves.com**	**Website:** **https://www.hearthstonestoves.com/**

EPA Submission Date of 30 day Notice: 4/26/2022

MANUFACTURER'S AUTHORIZED REPRESENTATIVE INFORMATION

Name: SIMON BOOTH

Position/Title: ENGINEERING MANAGER

Address: 317 STAFFORD AVE

City: MORRISVILLE	**State: VT**	**ZIP Code: 05661**
Phone: 802-851-4044	**E-mail:** **SBOOTH@HEARTHSTONESTOVES.COM**	**Website:** **https://www.hearthstonestoves.com/**

Remarks:

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

EPA-APPROVED TEST LABORATORY		
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		
Name of Person Authorized or Responsible for Reviewing Test Report and/or Issuing Certification of Conformity: John Steinert		
Position/Title: Laboratory Manager		
Address: 11785 Highway 212. Ste. 305		
City: Clackasmas	**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

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). Manufacturers may use assembly or design drawings that have been prepared for other purposes, but must designate on the drawings the dimensions of each component listed in paragraph (k) of this section. Manufacturers must identify tolerances of components listed in paragraph (k)(2) of 60.533(b) and 60.5475(b) that are different from those specified in that paragraph, and show that such tolerances cannot reasonably be anticipated to cause wood heaters in the model line to exceed the applicable emission limits. The drawings must identify how the emission-critical parts, such as air tubes and catalyst, can be readily inspected and replaced.

Engineering drawings and specifications of components that may affect emissions are included with the CBI certification report. Dimensions and tolerances are in line with 60.533 (b), and our quality assurance plan and quality inspection sheets ensure on-going quality and conformance. Replacement instructions for emission-critical components are included in our operator's manual.

2. Firebox Statement Requirement

A statement whether the firebox or any firebox component (including the materials listed in paragraph (k)(3) of 60.533(b) and 60.5475(b) will be composed of material different from the material used for the firebox or firebox component in the wood heater on which certification testing was performed, a description of any such differences and demonstration that any such differences may not reasonably be anticipated to adversely affect emissions or efficiency.

All K-list items as described in 60.533 (b) on the certification test unit will be similar in all material respects to the production units.

3. CBI

Clear identification of any claimed confidential business information (CBI). Submit such information under separate cover to the EPA CBI Office; Attn: Residential Wood Heater Compliance Program Lead, 1200 Pennsylvania Ave., NW, Room 7138, MS:2227A, Washington, DC 20460. **Note that all emissions data, including all information necessary to determine emission rates in the format of the standard, cannot be claimed as CBI.**

A CBI and Non-CBI report will be provided separately.

4. Valid Certification Statement

All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results. Documentation must include the items specified in the applicable test methods. Documentation must include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed and why. The burn rate for the low burn rate category must be no greater than the rate that an operator can achieve in home use and no greater than is advertised by the manufacturer or retailer. The test report must include a summary table that clearly presents the individual and overall emission rates, efficiencies and heat outputs. Submit the test report and all associated required information, according to the procedures for electronic reporting specified in § 60.537(f) and 60.5475(f).

A valid certification test report with all required documentation as specified above has been submitted by Polytests.

5. Warranties

A copy of the warranties for the model line, which must include 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.

The warranty is detailed in the Operator's manual, which is provided with Polytest's report.

6. Q/A Statement

A statement that the manufacturer will conduct a quality assurance program for the model line that satisfies the requirements of paragraph (m) of this section.

Hearthstone is contracted with PFS-Teco as our third party certifier to review our QA/QC program, and to provide at least annual audits. Hearthstone's QA plan is included with the certification report.

7. Laboratory Sealing of Unit

A statement describing how the tested unit was sealed by the laboratory after the completion of certification testing and asserting that such unit will be stored by the manufacturer in the sealed state until 5 years after the certification test.

The unit has been sealed by Polytests and will be transferred back to Hearthstone. Hearthstone will store the unit in a sealed state for at least five years.

