



TEST REPORT

TEST OF A HYBRID WOOD HEATER FOR EMISSIONS AND EFFICIENCY

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

Client:

Hearthstone
317 Stafford ave.
Morrisville, Vt 05661

Model name: Mansfield 8013

Attention: Rafaël Sanchez

TESTED BY:

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

TEST DATES: September 29th to October 7th 2020

REPORT DATE: October 22nd 2020

Revision 1: October 4th 2021

Revision 2: February 26th 2024

Project number: PI-20240

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Tested:

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

Maxime Martin

written by:

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

Danick Power, P. Eng

Verified by third party certifier (PFS):

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List of Revision:

Revision 1: October 4th 2021:

- Additional letter for TYPO's about mixing baffle in the original report Appendix 15 added for certification documentation CoC, WHA, Letter and others.
- Table 2.6 p.9 updated for dual train precision in g/kg.
- Appendix 4 updated to include all data every minute for the aging.
- Calibration certificate in English appendix 3.
- Fuel density have been recalculating to exclude spacers and found compliant for each run as per clause 9.4.1.3 between 25 to 36 lb/ft³. Appendix 1 have been updated to represent those numbers.
- Appendix 9 updated for more detailed picture
- Appendix 12 updated to include calculation details.
- Preburn data for each test added in appendix 1

Revision 2: February 16th 2024:

- Correction of a Typo p.6, all the 50hrs aging was done by Services Polytests.
- Negative filter weight rounded to zero calculation of individual test in appendix 1 and weighted average in appendix 15.
- Table 2.1 updated to include summary of tests completed
- Appendix 1 updated to include all efficiency calculation numbers for all runs

List of appendixes

APPENDIX 1: Raw data, forms and results

APPENDIX 2: Proportionality results

APPENDIX 3: Calibration data

APPENDIX 4: Unit pre burn

APPENDIX 5: Participants

APPENDIX 6: Drawings and specifications

APPENDIX 7: Operator's manual

APPENDIX 8: Photographs of test set up

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APPENDIX 10: Laboratory Operating Procedures

APPENDIX 11: Sample Calculations

APPENDIX 12: Volume Calculations

APPENDIX 13: Operating instruction

APPENDIX 14: Drawing Air flow pattern

APPENDIX 15: 30-day notice, Wood heater application, Certificate of conformity

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: September 29th to October 7th 2020
- Test methods used:
 - Particulate emissions: ASTM E2780-10; ASTM E2515-11 methods 28R as referred into 40 CFR Part 60 Subpart AAA
 - Efficiency: CSA B415.1-10

1.2 TEST UNIT INFORMATION

General

- Manufacturer: Hearthstone
- Product type: Hybrid free standing stove
- Combustion system: catalytic, with pre-combustion
- Unit tested: Mansfield 8013
- Option: optional convection Fan
- Similar Model: none

1.3 RESULTS

Emission results obtained

- Average emission rate: 0.54 grams/hour
- Average Efficiency: 78%
- Average Co 0.82 gr/min
- 1st hour emission: 1.26 grams/hour

Conformity: NSPS Phase 2020

1.4 PRETEST INFORMATION

Unit condition: The unit was received by carrier first week of September 2020. The 50hrs of aging was done by Services Polytests at medium heat draw (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 all tests a sit is standard with the unit

Break in period

- Duration: the unit was pre burned by Services Polytests and run for at least 50 hours, adequate documentation of fuel additions, flue and unit temperatures recorded.
- Fuel: BC FIR between 19% and 25%

2 SUMMARY OF TEST RESULTS

2.1 EMISSIONS

Run Number	Test Date (AAA-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 CO emission Gr/Kg dry	(OHE) %	Heat Output (BTU/HR)
1	2020-09-29	0,60	0,920	1,58	16,03	17,42	81,2	14 043
2	2020-09-30	0,43	0,837	0,78	35,93	41,86	79,8	12 864
3	2020-10-01	1,18	2,307	3,28	64,51	27,95	74,2	32 200
4	2020-10-05	0,32	1,479	0,39	77,75	52,55	75,7	21 048
5	2020-10-06	0,42	0,961	0,99	24,70	25,69	79,9	14 447
6	2020-10-07	0,43	1,05	1,19	34,21	32,80	80,5	15 780

- run 2 have been rejected from the weighted average, Test failed due to temperature differential greater than 126°F (*ASTM 2780 Section 9.5.10 Wood heater thermal equilibrium*)
- Run 6 test was done without convection fan, this one is not included into the weighted average number.

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
1	0,920	0,60	81,2%	14 043	0,27
5	0,961	0,42	79,9%	14 447	0,41
4	1,479	0,32	75,7%	21 048	1,30
3	2,307	1,18	74,2%	32 200	1,08
Weighted particulate emission average of 4 test runs: 0.54 grams per hour.					
Weighted average HHV efficiency of 4 test runs: 77.7 %.					
Average Co 0.82 gr/min					
Average 1st hour 1.26 grams per hour.					

2.3 TEST FACILITY CONDITIONS

Run Number	Room Temperature		Barometric pressure		Relative humidity		Air Velocity	
	Before (F)	After (F)	Before (in.Hg)	After (in.Hg)	Before (%)	After (%)	Before (ft/min)	After (ft/min)
1	74	75	29,648	29,766	75,5	71,6	0	0
2	76	77	29,412	29,500	52,0	50,4	0	0
3	76	75	29,65	29,77	45,9	43	0	0
4	69	73	30,062	30,002	48,3	44,1	0	0
5	75	74	29,973	30,002	41,5	39,9	0	0
6	71	72	29,943	29,884	40,1	38,6	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	19,00	20,21	3,9	18,22	6,326	21,71	19	3	2	18
2	19,34	21,66	4,1	18,36	6,375	21,08	19	3	2	18
3	19,04	20,46	3,7	18,44	6,403	21,51	19	3	2	18
4	20,08	20,49	3,7	18,36	6,375	21,09	19	3	2	18
5	19,68	20,53	3,7	18,46	6,410	20,69	19	3	2	18
6	20,06	20,32	4,0	18,54	6,438	20,28	19	3	2	18

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	443	346,02	546,13	77,576	75,383	2,40	2,10
2	493	343,54	543,82	86,311	82,466	1,70	1,80
3	179	339,47	562,91	31,490	30,521	1,90	1,70
4	279	337,88	548,57	48,326	47,549	0,80	0,70
5	433	346,95	542,72	75,907	74,088	1,50	1,40
6	401	346,31	541,50	69,867	68,232	1,50	1,40

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	1975,97	2033,47	4,68	4,21	5,24%	0,069
2	1962,25	2053,76	3,34	3,70	5,13%	0,053
3	1929,70	1990,92	3,67	3,38	4,00%	0,041
4	1950,66	1982,56	1,56	1,39	5,86%	0,025
5	1979,11	2027,70	3,08	2,95	2,32%	0,020
6	1987,63	2035,24	2,92	2,79	2,23%	0,018

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 ² O)	static pressure tunnel (in. H ² O)	Primary Air Setting	Run Time (min)
1	0,920	366,88	-124,8	0,013	0,170	minimum	443
2	0,837	353,80	-148,1	0,013	0,170	minimum	493
3	2,307	518,32	-115,9	0,016	0,170	maximum	179
4	1,479	451,52	-89,0	0,014	0,180	medium setting	279
5	0,961	371,10	-97,1	0,013	0,170	minimum	433
6	1,046	398,98	-94,9	0,014	0,190	minimum	401

- Run 2 failed on delta T criteria with -148°F surface temperature differential Test failed due to temperature differential greater than 126°F (*ASTM 2780 Section 9.5.10 Wood heater thermal equilibrium*)

3 PROCESS DESCRIPTION

3.1 DISCUSSION

The unit was delivered by the client and received in a good condition. Five runs have been done for weighted average with the convection fan at “ON” position. Run number 2 was rejected Test failed due to temperature differential greater than 126°F (*ASTM 2780 Section 9.5.10 Wood heater thermal equilibrium*). One confirmation test was done without the standard convection fan (Run 6).

3.2 UNIT DIMENSIONS

Baffle

- Location: between top of combustion chamber and hearth
- Restriction: 2.375-inch X 18.375 inch at the front of the unit
- Dimensions: cover the hearth area minus the restriction at the front
- Material: Vermiculite 1.0 inch thick.

Bricks

- Stove made of soapstone brick 1¼ inch. thick cover all the sides and back, bottom of the firebox is made from cast iron inside lining of soapstone.

Flue gas exhaust

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

Gasket

- Glass holder: maniglass
- Window: ¼ round fiberglass
- Door gasket against facing: fiberglass 3/8” round diameter
- Refer to appendix 6 for complete list and location of each gaskets

Overall unit dimension

- Overall dimensions: 27-inch-wide x 24-inch-deep x 30 inch high
- Usable volume: 2.88 cuft

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: Fecralloy foil framed in 304 SS can

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 back 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
Identification	Type	Imin	Imax	Controlled	(sq. in.)
APPENDIX 14 SHARED and PA	Primary	(air control Slide) 0.168	(air control Slide) 2.457	yes	(Air Wash) 10.33
APPENDIX 14 SHARED and SA	Secondary	(Riser opening) 0.65	(Riser opening) 1.95	yes	(Secondary Tube holes) 1.86
Appendix 14 Shared and TA	Tertiary	Controlled by primary	Controlled by primary	Yes	(holes above baffle) .875
Appendix 14 TA	Pilot	Controlled by primary	Controlled by primary	Yes	Orifice .2"

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

Legend

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

Type: Characterization of air intake

Imin: Minimum air intake of a particular air channel

Imax: Maximum air intake of a particular air channel

Controlled: Determines if a provision for air control is present

Outlet: Total air outlet of a particular air channel

3.4 OPERATION DURING TEST

All runs have been found appropriate, no anomalies happened and all runs below have been validate and found compliant except for run no.2 failed on temperature differential requirement of 126°F (*ASTM 2780 Section 9.5.10 Wood heater thermal equilibrium*). During some of the tests, negative weight has been found on back filter but none on probe and gasket, those were handled properly

Run #1

This run was performed on September 29th 2020. It lasted 443 minutes and a 0.92 kg/hr burn rate was obtained & emission at 0.60 gr/hr. The convection fan Option was at on position during the entire test. Air inlet was set at the minimum (LOWEST) setting.

Run #2

This run was performed on September 30th 2020. It lasted 493 minutes and a 0.84 kg/hr burn rate was obtained & emission at 0.43 gr/hr. The convection fan Option was at on position during the entire test. Air inlet was set at the minimum (LOWEST) setting. This test failed on surface temperature average criteria with -148°F, this run will be rejected from the weighted average.

Run #3

This run was performed on October 1st 2020. It lasted 179 minutes and a 2.31 kg/hr burn rate was obtained & emission at 1.18 gr/hr. The convection fan Option was at on position during the entire test. Air inlet was set at the maximum (FULLY OPEN) setting,

Run #4

This run was performed on October 5th 2020. It lasted 279 minutes and a 1.48 kg/hr burn rate was obtained & emission at 0.32 gr/hr. The convection fan Option was at on position during the entire test. Air inlet was at the medium setting, category 3 burn rate was obtained.

Run #5

This run was performed on October 6th 2020. It lasted 433 minutes and a 0.96 kg/hr burn rate was obtained & emission at 0.42 gr/hr. The convection fan Option was at on position during the entire test. Air inlet was set at the minimum (LOWEST) setting.

Run #6

This run was performed on October 7th 2020. It lasted 401 minutes and a 1.05 kg/hr burn rate was obtained & emission at 0.43 gr/hr. The convection fan Option was at OFF position during the entire test as a no fan confirmation test. Air inlet was set at the minimum (LOWEST) setting.

- Details: Refer to the front page of each test run data sheets found in appendix for the detailed test sequence showing air supply settings and adjustments, fuel bed adjustments and operational specifics of the test unit. Three attempts were done at the minimum air setting, the stove wasn't able to burn less than 0.8 kg/hr.

- 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 in the system ahead of the sampling section. The sampling section is a continuous 15-foot section of 8-inch diameter pipe straight over its entire length. Tunnel velocity pressure is determined by a standard pitot tube located 48 inches from the beginning of the sampling section. Thermocouple is installed on the pitot tube to measure the dry bulb temperature. MC is assumed, as allowed, to be 4%. Tunnel samplers are located 56 inches downstream of the pitot tube and 16 inches upstream from the end of this section.

3.7 DRAWINGS

Various drawings of the stack gas sampling train and of dilution tunnel system are found in Appendix 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 fr', the resolution is 1 %, giving an accuracy higher than the 2% required by the standard.

5.1.2 SCALES

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

5.1.3 GAS ANALYZERS

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

5.2 TEST METHOD PROCEDURES

5.2.1 LEAK CHECK PROCEDURES

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

5.2.2 TUNNEL VELOCITY FLOW MEASUREMENT

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

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

5.2.3 PM SAMPLING PROPORTIONALITY (ASTM E2515)

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

APPENDIX 1: Raw data, forms and results

Paramètres

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

Code verrouillage:

HEA

Description du test

Test standard	EPA
Run #	1
Date	29-09-2020
Technicien	M.M
Project #	PI 20240

Description de l'unité

Manufacturier	HEARTHSTONE	
Modèle	Mansfield 8013	
Combustion system	Cat	
Appliance type	WOOD STOVE	
Firebox volume	2,88	cu ft.
Appliance weight empty	N.A	lbs
Appliance weight full	N.A	lbs

Paramètres du test

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

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	1,007	Dimensionless
Equipment number (DGM #1):	EM 178	
Calibration Factor (DGM #2):	1,008	Dimensionless
Equipment number (DGM #2):	EM 318	
Calibration Factor (DGM #3):	1,014	Dimensionless
Equipment number (DGM #3):	EM 179	Dimensionless

Tunnel

Targeted tunnel flow rate	350	scfm
Tunnel diameter	8	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	PI 20240
Date	29-09-2020
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

FUEL LOAD DATA SHEET, CSA B415

Test Load Weight:		
Lower	Ideal	Upper
18,1	20,2	22,2

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

Load Volume:	0,50	cu. ft	Loading Density:	6,3	lbs./ft3
Number of Spaces:	18		Load Density (wet):	32,4	lbs./ft3
Spacer weight:		lbs	Dry Wood Density:	26,6	lbs./ft3

Piece Size (in):			Weight lbs	Meter Moisture Content					Ave. MC x Weight	Volume Cubic Inches	Ave. MC %
Thick	Wide	Length		Dry Uncorrected %							
1,5	3,5	19	1,98	21,30	21,40	21,60	21,40	21,30	42,372	99,75	21,4
1,5	3,5	19	1,84	22,10	22,40	22,50	22,20	22,60	41,1424	99,75	22,4
1,5	3,5	19	1,90	21,60	21,90	21,80	21,50	21,50	41,154	99,75	21,7
1,5	3,5	19	1,90	22,00	22,00	21,90	21,40	21,60	41,382	99,75	21,8
3,5	3,5	19	4,44	21,70	21,30	21,90	21,80	21,40	95,9928	232,75	21,6
3,5	3,5	19	4,14	21,90	22,10	22,00	22,30	22,10	91,4112	232,75	22,1
										0,00	
1,5	0,75	5	0,10			20,60			2,06	5,63	20,6
1,5	0,75	5	0,12			20,40			2,448	5,63	20,4
1,5	0,75	5	0,10			21,10			2,11	5,63	21,1
1,5	0,75	5	0,10			21,00			2,1	5,63	21,0
1,5	0,75	5	0,10			20,90			2,09	5,63	20,9
1,5	0,75	5	0,12			20,80			2,496	5,63	20,8
1,5	0,75	5	0,10			20,90			2,09	5,63	20,9
1,5	0,75	5	0,13			21,00			2,73	5,63	21,0
1,5	0,75	5	0,10			20,60			2,06	5,63	20,6
1,5	0,75	5	0,10			20,00			2	5,63	20,0
1,5	0,75	5	0,14			20,30			2,842	5,63	20,3
1,5	0,75	5	0,13			20,60			2,678	5,63	20,6
1,5	0,75	5	0,1			20,40			2,04	5,63	20,4
1,5	0,75	5	0,13			21,00			2,73	5,63	21,0
1,5	0,75	5	0,14			21,10			2,954	5,63	21,1
1,5	0,75	5	0,13			21,6			2,808	5,63	21,6
1,5	0,75	5	0,08			21,3			1,704	5,63	21,3
1,5	0,75	5	0,1			21,3			2,13	5,63	21,3
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
									SUM MCx	395,5244	21,1 %

Test Load Weight: 18,22 lbs. Dry Weight: 6,79 kg.

Average Moisture Content: %
 Dry: 21,71 Dry(EPA) 21,71 Wet: 17,84
 Dry(B415) 21,71 Must be 19-25 must be 15,2-22

Coal Bed Range: 3,6 lbs. to 4,6 lbs.

TEST CHARGE: Coal bed weight: 3,9 lbs.
 Project nu. PI 20240
 Date 29-09-2020
 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	9	700	701	1	15	702	703	11	16	704	705	37	706		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,4565	0,1274	0,1281	35,3895	108,7830	0,1261	0,1270	34,6362	108,7533	0,1270	0,1270	33,4700	0,1255	2020-09-24	17:00
Before (6)	61,4566	0,1275	0,1280	35,3896	108,7831	0,1262	0,1269	34,6361	108,7534	0,1269	0,1269	33,4699	0,1256	2020-09-29	10:00
After (1)	61,4572	0,1271	0,1280	35,3928	108,7839	0,1268	0,1269	34,6409	108,7540	0,1273	0,1267	33,4763	0,1258	2020-09-29	20:00
After (2)	61,4567	0,1271	0,1280	35,3908	108,7832	0,1268	0,1269	34,6373	108,7535	0,1273	0,1267	33,4715	0,1257	2020-10-05	08:00
After (3)	61,4567	0,1271	0,1280	35,3907	108,7832	0,1267	0,1269	34,6372	108,7535	0,1274	0,1268	33,4716	0,1257	2020-10-13	08:00
After (4)	61,4567	0,1271	0,1280	35,3907	108,7832	0,1267	0,1269	34,6372	108,7535	0,1274	0,1268	33,4716	0,1257	2020-10-14	08:00
After (5)															
After (6)	61,4567	0,1271	0,1280	35,3907	108,7832	0,1267	0,1269	34,6372	108,7535	0,1274	0,1268	33,4716	0,1257	2020-10-14	08:00
Difference	0,0001	-0,0004	0,0000	0,0011	0,0001	0,0005	0,0000	0,0011	0,0001	0,0005	-0,0001	0,0017	0,0001		
Total (mg)		0,8				2,5				2,2			0,1		
Total ajusté (mg)		0,70				2,40				2,10					

Project nu.	PI 20240
Date	29-09-2020
Technicien	mm

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	9	700	701	1	15	702	703	11	16	704	705	37	706		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,4565	0,1274	0,1281	35,3895	108,7830	0,1261	0,1270	34,6362	108,7533	0,1270	0,1270	33,4700	0,1255	2020-09-24	17:00
Before (6)	61,4566	0,1275	0,1280	35,3896	108,7831	0,1262	0,1269	34,6361	108,7534	0,1269	0,1269	33,4699	0,1256	2020-09-29	10:00
After (1)	61,4572	0,1271	0,1280	35,3928	108,7839	0,1268	0,1269	34,6409	108,7540	0,1273	0,1267	33,4763	0,1258	2020-09-29	20:00
After (2)	61,4567	0,1271	0,1280	35,3908	108,7832	0,1268	0,1269	34,6373	108,7535	0,1273	0,1267	33,4715	0,1257	2020-10-05	08:00
After (3)	61,4567	0,1271	0,1280	35,3907	108,7832	0,1267	0,1269	34,6372	108,7535	0,1274	0,1268	33,4716	0,1257	2020-10-13	08:00
After (4)	61,4567	0,1271	0,1280	35,3907	108,7832	0,1267	0,1269	34,6372	108,7535	0,1274	0,1268	33,4716	0,1257	2020-10-14	08:00
After (5)															
After (6)	61,4567	0,1275	0,1280	35,3907	108,7832	0,1267	0,1269	34,6372	108,7535	0,1274	0,1269	33,4716	0,1257	2020-10-14	08:00
Difference	0,0001	0,0000	0,0000	0,0011	0,0001	0,0005	0,0000	0,0011	0,0001	0,0005	0,0000	0,0017	0,0001		
Total (mg)		1,2				2,9				2,3			0,1		
Total ajusté (mg)		1,10				2,80				2,20					

Project nu.	PI 20240
Date	29-09-2020
Technicien	mm

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 0,6 g/hr

Burn Rate : 0,920 Dry kg/hr

Test Duration: 443 min

PRESSURE FACTOR: DGM 1 0,96888
 DGM 2 0,97400
 DGM 3 0,99289

BAROMETRIC PRESSURE
 Average: 29,707169 in Hg
 Start: 29,648109 in Hg
 End: 29,766229 in Hg

TEMPERATURE FACTORS DGM 1 0,98308
 DGM 2 0,96078
 DGM 3 0,98877

DGM CONTROLLER VALUES

DGM 1 Final: 10435,291 Cuft
 Initial: 10354,426 Cuft

VOLUMES SAMPLED DGM 1 77,576 SCft
 DGM 2 75,383 SCft
 DGM 3 58,862 SCft

DGM 2 Final: 2055,742 Cuft
 Initial: 1975,803 Cuft

DGM #3 Final: 7225,703 Cuft
 Initial: 7166,576 Cuft

TOTAL TUNNEL VOLUME : 153288

TEMPERATURES

DGM 1 537,086 °R
 DGM 2 549,555 °R

SAMPLE RATIOS
 Sample Train 1: 1975,970
 Sample Train 2: 2033,473

CALIBRATION FACTORS

DGM 1 1,0072
 DGM 2 1,0077
 DGM #3 1,0140

Paticulate concentration
 Sample Train 1 **0,000032** g/dscf
 Sample Train 2 **0,000029** g/dscf
 Room **0,000002** g/dscf

TUNNEL FLOW RATE: 346,023 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **4,68** g
 Sample Train 2 **4,21** g

PARTICULATE CATCH
 Total Sample Train 1: 2,50 mg
 Total Sample Train 2: 2,20 mg
 Total Sample Train 1 1st hour: 0,80 mg

EMISSION RATES
 Sample Train 1 **0,63** g/hr
 Sample Train 2 **0,57** g/hr

1st hour emission rate **1,58** g/hr

DEVIATION: 5,24%

Cs Train 1 Train 2
 3,223E-05 2,91845E-05

89	560,14	75,61	112,04	750,23	8,98	532,44	435,15	658,07	379,54	513,19
90	556,94	75,66	112,36	747,35	8,78	541,03	442,91	658,11	383,59	520,27
91	555,17	75,39	111,39	745,62	8,58	548,63	450,57	657,23	387,53	525,82
92	553,46	75,75	111,24	745,86	8,37	556,73	458,08	656,41	391,31	532,06
93	551,44	75,85	111,01	744,45	8,18	564,25	465,39	656,15	394,97	537,35
94	550,16	75,62	110,66	744,43	7,98	570,75	472,53	656,39	397,87	543,44
95	547,08	75,97	111,72	743,27	7,86	577,54	479,61	657,38	400,80	549,24
96	544,83	75,96	110,23	741,45	7,67	584,39	486,32	659,03	403,86	553,93
97	541,85	75,80	110,31	740,60	7,48	589,36	493,07	661,47	407,03	559,74
98	541,28	75,93	109,95	739,65	7,28	594,35	499,25	664,37	410,38	564,72
99	538,45	75,78	109,49	739,67	7,18	599,71	505,38	664,75	411,77	566,55
100	489,70	76,02	99,91	720,64	7,07	604,64	510,45	663,16	413,63	569,26
101	425,44	75,64	93,30	773,76	6,88	608,18	515,12	650,72	416,34	574,54
102	394,80	75,86	91,21	787,69	6,88	611,24	518,48	634,51	417,96	576,02
103	373,35	75,91	91,54	763,78	6,78	613,94	521,03	618,75	419,78	580,27
104	356,25	75,95	90,63	744,45	6,68	614,51	521,89	604,29	419,98	582,56
105	342,40	76,08	90,63	731,72	6,58	614,81	522,45	591,40	420,48	584,67
106	330,11	75,78	89,04	719,62	6,58	613,55	522,57	579,99	421,12	584,03
107	318,95	75,57	86,65	709,73	6,47	611,14	522,36	569,77	420,59	582,45
108	310,79	75,77	88,07	725,80	6,47	608,35	520,01	560,99	420,43	584,32
109	304,40	75,70	85,39	755,47	6,37	598,95	517,71	553,42	419,98	585,81
110	299,34	75,85	83,55	769,89	6,37	595,41	514,33	546,77	419,21	583,88
111	293,93	75,74	82,71	771,46	6,28	588,64	511,56	540,91	418,89	582,07
112	290,26	75,15	84,23	770,05	6,27	586,14	508,37	535,86	417,68	579,37
113	286,09	75,69	85,11	770,38	6,27	581,09	505,14	531,58	416,53	576,48
114	284,02	75,52	84,36	771,62	6,18	572,49	502,38	528,06	415,39	574,23
115	280,15	75,69	82,68	774,97	6,17	565,51	498,99	525,26	414,77	572,21
116	279,96	75,45	82,92	817,29	6,08	559,46	496,30	523,71	413,72	569,26
117	283,96	75,67	83,91	911,57	5,98	554,76	493,03	524,38	411,67	567,16
118	288,55	75,47	83,98	960,67	5,98	548,53	490,19	526,43	410,37	564,20
119	294,64	75,38	85,29	991,96	5,87	545,76	486,71	529,11	408,51	560,49
120	301,35	75,50	85,13	1005,57	5,77	541,74	483,75	532,05	406,81	556,24
121	305,98	75,72	83,70	1011,56	5,70	533,33	481,72	534,98	405,15	552,56
122	310,12	75,57	82,28	1015,26	5,67	527,99	479,71	537,85	404,83	547,09
123	312,76	75,43	83,19	1017,68	5,57	524,81	477,43	540,74	402,62	543,62
124	313,52	75,65	84,68	1018,04	5,48	521,83	476,31	543,62	400,32	539,47
125	314,45	75,20	85,21	1017,39	5,48	517,66	475,67	545,97	398,75	535,77
126	434,87	75,17	141,02	1041,99	2,81	515,09	474,89	548,26	396,97	530,89
127	379,78	75,46	94,45	866,10	5,08	511,57	475,45	549,24	395,33	526,86
128	345,35	75,15	88,67	837,11	4,97	507,36	476,48	545,80	393,98	524,26
129	331,04	75,50	87,26	827,47	4,97	507,68	478,74	540,17	392,38	521,29
130	322,57	74,71	85,64	819,45	4,87	504,65	480,67	533,86	391,96	521,01
131	315,58	75,11	83,50	822,01	4,78	503,74	482,38	527,46	390,49	520,20
132	308,28	74,33	85,35	813,90	4,68	504,85	484,17	521,35	388,86	518,54
133	301,36	75,21	84,91	787,46	4,68	506,45	486,16	515,76	388,74	516,50
134	294,96	75,24	83,92	760,56	4,57	507,94	488,27	510,63	387,90	514,88
135	288,83	75,19	83,77	739,02	4,56	508,03	489,54	505,93	387,10	513,79
136	282,72	75,02	83,72	725,35	4,47	504,80	490,25	501,62	386,62	518,93
137	277,66	74,95	85,14	714,62	4,45	505,35	490,37	497,66	386,32	519,14
138	272,44	75,20	84,62	710,59	4,37	505,63	491,05	494,04	385,26	515,75
139	269,22	75,13	83,71	709,23	4,35	504,76	490,91	490,84	385,13	513,62
140	271,66	75,21	83,76	724,61	4,27	503,38	490,38	488,10	384,24	514,10
141	272,00	75,37	84,07	741,52	4,27	501,56	489,69	485,97	383,55	516,35
142	270,36	75,23	84,58	746,77	4,27	499,58	488,02	484,44	382,44	513,94
143	263,56	75,25	83,87	748,49	4,27	498,26	486,61	483,37	381,85	510,98
144	258,93	75,02	84,15	748,84	4,27	496,16	484,54	482,68	380,98	510,08
145	255,21	74,87	83,56	741,48	4,17	494,00	482,98	482,31	380,30	505,46
146	252,13	74,88	83,69	731,60	4,17	491,65	480,85	482,25	379,02	505,11
147	248,45	74,94	83,32	722,73	4,17	489,34	478,56	482,31	377,83	501,24
148	245,83	74,52	83,43	714,96	4,10	487,28	476,65	482,54	376,56	499,21
149	243,84	74,75	83,13	707,48	4,17	484,71	474,57	482,88	375,12	496,72
150	240,49	74,69	82,97	699,40	4,08	481,73	471,73	483,32	373,96	495,70
151	237,84	74,47	82,95	691,23	4,08	479,20	470,17	483,82	372,65	493,35
152	235,45	74,82	83,13	684,33	4,07	476,69	467,59	484,32	371,08	493,37
153	232,74	74,78	83,25	678,52	3,98	474,76	466,03	484,78	369,51	489,55
154	230,48	74,59	83,02	673,72	3,98	472,56	464,30	485,27	368,27	487,31
155	228,45	74,49	82,84	669,13	3,98	470,19	461,81	485,73	366,69	485,16
156	226,33	74,73	82,67	664,96	3,98	468,24	460,45	486,29	365,52	485,23
157	223,93	74,51	82,40	660,65	3,98	465,78	458,47	486,87	363,89	484,53
158	222,30	74,39	82,39	657,47	3,98	463,90	456,13	487,48	362,06	482,30
159	220,63	74,31	81,79	654,62	3,87	461,50	454,93	488,15	360,30	478,66
160	266,58	74,43	90,96	632,63	3,87	460,62	453,34	491,27	359,14	477,46