8. Statements that the wood heaters manufactured under this certificate will be—

(i) 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) Accompanied by an owner's manual that meets the requirements in § 60.536 and 60.5478. In addition, a copy of the owner's manual must be submitted to the Administrator and be available to the public on the manufacturer's web site.

i) The tested unit is the same in all material respects that would affect emissions to production units, and production units will be labeled in accordance with 60.536

(i) (ii) All production units will include a copy of the owner's operation/installation manual that meets the requirements as specified in 60.536. A copy of the owner's manual has been provided with the report, and will be made available on Hearthstone's website once the unit is available for sale.

9. Third Party Certification Statement

A statement that the manufacturer has entered into contracts with an approved laboratory and an approved third-party certifier that satisfy the requirements of paragraph (f) of this section.

Hearthstone is contracted with PFS-Teco as our third party certifier.

10. Approved laboratory/third party Statement

A statement that the approved laboratory and approved third-party certifier are allowed to submit information on behalf of the manufacturer, including any claimed to be CBI.

Polytests and PFS-Teco are allowed to submit information related to EPA emissions testing performed by Polytests on behalf of Hearthstone, including any claimed CBI.

11. Manufacturer's Website Certification Test Reports Availability Statement

A statement that the manufacturer will place a copy of the certification test report and summary on the manufacturer's web site available to the public within 30 days after the Administrator issues a certificate of compliance.

Hearthstone will place a copy of the Non-CBI (or public version) of the certification test report and summary on our website as soon as the unit becomes available for sale.

12. Transferability Acknowledgement Statement

A statement of acknowledgment that the certificate of compliance cannot be transferred to another manufacturer or model line without written approval by the Administrator.

Hearthstone 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

A statement acknowledging that it is unlawful to sell, distribute or offer to sell or distribute an affected wood heater without a valid certificate of compliance.

Hearthstone 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: SIMON BOOTH ENGINEERING MANAGER	**Date: 8/3/2022**

Signature of responsible representative of the manufacturer certifying the accuracy of the above statements:

The authorized or responsible party whose signature is above is certifying that the manufacturer has complied with and will continue to comply with all requirements of the 2015 NSPS for compliance certification and that the manufacturer remains responsible for compliance regardless of any error by the test laboratory or third-party certifier.

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 Method 28R for Certification and Auditing of Wood Heaters

A. *SUMMARY RESULTS – ADJUSTABLE WOOD BURNING HEATERS*

Test No.	Burn Rate (Kg/hr)	(E) Ave. Emission Rate g/hr	(OHE) %	Heat Output (BTU/HR)	CSA B415.1 CO emission g/min
3	0,85	1,06	78,4%	12 501	0,560
1	1,11	0,50	78,0%	16 153	0,429
4	1,42	1,23	76,3%	20 362	0,590
2	1,73	1,26	75,6%	24 540	0,669
Weighted particulate emission average of 4 test runs: 0.98 grams per hour.					
Weighted average HHV efficiency of 4 test runs: 77.3 %.					
Average Co 0.55 gr/min					

							Type of	
							Stove:	1
					Weighted Average		1=cat	
							2=noncat	
							3=pellet	
		(E)						
		Ave.		Heat		(K)		
	Burn	Emission		Output		Weighting		
Test No.	Rate	Rate g/hr	(OHE)	(BTU/HR)	Prob.	Factor	(KxE)	KxOHE
3	0,85	1,26	78,4%	12501	0,2531	0,4658	0,5870	0,37
1	1,11	0,87	78,0%	16153	0,4658	0,4526	0,3937	0,35
4	1,42	1,73	76,3%	20362	0,7056	0,3832	0,6630	0,29
2	1,73	1,54	75,6%	24540	0,8491	0,2944	0,4533	0,22
					1,0000	0,0000	0,0000	0,00
					1,0000	0,0000	0,0000	0,00
					1,0000	0,0000	0,0000	0,00
					1,0000	0,0000	0,0000	0,00
					1,0000	0,0000	0,0000	0,00
					1,0000	0,0000	0,0000	0,00
						1,596012	2,0970	1,23
ghted average emissions rate:							1,3139	
	Weighted Average OHE						77,3%	

weighted average emission rate with negative filter weight rounded to zero,