435,00	0,08	0,02	7,73	153,4%	20,43	12,69	80,2	26,3	100,3%	85,0%	85,2%
436,00	0,07	0,02	7,74	153,3%	20,43	12,68	80,0	26,3	100,3%	85,0%	85,3%
437,00	0,08	0,02	7,74	153,2%	20,43	12,68	80,1	26,1	100,3%	85,0%	85,2%
438,00	0,03	0,02	7,69	154,8%	20,43	12,73	80,0	26,1	100,3%	85,0%	85,2%
439,00	0,03	0,02	7,67	155,4%	20,43	12,75	79,8	26,2	100,3%	85,0%	85,2%
440,00	0,03	0,02	7,64	156,5%	20,43	12,78	79,3	26,3	100,3%	85,0%	85,3%
441,00	0,03	0,02	7,49	161,6%	20,44	12,94	79,3	26,2	100,3%	84,9%	85,2%
442,00	0,03	0,02	7,18	172,9%	20,46	13,28	79,1	26,2	100,3%	84,7%	85,0%
443,00	0,00	0,02	7,06	177,4%	20,47	13,40	79,2	26,1	100,4%	84,7%	85,0%

Date: 2020-09-29 Manufacturer: ~~Stu~~ ^{M.M.} Hearthstone Model: 8013
 Project #: PI 20240 Run: 1 Tech: MM Reviewer: N

- kindling 500 LBS START FIRE
- Door open
- by pass open
- air inlet Full open
- Fan off
- At 100 LBS insert prebed
- After 8 min close Door
- At 25 LBS close Door
- At 700 LBS close by pass, close air inlet and open Fan (low)
- After 5 min move wood
- After ^{At 3 min} 300 LBS RAKE coal Bed
- After 2 min insert load
- close Door immediately
- After 5 min close air inlet

TEST LOAD CONFIGURATION

PRE / POST CHECKS

Date: 2020-09-29 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 1 Tech: MM Reviewer: DP

Moisture Meter Calibration Check:

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

Pre-Test

Post-Test

Facility Conditions:

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

0	(max50 Fpm)	0	(max50 Fpm)
OK		NA	
0	1/2	0	1/2

Wood Heater Conditions:

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

2020-09-29
2020-09-29
OK
OK

0	1/2
---	-----

Temperature System:

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

0	1/2	°F
0	1/2	°F

Proportional Checks:

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

OK
OK
OK

Sampling Train ID Numbers:

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

	Train 1 st hour	Train 1	Train 2
Probe	009	15	16
Filter Front	700	702	704
Filter Back	701	703	705
Filter Thermocouple	11	11	12
Filter (<90°F)	OK	OK	OK

SAMPLING EQUIPMENT CHECK OUT

Date: 2020-09-29 Manufacturer: Heartstone Model: 8013
 Project #: PT 20240 Run: 1 Tech: MM Reviewer: SP

Leakage Checks Tunnel Samplers

	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Unplugged Flow Rate = .25cfm						
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	293203.65	295495.28	293203.75	295495.50	055997.62	058214.00
Initial 1minute DGM (Liter)	293203.65	295495.28	293203.75	295495.45	055997.62	058214.00
Change © (Liter)	∅	∅	∅	0.05	∅	∅
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

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

Leakage Checks Pitot

Plugged Probe	Pre Test 3 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

Date: 2020-09-29 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 1 Tech: MM Reviewer: DP

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Wood	EM-090	440 lbs, Class F	440 lbs
Analytical	EM-128	100mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

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

Date: 2020-09-29 Manufacturer: Hearthstone Model: 8013
 Project #: PI 2024 Run: 1 Tech: MM Reviewer: JP

FOR TUNNELS < 12 in

 Barometric pressure (P_{bar}) 1004 (KPa.) Static pressure (P_q) 0.17 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.079	74.35
B - Centroid	3.00	3.50	4	0.078	74.13
A-1	0.40	0.50	0.50	0.065	74.38
A-2	1.50	1.75	2	0.068	74.38
A-3	4.50	5.25	6	0.071	74.32
A-4	5.60	6.5	7.5	0.066	74.32
B-1	0.40	0.50	0.50	0.065	74.13
B-2	1.50	1.75	2	0.064	74.22
B-3	4.50	5.25	6	0.074	74.22
B-4	5.60	6.5	7.5	0.065	74.24
				AVERAGE	

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

Where,

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

 Δ_p = manometer reading (inches H₂O)

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

 P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qg}$
 P_q = static pressure in. H₂O
 { 13.6 }

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

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

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

CONTINUOUS ANALYZERS

 Date: 2020-09-29 Manufacturer: Hearthstone Model: 8013
 Project #: PI 26240 Run: 1 Tech: MM Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2968	3000	1007	1000
Tolerance CO	0	+/- 0.02	0032	+/- 0.15	0007	+/- 0.05
CO ₂	0	0	1798	1800	975	1000
Tolerance CO ₂	0	+/- 0.02	002	+/- 0.5	025	+/- 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	2980	1002	0	0.02	0012	0.15	0005	0.05	✓	
CO ₂	0	1802	981	0	0.02	004	0.5	006	0.5	✓	

Date: 2020-09-29 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 1 Tech: MM Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blanck
Final (Liter)	295494.52	058212.13	204609.12
Initial (Liter)	293204.68	055948.50	202934.82

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	100.4	100.8
Dry Bulb (F):	69.6	74.6
Humidity (%):	75.5	71.6

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

FUEL DATA

Date: 2020-09-29 Manufacturer: Hearthstone Model: 8013
 Project #: PI 2240 Run: 1 Tech: MM Reviewer: DL

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 16 in.	182 lbs.	196	199	198	194	198
1 1/2 x 3 1/2 x 16 in.	160 lbs.	198	199	197	198	198
1 1/2 x 3 1/2 x 16 in.	162 lbs.	191	192	192	194	196
1 1/2 x 3 1/2 x 16 in.	156 lbs.	196	197	200	200	201
1 1/2 x 3 1/2 x 16 in.	156 lbs.	200	204	203	202	208
1 1/2 x 3 1/2 x 16 in.	164 lbs.	196	194	193	198	196
1 1/2 x 3 1/2 x 16 in.	156 lbs.	200	204	203	203	208
1 1/2 x 3 1/2 x 19 in.	188 lbs.	210	216	218	213	214
1 1/2 x 3 1/2 x 19 in.	192 lbs.	209	204	208	206	209
1 1/2 x 3 1/2 x 19 in.	192 lbs.	201	207	203	204	206
1 1/2 x 3 1/2 x 19 in.	192 lbs.	209	206	205	203	204
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
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: 1900 lbs

FUEL DATA

Date: 2020-09-29 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 1 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 19 in.	1 98 lbs.	213	214	216	214	213
1 1/2 x 3 1/2 x 19 in.	1 84 lbs.	221	224	225	222	226
1 1/2 x 3 1/2 x 19 in.	1 90 lbs.	216	219	218	215	215
1 1/2 x 3 1/2 x 19 in.	1 90 lbs.	220	220	219	214	216
3 1/2 x 3 1/2 x 19 in.	4 44 lbs.	217	213	219	218	214
3 1/2 x 3 1/2 x 19 in.	4 14 lbs.	219	221	220	223	221
x x in.	lbs.					
1 1/2 x 3/4 x 5 in.	0 100 lbs.			206		
1 1/2 x 3/4 x 5 in.	0 120 lbs.			204		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			211		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			210		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			209		
1 1/2 x 3/4 x 5 in.	0 120 lbs.			208		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			209		
1 1/2 x 3/4 x 5 in.	0 130 lbs.			210		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			206		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			200		
1 1/2 x 3/4 x 5 in.	0 140 lbs.			203		
1 1/2 x 3/4 x 5 in.	0 130 lbs.			206		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			204		
1 1/2 x 3/4 x 5 in.	0 130 lbs.			210		
1 1/2 x 3/4 x 5 in.	0 140 lbs.			211		
1 1/2 x 3/4 x 5 in.	0 130 lbs.			216		
1 1/2 x 3/4 x 5 in.	0 080 lbs.			213		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			213		
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 18 22 lbs Min 20%: 364 Max 25%: 4 55



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-09-24 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20270 Run: 1 Tech: M M Reviewer: DP

		SYSTEM 1 - 1 st hour					SYSTEM 1				
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Back Filter Number	Blank	
Date	Time	009	700	701	1	15	702	703	11	706	
2020-09-24	17:00	614565	01274	01281	353895	1087830	01261	01270	346362	01255	
2020-09-20	10:00	614566	01275	01280	353896	1087831	01262	01271 01269	346361	01256	

		SYSTEM 1 - 1 st hour					SYSTEM 1				
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Back Filter Number	Blank	
Date	Time	009	700	701	1	15	702	703	11	706	
2020-09-24	20:00	614572	01271	01280	353928	1087839	01268	01269	346409	01258	
2020-10-05	8:00	614567	01271	01280	353908	1087832	01268	01269	346373	01257	
2020-10-13	8:00	614567	01271	01280	353907	1087832	01267	01269	346372	01257	
2020-10-14	8:00	614567	01271	01280	353907	1087832	01267	01269	346372	01257	



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-09-24 Project #: PI 20240 Run: 1 Manufacturer: Hearthstone Model: 8013
 Tech: MR Reviewer: [Signature]

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	16	704	705	37
2020-09-24	17:00	1087533	01270	01270	33 4700
2020-09-24	10:00	1087534	01269	01269	33 4699

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	16	704	705	37
2020-09-24	20:00	1087540	01273	01267	33 4763
2020-10-05	8:00	1087535	01273	01267	33 4715
2020-10-13	8:00	1087535	01274	01268	33 4716
2020-10-14	8:00	1087535	01274	01268	33 4716

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	30-09-2020
Technicien	M.M
Project #	PI 20240

Description de l'unité

Manufacturier	HEARTHSTONE	
Modèle	Mansfield 8013	
Combustion system	Cat	
Appliance type	WOOD STOVE	
Firebox volume	2,88	cu ft.
Appliance weight empty	N.A	lbs
Appliance weight full	N.A	lbs

Paramètres du test

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

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	1,007	Dimensionless
Equipment number (DGM #1):	EM 178	
Calibration Factor (DGM #2):	1,008	Dimensionless
Equipment number (DGM #2):	EM 318	
Calibration Factor (DGM #3):	1,014	Dimensionless
Equipment number (DGM #3):	EM 179	Dimensionless

Tunnel

Targeted tunnel flow rate	350	scfm
Tunnel diameter	8	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	PI 20240
Date	30-09-2020
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

FUEL LOAD DATA SHEET, CSA B415

Test Load Weight:		
Lower	Ideal	Upper
18,1	20,2	22,2

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

Load Volume:	<input type="text" value="0,50"/>	cu. ft	Loading Density:	6,4	lbs./ft3
Number of Spaces:	<input type="text" value="18"/>		Load Density (wet):	33,0	lbs./ft3
Spacer weight:	<input type="text" value=""/>	lbs	Dry Wood Density:	27,3	lbs./ft3

Piece Size (in):			Weight lbs	Meter Moisture Content				Ave. MC x Weight	Volume Cubic Inches	Ave. MC %	
Thick	Wide	Length		Dry Uncorrected %							
1,5	3,5	19	2,06	20,10	20,10	20,20	20,00	41,3648	99,75	20,1	
1,5	3,5	19	1,72	21,10	21,60	21,30	22,00	37,1176	99,75	21,6	
1,5	3,5	19	1,86	21,30	21,00	21,00	20,90	39,06	99,75	21,0	
1,5	3,5	19	2,10	20,10	20,40	20,40	20,30	42,504	99,75	20,2	
3,5	3,5	19	4,50	21,80	21,30	21,70	21,60	97,02	232,75	21,6	
3,5	3,5	19	4,28	21,70	21,30	21,80	21,40	92,02	232,75	21,5	
									0,00		
1,5	0,75	5	0,10				20,80	2,08	5,63	20,8	
1,5	0,75	5	0,10				20,30	2,03	5,63	20,3	
1,5	0,75	5	0,10				20,40	2,04	5,63	20,4	
1,5	0,75	5	0,10				21,00	2,1	5,63	21,0	
1,5	0,75	5	0,10				21,00	2,1	5,63	21,0	
1,5	0,75	5	0,10				21,30	2,13	5,63	21,3	
1,5	0,75	5	0,10				20,90	2,09	5,63	20,9	
1,5	0,75	5	0,10				20,60	2,06	5,63	20,6	
1,5	0,75	5	0,09				20,30	1,827	5,63	20,3	
1,5	0,75	5	0,10				20,80	2,08	5,63	20,8	
1,5	0,75	5	0,08				20,90	1,672	5,63	20,9	
1,5	0,75	5	0,13				20,80	2,704	5,63	20,8	
1,5	0,75	5	0,1				20,40	2,04	5,63	20,4	
1,5	0,75	5	0,11				20,40	2,244	5,63	20,4	
1,5	0,75	5	0,11				20,90	2,299	5,63	20,9	
1,5	0,75	5	0,12				20,4	2,448	5,63	20,4	
1,5	0,75	5	0,08				20,3	1,624	5,63	20,3	
1,5	0,75	5	0,12				20,2	2,424	5,63	20,2	
									0,00		
									0,00		
									0,00		
									0,00		
									0,00		
									0,00		
									0,00		
									0,00		
SUM MCx								387,0784		20,7	%

Test Load Weight: lbs. Dry Weight: kg.

Average Moisture Content: %
 Dry: Dry(EPA) 21,08 Wet:
 Dry(B415) 21,08 **Must be 19-25** **must be 15,2-22**

Coal Bed Range: lbs. to lbs.

TEST CHARGE: Coal bed weight: lbs.

Project nu.	PI 20240
Date	30-09-2020
Technicien	<input type="text" value="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	11	710	711	33	38	712	713	35	42	714	715	39	716		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	93,7205	0,1289	0,1278	34,6481	110,4356	0,1264	0,1274	34,8946	110,3150	0,1262	0,1272	34,3650	0,1275	2020-09-29	17:00
Before (6)	93,7206	0,1288	0,1277	34,6482	110,4357	0,1265	0,1273	34,8945	110,3151	0,1261	0,1271	34,3649	0,1275	2020-09-30	09:00
After (1)	93,7209	0,1282	0,1270	34,6512	110,4359	0,1271	0,1272	34,8969	110,3154	0,1269	0,1271	34,3679	0,1276	2020-09-30	21:00
After (2)	93,7207	0,1282	0,1270	34,6496	110,4357	0,1268	0,1270	34,8958	110,3152	0,1266	0,1271	34,3662	0,1275	2020-10-08	08:00
After (3)	93,7207	0,1283	0,1271	34,6496	110,4357	0,1268	0,1270	34,8958	110,3151	0,1266	0,1271	34,3662	0,1275	2020-10-13	08:00
After (4)															
After (5)															
After (6)	93,7207	0,1283	0,1271	34,6496	110,4357	0,1268	0,1270	34,8958	110,3151	0,1266	0,1271	34,3662	0,1275	2020-10-13	08:00
Difference	0,0001	-0,0005	-0,0006	0,0014	0,0000	0,0003	-0,0003	0,0013	0,0000	0,0005	0,0000	0,0013	0,0000		
Total (mg)		0,4				1,7				1,8			0		
Total ajusté (mg)		0,40				1,70				1,80					

Project nu.	PI 20240
Date	30-09-2020
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	11	710	711	33	38	712	713	35	42	714	715	39	716		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	93,7205	0,1289	0,1278	34,6481	110,4356	0,1264	0,1274	34,8946	110,3150	0,1262	0,1272	34,3650	0,1275	2020-09-29	17:00
Before (6)	93,7206	0,1288	0,1277	34,6482	110,4357	0,1265	0,1273	34,8945	110,3151	0,1261	0,1271	34,3649	0,1275	2020-09-30	09:00
After (1)	93,7209	0,1282	0,1270	34,6512	110,4359	0,1271	0,1272	34,8969	110,3154	0,1269	0,1271	34,3679	0,1276	2020-09-30	21:00
After (2)	93,7207	0,1282	0,1270	34,6496	110,4357	0,1268	0,1270	34,8958	110,3152	0,1266	0,1271	34,3662	0,1275	2020-10-08	08:00
After (3)	93,7207	0,1283	0,1271	34,6496	110,4357	0,1268	0,1270	34,8958	110,3151	0,1266	0,1271	34,3662	0,1275	2020-10-13	08:00
After (4)															
After (5)															
After (6)	93,7207	0,1288	0,1277	34,6496	110,4357	0,1268	0,1273	34,8958	110,3151	0,1266	0,1271	34,3662	0,1275	2020-10-13	08:00
Difference	0,0001	0,0000	0,0000	0,0014	0,0000	0,0003	0,0000	0,0013	0,0000	0,0005	0,0000	0,0013	0,0000		
Total (mg)		1,5			3,1			1,8			0				
Total ajusté (mg)		1,50			3,10			1,80							

Project nu.	PI 20240
Date	30-09-2020
Technicien	M.M

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 0,4 g/hr
 Burn Rate : 0,837 Dry kg/hr

Test Duration: 493 min

PRESSURE FACTOR: DGM 1 0,95861
 DGM 2 0,96479
 DGM 3 0,98450

BAROMETRIC PRESSURE
 Average: 29,456164 in Hg
 Start: 29,411869 in Hg
 End: 29,500459 in Hg

TEMPERATURE FACTORS DGM 1 0,97445
 DGM 2 0,95341
 DGM 3 0,98380

DGM CONTROLLER VALUES
 DGM 1 Final: 10527,129 Cuft
 Initial: 10435,389 Cuft

VOLUMES SAMPLED DGM 1 86,311 SCft
 DGM 2 82,466 SCft
 DGM 3 65,222 SCft

DGM 2 Final: 2144,872 Cuft
 Initial: 2055,904 Cuft

DGM #3 Final: 7292,112 Cuft
 Initial: 7225,704 Cuft

TOTAL TUNNEL VOLUME : 169364

TEMPERATURES
 DGM 1 541,843 °R
 DGM 2 553,802 °R

SAMPLE RATIOS
 Sample Train 1: 1962,255
 Sample Train 2: 2053,756

CALIBRATION FACTORS
 DGM 1 1,0072
 DGM 2 1,0077
 DGM #3 1,0140

Paticulate concentration
 Sample Train 1 **0,000020** g/dscf
 Sample Train 2 **0,000022** g/dscf
 Room **0,000000** g/dscf

TUNNEL FLOW RATE: 343,538 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **3,34** g
 Sample Train 2 **3,70** g

PARTICULATE CATCH
 Total Sample Train 1: 1,70 mg
 Total Sample Train 2: 1,80 mg
 Total Sample Train 1 1st hour: 0,40 mg

EMISSION RATES
 Sample Train 1 **0,41** g/hr
 Sample Train 2 **0,45** g/hr

1st hour emission rate **0,78** g/hr

DEVIATION: 5,13%

Cs Train 1 Train 2
 1,97E-05 2,18273E-05

91	546,50	75,63	113,17	734,71	8,88	542,47	430,66	660,77	379,93	521,73
92	543,06	74,95	112,98	732,25	8,68	549,42	440,47	664,69	383,45	527,85
93	541,79	75,53	112,81	729,02	8,50	555,84	449,90	668,99	386,84	533,22
94	539,43	75,23	111,95	728,48	8,37	561,38	458,79	673,83	389,94	538,47
95	538,46	74,70	111,77	727,44	8,18	566,71	467,36	678,80	392,84	543,17
96	536,99	75,12	111,46	729,18	7,99	571,88	475,49	684,78	395,64	547,08
97	535,72	75,50	111,45	731,73	7,87	577,03	483,16	691,01	398,06	551,06
98	534,06	75,16	111,47	732,39	7,67	580,74	490,57	697,51	400,74	555,16
99	533,76	75,46	111,09	733,95	7,56	584,98	497,75	704,02	403,38	558,76
100	531,91	75,32	110,85	732,11	7,38	588,81	504,57	710,94	405,67	561,45
101	532,15	75,51	110,62	730,92	7,28	592,60	511,11	718,12	408,14	565,19
102	510,55	75,20	105,92	719,76	7,07	596,32	515,97	724,33	410,21	566,66
103	429,36	75,44	96,98	747,83	6,97	598,77	520,62	714,15	410,71	570,52
104	394,98	75,40	94,78	782,30	6,88	601,07	523,59	696,90	411,99	574,37
105	372,19	75,61	92,93	758,54	6,81	602,89	526,72	679,51	413,23	577,04
106	353,97	75,53	91,52	730,20	6,78	603,30	527,48	663,21	414,16	579,66
107	338,70	75,82	90,64	718,73	6,68	603,98	526,91	648,28	414,39	580,25
108	326,55	75,69	89,73	718,91	6,68	602,38	526,62	635,46	414,74	580,63
109	316,65	75,74	89,76	723,80	6,68	600,04	523,68	624,41	414,74	581,11
110	308,77	75,79	89,00	746,57	6,68	597,69	521,82	615,37	414,30	579,38
111	306,85	76,12	88,78	843,72	6,57	593,68	518,20	609,18	413,17	577,27
112	307,42	75,92	87,75	902,14	6,47	587,88	514,97	604,80	412,47	574,67
113	307,89	76,12	88,68	929,64	6,47	583,42	511,63	601,73	411,43	571,39
114	309,06	75,84	88,83	954,56	6,37	578,66	508,00	599,65	410,24	566,97
115	311,02	75,92	88,36	977,02	6,37	572,59	504,18	597,69	409,04	562,43
116	313,69	76,18	88,55	993,69	6,27	567,67	501,29	596,23	407,40	557,93
117	315,46	75,99	88,74	1004,44	6,18	561,94	498,30	595,23	406,17	553,49
118	316,87	76,04	88,47	1010,42	6,18	556,79	495,51	594,48	404,49	548,71
119	318,32	76,08	88,02	1014,62	6,08	552,19	493,42	594,01	402,75	544,14
120	318,80	75,95	88,28	1017,53	6,08	547,08	491,77	593,72	401,60	539,32
121	319,54	75,84	87,80	1020,06	5,98	541,35	490,38	593,24	399,91	535,14
122	320,49	75,77	88,04	1020,52	5,87	537,57	489,11	592,72	398,11	530,75
123	320,59	75,85	87,83	1020,31	5,87	532,82	487,96	592,25	396,71	526,93
124	319,45	75,79	87,87	1019,52	5,78	528,72	487,29	591,80	395,30	523,62
125	318,99	76,15	87,60	1018,71	5,67	524,78	486,22	591,39	393,30	519,14
126	319,62	76,13	87,46	1018,89	5,67	521,20	485,43	590,90	391,63	515,44
127	319,39	75,67	86,72	1018,84	5,57	517,12	485,96	590,48	390,16	510,63
128	423,05	76,13	113,69	912,46	5,48	514,25	486,22	592,80	388,69	506,98
129	366,09	75,87	94,06	847,94	5,27	509,74	487,42	589,89	387,21	505,23
130	345,02	73,91	88,32	852,46	5,17	508,86	490,63	583,53	386,04	497,36
131	333,33	73,05	87,40	851,78	5,07	508,33	492,85	575,76	384,58	499,78
132	324,19	73,26	87,09	840,09	5,07	507,81	494,53	567,67	383,40	501,13
133	316,56	73,92	86,68	809,86	4,97	508,32	496,59	559,61	382,70	502,08
134	309,38	73,94	86,37	782,00	4,87	509,13	498,50	551,80	381,80	502,51
135	302,22	74,20	86,31	759,46	4,78	508,59	500,93	544,28	381,42	504,81
136	295,12	74,37	86,15	743,68	4,71	509,35	502,24	537,12	380,64	504,68
137	289,51	74,63	85,23	729,89	4,68	509,87	503,94	530,32	380,00	504,12
138	283,45	75,09	84,78	713,49	4,68	509,44	504,96	523,93	379,86	504,79
139	276,81	75,15	84,74	696,50	4,57	509,92	506,05	517,91	379,55	505,62
140	271,10	75,28	85,14	680,62	4,57	509,75	506,37	512,26	379,24	506,39
141	265,15	75,28	84,08	667,65	4,47	509,89	506,89	506,89	378,81	506,45
142	259,62	75,16	84,27	659,45	4,47	508,38	506,25	501,91	378,13	506,75
143	254,19	75,46	84,10	657,50	4,47	508,06	505,25	497,22	377,97	507,21
144	248,76	75,24	84,34	667,31	4,47	506,03	503,90	492,87	377,42	507,52
145	247,18	75,42	84,38	717,25	4,47	503,48	502,32	489,02	376,51	507,13
146	246,73	75,60	84,36	759,99	4,45	502,06	500,23	485,61	375,34	506,25
147	246,89	75,67	84,01	776,20	4,37	499,18	497,42	482,65	374,64	503,95
148	246,92	75,66	84,05	766,00	4,37	495,00	493,50	480,16	373,20	502,23
149	245,65	75,30	83,89	754,70	4,37	492,74	490,53	478,03	372,03	499,58
150	244,14	75,52	84,25	750,82	4,37	489,44	486,41	476,22	370,47	495,69
151	243,15	75,31	83,95	752,14	4,37	485,74	482,97	474,70	368,97	492,43
152	241,89	75,46	84,01	755,06	4,27	482,00	480,41	473,46	367,60	488,93
153	240,93	75,24	83,80	757,30	4,37	477,39	476,63	472,40	365,85	486,53
154	239,76	75,55	83,67	758,70	4,27	475,07	472,88	471,56	364,58	482,60
155	239,60	75,90	83,72	758,90	4,27	470,98	469,76	470,91	362,69	479,13
156	239,05	75,79	83,48	758,44	4,27	467,08	466,53	470,50	360,94	476,34
157	238,35	75,73	83,43	757,26	4,27	465,06	463,58	470,25	359,19	472,49
158	237,47	75,64	82,85	755,64	4,17	461,63	460,67	470,22	357,65	469,83
159	236,18	75,65	83,45	753,12	4,17	458,76	457,65	470,32	356,21	467,45
160	235,75	75,90	83,09	750,65	4,17	455,77	455,39	470,53	354,42	464,43
161	295,19	75,89	104,58	745,57	4,17	453,05	452,28	471,64	352,53	461,25

Table with columns: Elapsed Time, Raw data row, Weight, CO, CO2, O2, Gas, Room, Tunnel, Unit (Top, Back, R.Side, L.Side, Bottom), Mass flow 1, DGM 1, DGM 1, Filter 1, Mass flow 2, DGM 2, DGM 2, Filter 2, Tunnel Veloc, Flue draft, Change in Surface Temp. Rows range from 0.00 to 101.00.

Manufacturer: HEARTHSTONE
Model: Mansfield 8013

Run: 2
Project #: PI 20240
Test Duration: 493 min

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

Overall Heating Efficiency: 79,75%
Combustion Efficiency: 97,23%
Heat Transfer Efficiency: 82,03%

Summary table with columns: Eff, Comb Eff, HT Eff, Output, Burn Rate, Grams CO, Input, MC wet. Rows show various efficiency and output metrics.

Ultimate CO2
CO2-ult 19,64
F0 1,062

Summary table with columns: Heat Output, Heat Input, Burn Duration, Burn Rate, Stack Temp. Rows show heating and combustion parameters.

Main data table with columns: Elapsed Time, Weight Remaining, % CO [e], % CO2 [d], Excess Air EA, Total O2, Calc. % O2 [g], Flue Gas (C), Room Temp (C), Combust Eff %, Heat Transfer %, Net Eff %. Contains 93 rows of time-series data.

435,00	0,26	0,01	7,97	146,1%	20,41	12,44	74,5	25,4	100,3%	85,6%	85,9%
436,00	0,26	0,01	7,92	147,6%	20,42	12,49	74,3	25,4	100,3%	85,6%	85,9%
437,00	0,26	0,01	7,84	150,2%	20,42	12,58	74,2	25,4	100,3%	85,6%	85,8%
438,00	0,26	0,01	7,81	151,2%	20,42	12,61	74,3	25,4	100,3%	85,5%	85,8%
439,00	0,26	0,01	7,75	152,9%	20,43	12,67	74,2	25,4	100,3%	85,5%	85,8%
440,00	0,21	0,01	7,71	154,4%	20,43	12,72	74,5	25,4	100,3%	85,5%	85,8%
441,00	0,21	0,01	7,71	154,5%	20,43	12,72	74,9	25,4	100,3%	85,4%	85,7%
442,00	0,21	0,01	7,64	156,7%	20,43	12,79	74,8	25,4	100,3%	85,4%	85,7%
443,00	0,21	0,01	7,64	156,8%	20,43	12,79	74,8	25,4	100,4%	85,4%	85,7%
444,00	0,21	0,01	7,61	157,8%	20,44	12,82	74,8	25,4	100,4%	85,4%	85,7%
445,00	0,21	0,01	7,64	156,7%	20,43	12,79	74,9	25,4	100,3%	85,4%	85,7%
446,00	0,21	0,01	7,54	160,1%	20,44	12,90	74,7	25,4	100,4%	85,4%	85,7%
447,00	0,19	0,01	7,50	161,3%	20,44	12,93	74,8	25,4	100,4%	85,3%	85,6%
448,00	0,21	0,01	7,36	166,6%	20,45	13,09	74,9	25,3	100,4%	85,2%	85,6%
449,00	0,19	0,01	7,31	168,3%	20,46	13,14	74,9	25,4	100,4%	85,2%	85,5%
450,00	0,21	0,01	7,27	169,6%	20,46	13,18	74,8	25,3	100,4%	85,2%	85,5%
451,00	0,17	0,01	7,22	171,4%	20,46	13,23	74,7	25,4	100,4%	85,2%	85,5%
452,00	0,17	0,01	7,20	172,5%	20,46	13,26	74,8	25,3	100,4%	85,2%	85,5%
453,00	0,17	0,01	7,19	172,9%	20,46	13,27	75,0	25,3	100,4%	85,1%	85,5%
454,00	0,17	0,01	7,13	175,0%	20,47	13,33	75,1	25,3	100,4%	85,1%	85,4%
455,00	0,17	0,01	6,98	181,1%	20,48	13,50	75,0	25,3	100,4%	85,0%	85,4%
456,00	0,17	0,01	6,95	182,4%	20,48	13,53	74,8	25,3	100,4%	85,0%	85,4%
457,00	0,17	0,01	6,85	186,3%	20,49	13,63	74,7	25,3	100,5%	85,0%	85,4%
458,00	0,15	0,01	6,80	188,3%	20,49	13,68	74,3	25,3	100,5%	85,0%	85,4%
459,00	0,17	0,01	6,78	189,2%	20,49	13,70	74,4	25,3	100,5%	84,9%	85,3%
460,00	0,17	0,01	6,75	190,5%	20,49	13,74	74,2	25,3	100,5%	84,9%	85,3%
461,00	0,12	0,01	6,67	194,0%	20,50	13,82	74,1	25,3	100,5%	84,9%	85,3%
462,00	0,13	0,01	6,82	187,7%	20,49	13,67	74,1	25,3	100,4%	85,0%	85,4%
463,00	0,12	0,01	6,81	187,7%	20,49	13,67	73,7	25,3	100,4%	85,0%	85,4%
464,00	0,12	0,01	6,80	188,5%	20,49	13,69	73,7	25,3	100,4%	85,0%	85,4%
465,00	0,12	0,01	6,70	192,7%	20,50	13,79	73,5	25,2	100,5%	85,0%	85,4%
466,00	0,12	0,01	6,70	192,5%	20,50	13,79	73,4	25,3	100,5%	85,0%	85,4%
467,00	0,12	0,01	6,69	193,3%	20,50	13,81	73,1	25,2	100,5%	85,0%	85,4%
468,00	0,12	0,01	6,65	194,9%	20,50	13,84	73,0	25,2	100,5%	85,0%	85,4%
469,00	0,12	0,01	6,62	196,2%	20,50	13,88	72,7	25,2	100,5%	85,0%	85,4%
470,00	0,08	0,01	6,54	199,9%	20,51	13,96	72,8	25,2	100,5%	84,9%	85,3%
471,00	0,08	0,01	6,44	204,6%	20,51	14,07	73,2	25,2	100,5%	84,8%	85,3%
472,00	0,08	0,01	6,46	203,7%	20,51	14,05	72,9	25,2	100,5%	84,9%	85,3%
473,00	0,10	0,01	6,46	203,8%	20,51	14,05	72,9	25,2	100,5%	84,9%	85,3%
474,00	0,08	0,01	6,51	201,4%	20,51	14,00	72,8	25,2	100,5%	84,9%	85,3%
475,00	0,08	0,01	6,54	199,8%	20,51	13,96	72,7	25,2	100,5%	85,0%	85,4%
476,00	0,08	0,01	6,65	194,8%	20,50	13,84	72,3	25,2	100,5%	85,1%	85,5%
477,00	0,08	0,01	6,70	192,8%	20,50	13,79	72,3	25,2	100,5%	85,1%	85,5%
478,00	0,08	0,01	6,63	195,5%	20,50	13,86	72,2	25,2	100,5%	85,1%	85,5%
479,00	0,08	0,01	6,63	195,6%	20,50	13,86	72,2	25,2	100,5%	85,1%	85,5%
480,00	0,08	0,01	6,64	195,5%	20,50	13,86	72,2	25,2	100,5%	85,1%	85,5%
481,00	0,08	0,01	6,59	197,6%	20,50	13,91	72,2	25,2	100,5%	85,0%	85,4%
482,00	0,03	0,01	6,55	199,2%	20,51	13,95	72,1	25,2	100,5%	85,0%	85,4%
483,00	0,03	0,01	6,51	201,4%	20,51	14,00	71,9	25,2	100,5%	85,0%	85,4%
484,00	0,03	0,01	6,49	202,2%	20,51	14,02	71,8	25,2	100,5%	85,0%	85,4%
485,00	0,03	0,01	6,65	194,7%	20,50	13,84	71,6	25,2	100,5%	85,1%	85,5%
486,00	0,03	0,01	6,64	195,4%	20,50	13,86	71,7	25,2	100,5%	85,1%	85,5%
487,00	0,03	0,01	6,61	196,9%	20,50	13,89	71,6	25,1	100,5%	85,1%	85,5%
488,00	0,03	0,01	6,52	200,6%	20,51	13,98	71,6	25,1	100,5%	85,1%	85,5%
489,00	0,03	0,01	6,52	200,6%	20,51	13,98	71,3	25,1	100,5%	85,1%	85,5%
490,00	0,03	0,01	6,52	200,6%	20,51	13,98	71,6	25,1	100,5%	85,1%	85,5%
491,00	0,03	0,01	6,49	202,3%	20,51	14,02	71,5	25,1	100,5%	85,0%	85,4%
492,00	0,03	0,01	6,46	203,6%	20,51	14,05	71,4	25,1	100,5%	85,0%	85,4%
493,00	0,00	0,01	6,41	206,1%	20,52	14,10	71,2	25,1	100,5%	85,0%	85,4%

Date: 2020-09-30 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 2 Tech: MM Reviewer: [Signature]

- Loading 500 LBS START FIRE

- Door open

- by pass open

- air inlet full open

- Fan off

- At 25 LBS close Door

- At 100 LBS insert pre load

After 8 min close Door

- At ~~25 min~~ ^{mm} At 71 LBS close by pass
 close air inlet and open fan (low)

- After 25 min ~~mm~~ MOVE WOOD

- At 42 LBS RAKE coal Bed

- After 2 min insert load

- close Door immediately

- After 5 min close air inlet

- At

TEST LOAD CONFIGURATION

PRE / POST CHECKS

Date: 2020-09-30 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 2 Tech: mm Reviewer: SP

Moisture Meter Calibration Check:

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

Pre-Test

Post-Test

Facility Conditions:

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

	(max50 Fpm)	(max50 Fpm)
	0	0
4 sides	ok	NA
	ok	ok

Wood Heater Conditions:

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

2020-09-29
2020-09-29
ok
ok

ok

Temperature System:

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

ok	°F
ok	°F

Proportional Checks:

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

ok
ok
ok

Sampling Train ID Numbers:

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

Train 1 st hour	Train 1	Train 2
4	38	42
710	712	714
711	713	715
4	11	12
ok	ok	ok

SAMPLING EQUIPMENT CHECK OUT

Date: 2020-09-30 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 2 Tech: MM Reviewer: [Signature]

Leakage Checks Tunnel Samplers

	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Unplugged Flow Rate = .25cfm						
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	29549625	29809580	29549651	29809588	05821587	06073785
Initial 1minute DGM (Liter)	29549615	29809570	29549645	29809580	05821584	06073780
Change © (Liter)	010	005	006	003	0	003
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	OK	OK	OK	OK	OK	OK

Leakage Checks Flue Gas Sampler

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

Leakage Checks Pitot

Plugged Probe	Pre Test 3 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

PRE-TEST SCALE AUDIT

Date: 2020-09-30 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 2 Tech: MM Reviewer: DP

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44.0 lbs
Wood	EM-090	440 lbs, Class F	440 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

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

Date: 2020-09-30 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 2 Tech: MM Reviewer: JP

FOR TUNNELS < 12 in

Barometric pressure (P_{bar}) 996 (KPa.) Static pressure (P_q) 0.17 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.077	75.13
B - Centroid	3.00	3.50	4	0.077	75.27
A-1	0.40	0.50	0.50	0.064	75.13
A-2	1.50	1.75	2	0.068	75.14
A-3	4.50	5.25	6	0.070	75.14
A-4	5.60	6.5	7.5	0.063	75.17
B-1	0.40	0.50	0.50	0.063	75.27
B-2	1.50	1.75	2	0.064	75.13
B-3	4.50	5.25	6	0.073	75.13
B-4	5.60	6.5	7.5	0.062	75.25
				AVERAGE	

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

Where,

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

Δ_p = manometer reading (inches H₂O)

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

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

P_q = static pressure in. H₂O
 { 13.6 }

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

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

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

CONTINUOUS ANALYZERS

 Date: 2020-09-30 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 2 Tech: MR Reviewer: SP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2969	3000	1009	1000
Tolerance CO	0	+/- 0.02	0.003	+/- 0.15	0009	+/- 0.05
CO ₂	0	0	1798	1800	977	1000
Tolerance CO ₂	0	+/- 0.02	0.002	+/- 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	2973	1003	0	0.02	0.004	0.15	0.006	0.05	✓	
CO ₂	0	1797	976	0	0.02	0.01	0.5	0.01	0.5	✓	

Date: 2020-09-30 Manufacturer: Heathstone Model: 8013
 Project #: PI 20240 Run: 2 Tech: MM Reviewer: SP

RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	29809508	06073600	20648962
Initial (Liter)	29549730	05821672	20460916

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	996	999
Dry Bulb (F):	76.1	77.3
Humidity (%):	52	50.4

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

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

FUEL DATA

Date: 2020-09-30 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 2 Tech: MM Reviewer: SP

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size		Weight		Meter Moisture Content (% dry)*				
1 1/2	x 3 1/2 x 16 in.	164	lbs.	213	216	219	220	223
1 1/2	x 3 1/2 x 16 in.	168	lbs.	220	224	215	213	214
1 1/2	x 3 1/2 x 16 in.	168	lbs.	218	213	218	217	213
1 1/2	x 3 1/2 x 16 in.	166	lbs.	220	223	224	220	217
1 1/2	x 3 1/2 x 16 in.	164	lbs.	213	213	212	212	214
1 1/2	x 3 1/2 x 16 in.	178	lbs.	213	216	217	213	215
1 1/2	x 3 1/2 x 16 in.	164	lbs.	200	206	204	203	202
1 1/2	x 3 1/2 x 19 in.	192	lbs.	223	221	224	223	223
1 1/2	x 3 1/2 x 19 in.	192	lbs.	223	224	221	220	221
1 1/2	x 3 1/2 x 19 in.	190	lbs.	220	216	213	214	213
1 1/2	x 3 1/2 x 19 in.	188	lbs.	221	220	218	217	216
x	x in.		lbs.					
x	x in.		lbs.					
x	x in.		lbs.					
x	x in.		lbs.					
x	x in.		lbs.					
x	x in.		lbs.					
x	x in.		lbs.					
x	x in.		lbs.					
x	x in.		lbs.					
x	x in.		lbs.					
x	x in.		lbs.					
x	x in.		lbs.					

TEST LOAD WEIGHT: 1934 lbs

FUEL DATA

Date: 2020-09-30 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 2 Tech: MM Reviewer: SO

FUEL DESCRIPTION:

Type of wood :

TEST LOAD

Piece Size		Weight	Meter Moisture Content (% dry)*				
1 1/2	x 3 1/2 x 19 in.	206 lbs.	20 ¹	20 ¹	20 ²	20 ⁰	20 ⁰
1 1/2	x 3 1/2 x 19 in.	172 lbs.	21 ¹	21 ⁶	21 ³	20 ⁰	21 ⁹
1 1/2	x 3 1/2 x 19 in.	186 lbs.	21 ³	21 ⁰	21 ⁰	20 ⁹	20 ⁸
1 1/2	x 3 1/2 x 19 in.	210 lbs.	20 ¹	20 ⁴	20 ⁴	20 ³	20 ⁰
3 1/2	x 3 1/2 x 19 in.	450 lbs.	21 ⁸	21 ³	21 ³	21 ⁶	21 ⁴
3 1/2	x 3 1/2 x 19 in.	428 lbs.	21 ⁷	21 ³	21 ⁸	21 ⁴	21 ³
	x x in.	lbs.					
1 1/2	x 3/4 x 5 in.	0100 lbs.			20 ⁸		
1 1/2	x 3/4 x 5 in.	0100 lbs.			20 ³		
1 1/2	x 3/4 x 5 in.	0100 lbs.			20 ⁴		
1 1/2	x 3/4 x 5 in.	0100 lbs.			21 ⁰		
1 1/2	x 3/4 x 5 in.	0100 lbs.			21 ⁰		
1 1/2	x 3/4 x 5 in.	0100 lbs.			21 ³		
1 1/2	x 3/4 x 5 in.	0100 lbs.			20 ⁹		
1 1/2	x 3/4 x 5 in.	0100 lbs.			20 ⁶		
1 1/2	x 3/4 x 5 in.	0090 lbs.			20 ³		
1 1/2	x 3/4 x 5 in.	0100 lbs.			20 ⁸		
1 1/2	x 3/4 x 5 in.	0080 lbs.			20 ⁹		
1 1/2	x 3/4 x 5 in.	0130 lbs.			20 ⁸		
1 1/2	x 3/4 x 5 in.	0100 lbs.			20 ⁴		
1 1/2	x 3/4 x 5 in.	0110 lbs.			20 ⁴		
1 1/2	x 3/4 x 5 in.	0110 lbs.			20 ⁹		
1 1/2	x 3/4 x 5 in.	0120 lbs.			20 ⁴		
1 1/2	x 3/4 x 5 in.	0080 lbs.			20 ³		
1 1/2	x 3/4 x 5 in.	0120 lbs.			20 ²		
	x x in.	lbs.					
	x x in.	lbs.					

TEST LOAD WEIGHT: 1836 lbs Min 20%: 367..... Max 25%: 460

Date: 2020-09-29 Manufacturer: Healthstone Model: 8013

Project #: PI 20240 Run: 2 Tech: MM Reviewer: DP

Pre-test Weight Record	SYSTEM 1 - 1 st hour					SYSTEM 1				
	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank	
Date	11	710	711	33	38	712	713	35	716	
2020-09-29 17:00	937205	01289	01278	346481	1104356	01264	01274	348946	01275	
2020-09-30 9:00	937206	01288	01277	346482	1104357	01265	01273	348945	01275	

Post-test Weight Record	SYSTEM 1 - 1 st hour					SYSTEM 1				
	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank	
Date	11	710	711	33	38	712	713	35	716	
2020-09-30 21:00	937209	01282	01270	346512	1104359	01271	01272	348969	01276	
2020-10-08 8:00	937207	01282	01270	346496	1104357	01268	01270	348958	01275	
2020-10-13 8:00	937207	01283	01271	346496	1104357	01268	01270	348958	01275	



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-09-29

Manufacturer: Heartkstone

Model: 8013

Project #: PI 20240 Run: 2

Tech: M M

Reviewer: MP

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	42	714	715	39
2020-09-29	17:00	110 3150	01262	01272	34 3650
2020-09-30	9:00	110 3151	01261	01271	34 3649

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	42	714	715	39
2020-09-30	21:00	110 3154	01269	01271	34 3679
2020-10-08	8:00	110 3152	01266	01271	34 3662
2020-10-13	8:00	110 3151	01266	01271	34 3662

Paramètres

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

Code verrouillage:

Description du test

Test standard	EPA
Run #	3
Date	01-10-2020
Technicien	M.M
Project #	PI 20240

Description de l'unité

Manufacturier	HEARTHSTONE	
Modèle	Mansfield 8013	
Combustion system	Cat	
Appliance type	WOOD STOVE	
Firebox volume	2,88	cu ft.
Appliance weight empty	N.A	lbs
Appliance weight full	N.A	lbs

Paramètres du test

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

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	1,007	Dimensionless
Equipment number (DGM #1):	EM 178	
Calibration Factor (DGM #2):	1,008	Dimensionless
Equipment number (DGM #2):	EM 318	
Calibration Factor (DGM #3):	1,014	Dimensionless
Equipment number (DGM #3):	EM 179	Dimensionless

Tunnel

Targeted tunnel flow rate	350	scfm
Tunnel diameter	8	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	PI 20240
Date	01-10-2020
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

FUEL LOAD DATA SHEET, CSA B415

Test Load Weight:

Lower	Ideal	Upper
18,1	20,2	22,2

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

Load Volume: cu. ft Loading Density: 6,4 lbs./ft³

Number of Spaces: Load Density (wet): 33,0 lbs./ft³
Spacer weight: lbs Dry Wood Density: 27,2 lbs./ft³

Piece Size (in):			Weight lbs	Meter Moisture Content					Ave. MC x Weight	Volume Cubic Inches	Ave. MC %
Thick	Wide	Length		Dry Uncorrected %							
1,5	3,5	19	1,86	21,90	21,60	21,80	21,90	22,00	40,6224	99,75	21,8
1,5	3,5	19	1,74	20,90	21,00	21,30	21,40	21,20	36,8184	99,75	21,2
1,5	3,5	19	1,82	21,00	20,80	20,60	20,90	20,80	37,8924	99,75	20,8
1,5	3,5	19	1,84	20,70	20,60	20,90	20,80	20,70	38,1616	99,75	20,7
3,5	3,5	19	5,12	21,90	22,30	22,80	22,70	23,00	115,4048	232,75	22,5
3,5	3,5	19	4,14	21,90	22,00	21,10	21,10	21,30	88,9272	232,75	21,5
										0,00	
1,5	0,75	5	0,10			19,30			1,93	5,63	19,3
1,5	0,75	5	0,08			19,80			1,584	5,63	19,8
1,5	0,75	5	0,08			19,40			1,552	5,63	19,4
1,5	0,75	5	0,10			19,30			1,93	5,63	19,3
1,5	0,75	5	0,10			19,90			1,99	5,63	19,9
1,5	0,75	5	0,10			20,00			2	5,63	20,0
1,5	0,75	5	0,12			20,60			2,472	5,63	20,6
1,5	0,75	5	0,10			20,40			2,04	5,63	20,4
1,5	0,75	5	0,10			20,30			2,03	5,63	20,3
1,5	0,75	5	0,12			20,80			2,496	5,63	20,8
1,5	0,75	5	0,10			20,40			2,04	5,63	20,4
1,5	0,75	5	0,10			20,60			2,06	5,63	20,6
1,5	0,75	5	0,1			20,10			2,01	5,63	20,1
1,5	0,75	5	0,1			20,00			2	5,63	20,0
1,5	0,75	5	0,12			20,00			2,4	5,63	20,0
1,5	0,75	5	0,1			20,9			2,09	5,63	20,9
1,5	0,75	5	0,18			20,8			3,744	5,63	20,8
1,5	0,75	5	0,12			20,7			2,484	5,63	20,7
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
									SUM MCx	396,6788	20,5 %

Test Load Weight: lbs.

Dry Weight: kg.

Average Moisture Content: %

Dry: Dry(EPA) 21,51
Dry(B415) 21,51

Must be 19-25

Wet: must be 15,2-22

Coal Bed Range: lbs. to lbs.

TEST CHARGE:

Coal bed weight: lbs.

Project nu.	PI 20240
Date	01-10-2020
Technicien	<input type="text" value="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	7	719	720	4	21	721	722	19	43	723	724	42	725		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,4752	0,1266	0,1274	33,5866	108,7401	0,1272	0,1270	35,0085	109,1661	0,1272	0,1290	35,3422	0,1279	2020-09-30	17:00
Before (6)	61,4753	0,1265	0,1275	33,5867	108,7400	0,1271	0,1269	35,0084	109,1660	0,1273	0,1291	35,3423	0,1278	2020-10-01	09:00
After (1)	61,4755	0,1269	0,1277	33,5887	108,7402	0,1265	0,1261	35,0101	109,1662	0,1271	0,1282	35,3451	0,1279	2020-10-01	16:00
After (2)	61,4754	0,1269	0,1276	33,5878	108,7401	0,1265	0,1262	35,0098	109,1661	0,1271	0,1282	35,3450	0,1278	2020-10-08	08:00
After (3)	61,4754	0,1269	0,1276	33,5878	108,7401	0,1265	0,1262	35,0098	109,1661	0,1271	0,1282	35,3450	0,1278	2020-10-13	08:00
After (4)															
After (5)															
After (6)	61,4754	0,1269	0,1276	33,5878	108,7401	0,1265	0,1262	35,0098	109,1661	0,1271	0,1282	35,3450	0,1278	2020-10-13	08:00
Difference	0,0001	0,0004	0,0001	0,0011	0,0001	-0,0006	-0,0007	0,0014	0,0001	-0,0002	-0,0009	0,0027	0,0000		
Total (mg)		1,7			1,9					1,7			0		
Total ajusté (mg)		1,70			1,90					1,70					

Project nu.	PI 20240
Date	01-10-2020
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	7	719	720	4	21	721	722	19	43	723	724	42	725		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,4752	0,1266	0,1274	33,5866	108,7401	0,1272	0,1270	35,0085	109,1661	0,1272	0,1290	35,3422	0,1279	2020-09-30	17:00
Before (6)	61,4753	0,1265	0,1275	33,5867	108,7400	0,1271	0,1269	35,0084	109,1660	0,1273	0,1291	35,3423	0,1278	2020-10-01	09:00
After (1)	61,4755	0,1269	0,1277	33,5887	108,7402	0,1265	0,1261	35,0101	109,1662	0,1271	0,1282	35,3451	0,1279	2020-10-01	16:00
After (2)	61,4754	0,1269	0,1276	33,5878	108,7401	0,1265	0,1262	35,0098	109,1661	0,1271	0,1282	35,3450	0,1278	2020-10-08	08:00
After (3)	61,4754	0,1269	0,1276	33,5878	108,7401	0,1265	0,1262	35,0098	109,1661	0,1271	0,1282	35,3450	0,1278	2020-10-13	08:00
After (4)															
After (5)															
After (6)	61,4754	0,1269	0,1276	33,5878	108,7401	0,1271	0,1269	35,0098	109,1661	0,1273	0,1291	35,3450	0,1278	2020-10-13	08:00
Difference	0,0001	0,0004	0,0001	0,0011	0,0001	0,0000	0,0000	0,0014	0,0001	0,0000	0,0000	0,0027	0,0000		
Total (mg)		1,7				3,2				2,8			0		
Total ajusté (mg)		1,70				3,20				2,80					

Project nu.	PI 20240
Date	01-10-2020
Technicien	M.M

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 1,2 g/hr
 Burn Rate : 2,307 Dry kg/hr

Test Duration: 179 min

PRESSURE FACTOR: DGM 1 0,96695
 DGM 2 0,97046
 DGM 3 0,99289

BAROMETRIC PRESSURE
 Average: 29,707169 in Hg
 Start: 29,648109 in Hg
 End: 29,766229 in Hg

TEMPERATURE FACTORS DGM 1 0,97367
 DGM 2 0,95238
 DGM 3 0,97918

DGM CONTROLLER VALUES
 DGM 1 Final: 10560,369 Cuft
 Initial: 10527,161 Cuft

VOLUMES SAMPLED DGM 1 31,490 Scft
 DGM 2 30,521 Scft
 DGM 3 23,637 Scft

DGM 2 Final: 2177,834 Cuft
 Initial: 2145,063 Cuft

DGM #3 Final: 7316,094 Cuft
 Initial: 7292,119 Cuft

TOTAL TUNNEL VOLUME : 60765

SAMPLE RATIOS
 Sample Train 1: 1929,701
 Sample Train 2: 1990,922

TEMPERATURES
 DGM 1 542,277 °R
 DGM 2 554,403 °R

Paticulate concentration
 Sample Train 1 **0,000060** g/dscf
 Sample Train 2 **0,000056** g/dscf
 Room **0,000000** g/dscf

CALIBRATION FACTORS
 DGM 1 1,0072
 DGM 2 1,0077
 DGM #3 1,0140

TUNNEL FLOW RATE: 339,472 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **3,67** g
 Sample Train 2 **3,38** g

PARTICULATE CATCH
 Total Sample Train 1: 1,90 mg
 Total Sample Train 2: 1,70 mg
 Total Sample Train 1 1st hour: 1,70 mg

EMISSION RATES
 Sample Train 1 **1,23** g/hr
 Sample Train 2 **1,13** g/hr

1st hour emission rate **3,28** g/hr

DEVIATION: 4,00%

Cs Train 1 Train 2
 6,034E-05 5,56988E-05

Temps acquisition minutes	Flue	Room	Tunnel	Catalyst up	scale	Right	Back	bottom	Top	Left
	temp	temp	dry bulb							
	°F	°F	°F	°F	lbs	°F	°F	°F	°F	°F
1	73,79	72,51	72,72	75,02	4,97	76,62	77,38	78,21	76,65	77,01
2	88,43	72,47	74,61	80,80	4,87	76,58	77,34	89,41	76,60	76,99
3	95,60	72,47	74,90	89,51	4,87	76,67	77,51	121,44	76,64	77,18
4	106,29	72,49	76,08	102,55	4,78	76,97	77,98	128,66	76,67	77,72
5	97,73	72,45	74,73	111,61	4,87	77,61	78,73	129,33	76,78	78,49
6	91,46	72,46	74,28	108,78	4,77	78,32	79,42	127,83	76,84	79,22
7	102,59	72,24	76,82	105,65	4,97	78,98	79,99	128,46	76,95	79,79
8	131,87	72,44	82,56	135,92	4,57	79,57	80,61	132,81	77,05	80,30
9	167,15	72,54	90,11	202,87	4,47	80,65	81,70	141,53	77,23	81,15
10	204,77	72,56	99,90	270,74	4,27	82,65	83,69	160,48	77,50	82,62
11	244,50	72,42	110,87	354,86	4,16	85,95	87,12	184,91	77,95	85,10
12	294,67	72,50	125,84	467,59	3,87	91,21	92,15	211,24	78,58	88,95
13	302,14	72,61	128,84	530,42	3,67	99,55	98,56	245,00	79,45	93,94
14	335,77	72,48	141,47	536,01	3,37	110,62	105,60	288,64	80,60	99,98
15	365,57	72,66	151,27	568,78	3,07	123,40	113,78	331,06	82,08	106,93
16	364,08	72,60	151,93	564,19	2,87	136,63	123,01	370,61	83,77	114,80
17	390,85	72,75	161,97	557,74	2,57	150,20	132,65	417,07	85,58	123,43
18	384,17	72,73	109,67	534,92	2,27	162,92	142,93	463,54	87,56	132,78
19	358,32	72,79	95,95	483,92	2,17	175,39	152,52	496,88	90,12	143,49
20	342,54	72,62	92,24	453,65	2,07	187,39	160,52	522,18	93,24	153,84
21	337,05	72,71	90,40	440,03	1,97	198,32	167,15	535,27	96,73	163,35
22	331,45	72,78	89,28	431,36	1,97	208,56	172,66	539,43	100,28	171,68
23	330,88	72,85	88,44	422,91	1,87	217,99	177,44	541,48	103,94	179,25
24	327,35	72,95	88,23	415,96	1,77	227,08	181,68	547,26	107,52	186,11
25	327,21	72,71	88,10	415,68	1,67	235,37	185,52	554,19	110,99	192,17
26	324,07	72,62	87,83	415,83	1,57	243,39	189,00	562,76	114,41	197,63
27	321,43	72,75	87,75	414,53	1,47	251,29	192,27	575,48	117,81	202,59
28	314,47	72,61	86,95	407,68	1,47	258,62	195,38	590,74	121,08	207,08
29	312,05	72,68	87,00	405,42	1,37	265,69	198,31	602,69	124,27	211,18
30	308,89	72,49	86,78	402,68	1,37	271,92	201,04	608,12	127,28	215,02
31	299,00	72,55	86,01	393,93	1,27	276,48	203,61	614,31	130,08	218,68
32	286,12	72,54	85,30	382,95	1,27	280,81	205,96	626,80	132,70	222,10
33	281,38	72,64	85,51	380,16	1,17	284,14	207,96	629,82	135,08	225,18
34	278,26	72,67	84,90	378,43	1,17	285,83	209,78	628,13	137,28	227,84
35	277,15	72,82	84,51	377,53	1,17	287,17	211,49	626,39	139,30	230,63
36	278,03	72,68	84,51	378,04	1,17	287,83	213,12	627,21	141,17	233,58
37	276,39	72,85	84,46	375,96	1,07	288,26	214,76	633,13	142,98	236,76
38	274,11	72,83	84,37	373,97	1,07	287,57	216,43	634,62	144,79	240,32
39	273,34	72,83	84,61	374,17	0,97	287,92	218,02	636,13	146,49	243,47
40	279,19	72,99	96,61	379,33	1,07	287,61	219,85	639,67	148,19	246,48
41	264,15	72,69	118,67	313,83	15,58	287,93	222,18	640,24	149,82	249,39
42	261,24	72,87	122,24	274,61	19,78	287,56	224,66	645,10	151,34	251,87
43	290,61	72,68	132,01	266,93	19,48	286,77	227,96	654,87	152,46	253,64
44	267,43	72,51	124,07	309,09	19,28	285,71	232,66	650,55	153,46	254,31
45	272,22	72,89	126,76	306,73	15,69	284,84	237,84	640,08	154,19	254,77
46	266,87	72,92	91,57	316,86	18,93	283,55	242,96	637,21	154,80	255,31
47	261,47	72,96	87,59	322,71	18,88	281,77	246,54	634,77	155,33	256,52
48	257,59	73,12	86,08	327,08	18,81	281,02	248,47	633,04	156,08	257,40
49	263,51	72,94	86,31	340,99	18,68	281,47	249,21	633,02	156,86	257,52
50	295,03	72,81	87,63	382,20	18,58	279,77	249,16	633,95	157,83	257,69
51	334,94	72,84	89,95	422,66	18,38	279,44	249,27	636,25	159,07	257,59
52	334,25	72,62	89,52	411,26	18,28	280,09	249,96	641,83	161,06	257,90
53	336,62	73,13	89,68	413,21	18,18	282,32	250,84	647,49	163,43	259,38
54	328,27	72,77	89,29	408,19	18,00	284,13	251,70	650,20	166,23	261,76
55	314,07	72,73	88,40	398,30	17,98	285,25	252,26	653,73	169,04	265,28
56	312,42	72,85	88,98	399,41	17,78	285,89	252,47	659,35	171,53	268,90
57	313,75	72,68	88,65	402,72	17,78	285,86	252,25	664,85	173,80	271,99
58	316,65	72,69	89,25	406,09	17,58	285,37	251,91	669,97	175,89	274,21
59	325,23	72,72	89,89	415,37	17,48	285,30	251,59	675,15	177,84	275,96
60	346,85	72,82	91,51	433,71	17,28	285,01	251,58	679,77	179,81	277,52
61	399,10	72,74	95,87	485,05	17,08	285,53	252,22	683,47	182,02	279,28
62	435,73	72,95	98,82	533,92	16,78	286,76	253,92	682,65	185,00	282,29
63	449,03	73,02	99,75	556,59	16,48	289,72	256,61	678,99	189,54	287,11
64	447,40	73,19	99,75	558,74	16,28	294,67	259,81	677,70	195,55	293,54
65	449,58	73,11	100,96	563,99	16,08	300,84	263,17	678,37	201,72	300,97
66	449,06	73,46	100,38	562,27	15,78	307,57	266,44	679,47	207,71	308,70
67	456,24	73,07	101,22	566,42	15,68	314,12	269,67	682,18	213,35	316,39
68	484,67	73,21	103,96	603,37	15,38	320,84	272,88	685,07	218,73	324,02
69	511,02	73,23	107,05	634,88	15,08	328,41	276,71	687,74	224,39	331,35
70	541,97	73,35	110,07	668,12	14,78	336,69	281,22	690,27	231,40	338,74
71	550,91	73,37	111,40	687,74	14,48	344,89	286,32	689,48	239,59	346,65
72	550,04	73,73	111,53	691,10	14,18	353,99	291,66	688,51	248,59	354,77
73	549,00	73,00	111,52	696,98	13,98	361,87	297,20	687,35	257,58	363,14
74	553,15	73,66	110,26	703,43	13,68	371,45	302,96	686,79	265,38	370,79
75	556,87	73,46	112,32	711,99	13,28	378,97	309,20	686,61	274,49	380,43
76	561,78	73,69	112,90	720,28	13,08	386,33	315,81	685,56	282,37	389,71
77	566,77	73,79	113,41	734,20	12,78	394,44	322,81	683,93	290,28	398,70
78	573,65	73,74	113,28	745,57	12,48	402,85	330,14	682,07	297,83	407,50
79	582,51	73,61	115,34	759,31	12,18	411,09	337,67	677,86	305,51	416,21
80	576,29	73,91	114,15	767,41	11,87	420,16	340,91	673,97	312,45	424,23
81	543,53	74,00	108,16	946,56	11,66	429,21	342,84	664,83	313,96	431,84
82	538,31	73,78	107,22	967,24	11,38	436,75	347,60	658,12	319,31	441,68
83	536,71	74,04	106,31	989,48	11,17	446,26	351,60	650,39	325,26	450,82
84	538,79	74,22	106,80	996,88	10,88	454,20	357,38	642,95	331,54	459,98
85	535,90	74,25	106,41	978,39	10,68	464,91	362,83	636,74	336,75	464,99
86	530,32	74,07	105,26	959,01	10,47	471,85	368,70	631,54	342,68	474,32
87	526,12	74,33	105,98	965,30	10,18	480,79	374,94	627,28	348,07	482,56
88	520,79	73,92	105,44	943,10	10,08	487,23	382,34	623,01	353,45	489,66
89	514,80	74,50	105,11	921,21	9,87	494,78	388,58	619,52	358,03	496,46

90	510,74	74,60	104,84	910,71	9,68	502,69	394,07	619,06	361,76	503,25
91	506,50	74,64	104,39	906,93	9,48	508,94	400,98	620,42	365,67	510,00
92	504,68	74,69	103,95	905,41	9,28	514,96	406,88	623,97	369,14	516,14
93	503,31	74,54	103,44	905,24	9,07	520,43	413,28	628,88	372,29	521,77
94	502,46	74,78	103,69	910,26	8,88	525,77	419,15	632,75	375,69	527,71
95	501,42	74,86	103,55	916,77	8,78	531,46	424,33	636,65	377,74	533,10
96	499,86	74,89	103,41	915,56	8,57	536,47	429,68	640,79	380,57	538,51
97	498,84	74,93	103,21	919,95	8,37	541,71	434,96	646,15	383,38	543,77
98	497,63	75,13	103,31	926,71	8,18	547,11	439,76	651,46	384,97	548,32
99	497,96	75,19	103,24	928,21	7,98	552,13	444,91	656,61	387,36	552,85
100	498,53	75,03	103,07	924,79	7,77	557,08	448,30	662,53	389,95	557,29
101	497,91	74,76	102,56	923,80	7,67	562,03	453,27	668,52	391,95	560,97
102	499,61	74,67	102,86	924,73	7,41	564,04	457,67	674,54	394,03	566,02
103	501,44	74,91	102,68	934,87	7,27	567,97	460,59	678,21	396,88	570,71
104	501,02	75,04	102,90	934,90	7,07	575,37	465,15	679,73	398,36	574,13
105	499,01	74,93	102,58	936,35	6,88	577,70	469,91	677,69	401,04	579,22
106	499,55	75,31	102,67	941,69	6,78	583,42	472,83	677,59	403,27	582,77
107	675,39	75,89	154,85	1141,43	6,27	588,40	478,17	685,32	405,56	587,73
108	579,17	75,85	113,80	1008,35	6,04	593,89	483,60	678,79	407,30	591,44
109	547,66	75,99	108,36	978,86	5,77	599,22	488,76	666,24	410,42	595,46
110	540,54	76,10	106,94	991,09	5,57	603,91	490,94	653,51	413,84	599,58
111	533,57	76,05	105,35	992,51	5,48	608,50	493,61	642,29	417,85	603,81
112	523,20	76,07	104,32	940,73	5,28	612,83	494,91	633,06	421,16	607,66
113	510,54	75,87	103,52	897,51	5,22	617,37	497,28	625,62	424,33	611,59
114	498,78	76,04	102,50	868,00	5,07	621,01	499,07	619,20	426,72	615,09
115	489,85	75,93	101,26	848,61	4,97	623,99	499,91	613,22	427,79	619,23
116	482,20	76,10	100,89	838,97	4,87	625,95	499,94	607,68	428,64	619,41
117	476,17	75,81	100,47	832,77	4,78	625,90	500,06	602,69	427,95	619,77
118	471,23	74,93	100,10	826,73	4,69	626,18	499,55	598,42	427,06	620,69
119	467,70	75,42	99,91	821,71	4,57	625,38	499,07	594,88	425,70	619,20
120	464,04	75,86	99,28	818,05	4,51	623,95	499,27	591,89	425,16	622,32
121	461,85	75,52	99,31	814,40	4,47	620,66	499,23	590,28	424,96	622,12
122	459,14	75,58	98,91	810,67	4,28	620,29	498,31	590,28	423,66	622,91
123	455,57	75,71	98,47	804,68	4,27	618,36	498,01	591,37	422,29	623,44
124	451,29	75,58	97,98	798,08	4,17	616,01	498,31	593,07	421,40	624,15
125	448,83	75,87	97,83	793,74	4,08	614,90	496,91	594,96	420,26	624,43
126	444,23	75,93	97,75	786,09	3,98	612,97	495,47	597,13	418,84	624,42
127	439,97	75,53	97,49	778,31	3,98	609,93	494,28	599,24	417,64	624,70
128	435,82	76,15	96,77	767,67	3,87	608,36	493,48	600,96	415,75	625,57
129	431,75	75,85	96,44	758,12	3,77	606,89	491,80	602,48	413,61	625,63
130	427,28	76,09	96,17	748,97	3,77	604,89	491,21	603,91	411,65	623,96
131	423,17	76,01	95,79	744,01	3,77	603,22	490,32	605,10	410,27	624,13
132	471,27	76,23	124,78	712,37	4,52	601,59	490,12	606,98	408,34	623,22
133	456,03	76,43	108,29	604,71	3,67	599,11	489,07	605,11	406,95	622,60

Table with columns for Elapsed Time, Raw data row, Weight, CO, CO2, O2, Gas, Fluor, Room, Tunnel, and various measurement units for Mass flow, DGM, Filter, and Tunnel Velocity.

Manufacturer: HEARTHSTONE
Model: Mansfield 8013

Run: 3
Project #: PI 20240
Test Duration: 179 min

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

Overall Heating Efficiency: 74,24%
Combustion Efficiency: 98,12%
Heat Transfer Efficiency: 75,67%

Table with 3 columns: Parameter (Eff, Comb Eff, HT Eff, Output, Burn Rate, Grams CO, Input, MC wet), HHV, LHV.

Ultimate CO2
CO2-ult 19,64
F0 1,062

Heat Output: 32 200 Btu/h
Heat Input: 43 371 Btu/h
Burn Duration: 2,98 h
Burn Rate: 5,09 lb/h
Stack Temp: 446,2 Deg. F

Main data table with columns: Elapsed Time, Weight Remaining (kg), % CO [e], % CO2 [d], Excess Air EA, Total O2, Calc. % O2 [g], Flue Gas (°C), Room Temp (°C), Combust Eff, Heat Transfer %, Net Eff. Rows range from 0,00 to 92,00 minutes.

93,00	1,08	0,01	8,71	125,1%	20,36	11,65	213,1	27,1	100,3%	74,9%	75,1%
94,00	1,08	0,01	8,73	124,7%	20,36	11,63	211,9	27,1	100,3%	75,0%	75,2%
95,00	1,03	0,01	8,74	124,3%	20,36	11,61	211,4	27,1	100,3%	75,1%	75,3%
96,00	1,03	0,01	8,73	124,7%	20,36	11,63	209,7	27,1	100,3%	75,2%	75,4%
97,00	1,03	0,01	7,94	147,1%	20,42	12,47	208,5	27,1	100,3%	74,0%	74,3%
98,00	1,03	0,01	7,92	147,6%	20,42	12,49	207,7	27,3	100,3%	74,1%	74,3%
99,00	0,99	0,01	7,95	146,6%	20,41	12,45	207,1	27,3	100,3%	74,2%	74,4%
100,00	0,99	0,01	7,95	146,5%	20,41	12,45	206,0	27,3	100,3%	74,3%	74,5%
101,00	0,94	0,01	8,04	144,0%	20,41	12,37	205,5	27,4	100,3%	74,5%	74,7%
102,00	0,95	0,01	8,02	144,6%	20,41	12,38	204,8	27,4	100,3%	74,5%	74,8%
103,00	0,94	0,01	8,05	143,5%	20,41	12,35	203,9	27,4	100,3%	74,6%	74,9%
104,00	0,94	0,01	8,10	142,0%	20,40	12,29	203,3	27,5	100,3%	74,8%	75,0%
105,00	0,90	0,01	8,14	141,0%	20,40	12,26	202,6	27,4	100,3%	74,9%	75,1%
106,00	0,90	0,01	8,20	139,2%	20,40	12,19	202,2	27,5	100,3%	75,0%	75,3%
107,00	0,90	0,01	8,20	139,2%	20,40	12,19	201,3	27,5	100,3%	75,1%	75,3%
108,00	0,90	0,01	8,15	140,6%	20,40	12,24	201,1	27,5	100,3%	75,1%	75,3%
109,00	0,85	0,01	8,18	139,7%	20,40	12,21	200,6	27,6	100,3%	75,2%	75,4%
110,00	0,85	0,01	8,20	139,2%	20,40	12,19	199,7	27,6	100,3%	75,3%	75,5%
111,00	0,85	0,01	8,18	139,6%	20,40	12,21	199,4	27,5	100,3%	75,3%	75,5%
112,00	0,81	0,01	8,19	139,6%	20,40	12,21	198,7	27,5	100,3%	75,3%	75,6%
113,00	0,81	0,01	8,10	142,0%	20,40	12,29	198,6	27,5	100,3%	75,2%	75,4%
114,00	0,81	0,01	7,74	153,3%	20,43	12,68	198,3	27,5	100,3%	74,6%	74,9%
115,00	0,76	0,01	7,67	155,6%	20,43	12,75	198,3	27,2	100,3%	74,5%	74,7%
116,00	0,76	0,01	7,66	156,1%	20,43	12,77	198,4	27,2	100,3%	74,5%	74,7%
117,00	0,73	0,01	7,62	157,2%	20,44	12,81	198,5	27,3	100,3%	74,4%	74,6%
118,00	0,71	0,01	7,64	156,7%	20,43	12,79	198,4	27,2	100,3%	74,4%	74,7%
119,00	0,71	0,01	7,59	158,3%	20,44	12,84	198,6	27,4	100,3%	74,3%	74,6%
120,00	0,71	0,01	7,59	158,3%	20,44	12,84	198,4	27,4	100,3%	74,4%	74,6%
121,00	0,71	0,01	7,54	160,0%	20,44	12,89	198,6	27,0	100,3%	74,2%	74,5%
122,00	0,67	0,01	7,46	162,8%	20,45	12,98	198,5	27,0	100,4%	74,1%	74,3%
123,00	0,67	0,01	7,46	162,9%	20,45	12,98	197,9	27,2	100,4%	74,1%	74,4%
124,00	0,67	0,01	7,43	164,1%	20,45	13,02	197,1	27,3	100,4%	74,2%	74,4%
125,00	0,67	0,01	7,39	165,3%	20,45	13,05	196,8	27,2	100,4%	74,1%	74,4%
126,00	0,62	0,01	7,41	164,8%	20,45	13,04	196,6	27,1	100,4%	74,2%	74,4%
127,00	0,62	0,01	7,39	165,2%	20,45	13,05	196,1	27,1	100,4%	74,2%	74,5%
128,00	0,59	0,01	7,39	165,3%	20,45	13,05	195,7	26,6	100,4%	74,2%	74,5%
129,00	0,58	0,01	7,34	167,0%	20,45	13,10	195,7	26,9	100,4%	74,1%	74,4%
130,00	0,58	0,01	7,31	168,2%	20,46	13,14	195,1	27,1	100,4%	74,1%	74,4%
131,00	0,58	0,01	7,26	170,1%	20,46	13,19	194,8	27,1	100,4%	74,1%	74,4%
132,00	0,53	0,01	7,19	172,5%	20,46	13,26	194,2	27,1	100,4%	74,0%	74,3%
133,00	0,53	0,01	7,18	173,1%	20,47	13,28	194,5	27,0	100,4%	73,9%	74,2%
134,00	0,53	0,01	7,15	174,2%	20,47	13,31	194,2	26,9	100,4%	73,9%	74,2%
135,00	0,49	0,01	7,18	173,2%	20,47	13,28	194,0	27,0	100,4%	74,0%	74,3%
136,00	0,53	0,01	7,14	174,5%	20,47	13,32	193,8	27,0	100,4%	73,9%	74,2%
137,00	0,49	0,01	7,09	176,5%	20,47	13,37	193,7	26,9	100,4%	73,8%	74,1%
138,00	0,44	0,01	7,06	177,7%	20,47	13,41	193,6	26,9	100,4%	73,8%	74,1%
139,00	0,44	0,01	7,04	178,4%	20,47	13,43	192,7	26,5	100,4%	73,8%	74,1%
140,00	0,44	0,01	7,08	177,0%	20,47	13,39	192,3	26,7	100,4%	73,9%	74,2%
141,00	0,44	0,01	7,01	179,6%	20,48	13,46	191,7	26,8	100,4%	73,9%	74,2%
142,00	0,44	0,01	7,00	180,2%	20,48	13,47	191,2	26,8	100,4%	73,9%	74,2%
143,00	0,44	0,01	6,85	186,4%	20,49	13,63	191,2	26,9	100,4%	73,6%	73,9%
144,00	0,40	0,01	6,85	186,4%	20,49	13,64	190,8	26,9	100,4%	73,6%	73,9%
145,00	0,40	0,01	6,85	186,3%	20,49	13,63	190,6	27,0	100,4%	73,6%	74,0%
146,00	0,35	0,01	6,80	188,4%	20,49	13,69	190,3	26,8	100,4%	73,5%	73,9%
147,00	0,35	0,01	6,80	188,5%	20,49	13,69	190,2	26,9	100,4%	73,6%	73,9%
148,00	0,35	0,01	6,75	190,6%	20,49	13,74	190,2	26,6	100,5%	73,4%	73,8%
149,00	0,35	0,01	6,75	190,6%	20,49	13,74	190,0	26,8	100,5%	73,5%	73,8%
150,00	0,31	0,01	6,77	189,9%	20,49	13,72	189,4	26,8	100,5%	73,6%	73,9%
151,00	0,31	0,01	6,77	189,8%	20,49	13,72	188,8	26,8	100,5%	73,6%	74,0%
152,00	0,30	0,01	6,73	191,2%	20,49	13,75	189,0	26,7	100,5%	73,5%	73,9%
153,00	0,30	0,01	6,70	192,6%	20,50	13,79	188,8	26,9	100,5%	73,5%	73,8%
154,00	0,30	0,01	6,62	196,2%	20,50	13,88	188,4	26,6	100,5%	73,3%	73,7%
155,00	0,26	0,01	6,59	197,7%	20,50	13,91	188,1	26,8	100,5%	73,3%	73,7%
156,00	0,26	0,01	6,56	199,1%	20,51	13,95	188,3	26,6	100,5%	73,2%	73,6%
157,00	0,26	0,01	6,52	200,7%	20,51	13,98	188,3	26,7	100,5%	73,1%	73,5%
158,00	0,22	0,01	6,52	200,7%	20,51	13,98	188,2	26,8	100,5%	73,1%	73,5%
159,00	0,22	0,01	6,34	209,3%	20,52	14,18	187,3	26,7	100,5%	72,8%	73,2%
160,00	0,22	0,01	6,28	212,3%	20,52	14,24	186,7	26,8	100,5%	72,7%	73,1%
161,00	0,22	0,01	6,21	215,8%	20,53	14,31	186,7	26,8	100,5%	72,6%	73,0%
162,00	0,17	0,01	6,16	218,3%	20,53	14,37	186,4	26,8	100,5%	72,5%	72,9%
163,00	0,17	0,01	6,13	220,0%	20,53	14,40	186,2	26,8	100,5%	72,4%	72,8%
164,00	0,17	0,01	6,08	222,4%	20,54	14,45	186,2	26,7	100,5%	72,3%	72,7%
165,00	0,17	0,01	6,08	222,5%	20,54	14,45	186,3	26,7	100,5%	72,3%	72,7%
166,00	0,12	0,01	6,02	226,0%	20,54	14,52	186,0	26,5	100,6%	72,1%	72,5%
167,00	0,12	0,01	6,04	224,4%	20,54	14,49	185,6	26,6	100,6%	72,3%	72,7%
168,00	0,12	0,01	6,03	225,2%	20,54	14,51	185,3	26,7	100,6%	72,3%	72,7%
169,00	0,12	0,01	5,95	229,8%	20,55	14,60	184,5	26,6	100,6%	72,1%	72,5%
170,00	0,12	0,01	5,93	230,7%	20,55	14,61	183,7	26,6	100,6%	72,2%	72,6%
171,00	0,08	0,01	6,06	223,5%	20,54	14,47	182,7	26,7	100,6%	72,6%	73,0%
172,00	0,08	0,01	6,03	225,3%	20,54	14,51	182,2	26,7	100,6%	72,6%	73,0%
173,00	0,03	0,01	6,03	225,4%	20,54	14,51	181,7	26,7	100,6%	72,7%	73,1%
174,00	0,03	0,01	5,98	228,1%	20,54	14,56	181,7	26,7	100,6%	72,5%	72,9%
175,00	0,03	0,01	5,95	229,6%	20,55	14,59	181,4	26,6	100,6%	72,5%	72,9%
176,00	0,03	0,01	5,98	227,9%	20,54	14,56	181,5	26,6	100,6%	72,5%	73,0%
177,00	0,03	0,01	6,01	226,3%	20,54	14,53	180,8	26,6	100,6%	72,7%	73,1%
178,00	0,03	0,01	6,01	226,3%	20,54	14,53	180,7	26,6	100,6%	72,7%	73,1%
179,00	0,00	0,01	6,01	226,3%	20,54	14,53	180,1	26,5	100,6%	72,8%	73,2%

Date: 2020-10-01 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 3 Tech: MM Reviewer: NP

- kindling 500LBS start fire
- Door open
- by pass open
- air inlet open
- Fan off
- At 25LBS close door
- At 100LBS insert preload
- After 5min close door
- At 1600LBS open Fan High and close by pass
- At 25min move wood
- At 30RAL coal Bed
- At 37LBS insert load
- close door immediately

TEST LOAD CONFIGURATION

PRE / POST CHECKS

Date: 2020-10-01 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 3 Tech: MM Reviewer: DP

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
<u>Em 191</u>	<u>7:50</u>	<u>ok</u>	<u>ok</u>

Pre-Test Post-Test

Facility Conditions:

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

	Pre-Test	Post-Test
Air Velocity (max 50 Fpm)	<u>0</u>	<u>0</u>
Smoke Capture	<u>ok</u>	<u>NA</u>
4 sides	<u>ok</u>	<u>ok</u>

Wood Heater Conditions:

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

<u>2020-09-29</u>
<u>2020-09-29</u>
<u>ok</u>
<u>ok</u>

<u>ok</u>

Temperature System:

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

<u>ok</u>	°F
<u>ok</u>	°F

Proportional Checks:

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

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

Sampling Train ID Numbers:

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

	Train 1 st hour	Train 1	Train 2
Probe	<u>007</u>	<u>21</u>	<u>43</u>
Filter Front	<u>719</u>	<u>721</u>	<u>723</u>
Filter Back	<u>720</u>	<u>722</u>	<u>724</u>
Filter Thermocouple	<u>11</u>	<u>11</u>	<u>12</u>
Filter (<90°F)	<u>ok</u>	<u>ok</u>	<u>ok</u>

SAMPLING EQUIPMENT CHECK OUT

Date: 2020-10-01 Manufacturer: Ac earths JOMB Model: 8013
 Project #: PI 20240 Run: 3 Tech: MM Reviewer: JP

Leakage Checks Tunnel Samplers

	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1 minute DGM (Liter)	298096.30	297038.30	298096.99	297038.64	060759.28	061671.39
Initial 1 minute DGM (Liter)	298096.30	299038.30	298096.80	299038.65	060759.28	061671.39
Change © (Liter)	0	0	0.19	0.03	0	0
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

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

Leakage Checks Pitot

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

PRE-TEST SCALE AUDIT

Date: 2020-10-01 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 3 Tech: MM Reviewer: DO

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Wood	EM-090	440 lbs, Class F	440 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

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

Date: 2020-10-01 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 3 Tech: MM Reviewer: SP

FOR TUNNELS < 12 in

 Barometric pressure (P_{bar}) 100.4 (KPa.) Static pressure (P_q) 0.19 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.076	76.12
B - Centroid	3.00	3.50	4	0.075	75.87
A-1	0.40	0.50	0.50	0.062	76.12
A-2	1.50	1.75	2	0.075	76.02
A-3	4.50	5.25	6	0.076	76.02
A-4	5.60	6.5	7.5	0.063	75.95
B-1	0.40	0.50	0.50	0.062	75.87
B-2	1.50	1.75	2	0.063	75.82
B-3	4.50	5.25	6	0.082	75.82
B-4	5.60	6.5	7.5	0.063	75.85
				AVERAGE	

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

Where,

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

 Δ_p = manometer reading (inches H₂O)

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

 P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qg}$
 P_q = static pressure in. H₂O
 { 13.6 }

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

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

 $_{\Delta p,avg.}$ = average of the square roots of the velocity heads (Δ_p) measured at each traverse point.

CONTINUOUS ANALYZERS

Date: 2020-10-01 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 3 Tech: MM Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2971	3000	1010	1000
Tolerance CO	0	+/- 0.02	0029	+/- 0.15	0010	+/- 0.05
CO ₂	0	0	1805	1800	978	1000
Tolerance CO ₂	0	+/- 0.02	005	+/- 0.5		+/- 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	2974	1006	0	0.02	003	0.15	004	0.05	✓	
CO ₂	0	1801	984	0	0.02	004	0.5	006	0.5	✓	

Date: 2020-10-01 Manufacturer: Hearthstone Model: 8013
 Project #: PJ 20240 Run: 3 Tech: MM Reviewer: JD

RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	299036,35	061669,38	207168,72
Initial (Liter)	298096,00	060741,42	206489,80

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	100,4	100,8
Dry Bulb (F):	73,6	75,3
Humidity (%):	45,9	43,0

Flow Meter

	Start	End
Flow meter reading	N/A	N/A

Flow Meter Verification

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

FUEL DATA

Date: 2020-10-01 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 3 Tech: MM Reviewer: JP

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size		Weight		Meter Moisture Content (% dry)*				
1 1/2	X 3 1/2 X 16 in.	170	lbs.	198	196	200	201	203
1 1/2	X 3 1/2 X 16 in.	168	lbs.	196	193	194	198	201
1 1/2	X 3 1/2 X 16 in.	160	lbs.	204	203	203	203	205
1 1/2	X 3 1/2 X 16 in.	182	lbs.	210	211	213	210	210
1 1/2	X 3 1/2 X 16 in.	180	lbs.	203	204	203	204	208
1 1/2	X 3 1/2 X 16 in.	182	lbs.	199	198	197	196	193
3 1/2	X 3 1/2 X 19 in.	220	lbs.	200	200	203	204	207
3 1/2	X 3 1/2 X 19 in.	216	lbs.	208	209	208	207	206
3 1/2	X 3 1/2 X 19 in.	212	lbs.	200	200	201	201	202
3 1/2	X 3 1/2 X 19 in.	214	lbs.	221	220	220	221	220
X	X in.		lbs.					
X	X in.		lbs.					
X	X in.		lbs.					
X	X in.		lbs.					
X	X in.		lbs.					
X	X in.		lbs.					
X	X in.		lbs.					
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: 1904 lbs

FUEL DATA

Date: 2020-10-01 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 3 Tech: MM Reviewer: SP

FUEL DESCRIPTION:

Type of wood :

TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 19 in.	1 860 lbs.	219	216	218	219	220
1 1/2 x 3 1/2 x 19 in.	1 740 lbs.	209	210	213	214	212
1 1/2 x 3 1/2 x 19 in.	1 820 lbs.	210	208	206	209	208
1 1/2 x 3 1/2 x 19 in.	1 840 lbs.	207	206	207	208	207
3 1/2 x 3 1/2 x 19 in.	5 120 lbs.	219	223	228	227	223
3 1/2 x 3 1/2 x 19 in.	4 1/4 lbs.	219	220	211	211	213
x x in.	lbs.					
1 1/2 x 3/4 x 5 in.	0 100 lbs.			193		
1 1/2 x 3/4 x 5 in.	0 080 lbs.			198		
1 1/2 x 3/4 x 5 in.	0 080 lbs.			194		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			193		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			199		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			200		
1 1/2 x 3/4 x 5 in.	0 120 lbs.			206		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			201		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			203		
1 1/2 x 3/4 x 5 in.	0 100 0 120 lbs.			208		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			204		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			206		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			201		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			200		
1 1/2 x 3/4 x 5 in.	0 120 lbs.			200		
1 1/2 x 3/4 x 5 in.	0 100 lbs.			209		
1 1/2 x 3/4 x 5 in.	0 180 lbs.			208		
1 1/2 x 3/4 x 5 in.	0 100 0 12 lbs.			207		
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 18 44 lbs Min 20%: 3.69 Max 25%: 4.61

Date: 2020-09-30 Manufacturer: Health Stone Model: 8013

Project # PI 20240 Run: 3 Tech: M.N. Reviewer: SP

		SYSTEM 1 - 1 st hour					SYSTEM 1				
Pre-test Weight Record	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanc	
		007	719	720	4	21	721	722	19	725	
2020-09-30	17:00	614752	01266	01274	33 5866	108 7401	01272	01270	35 0085	01279	
2020-10-01	9:00	614753	01265	01275	33 5867	108 7400	01271	01269	35 0084	01278	

		SYSTEM 1 - 1 st hour					SYSTEM 1				
Post-test Weight Record	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanc	
		007	719	720	4	21	721	722	19	725	
2020-10-01	16:00	614755	01269	01277	33 5887	108 7402	01265	01261	35 0101	01279	
2020-10-08	8:00	614754	01269	01276	33 5878	108 7401	01265	01262	35 0098	01278	
2020-10-13	8:00	614754	01269	01276	33 5878	108 7401	01265	01262	35 0098	01278	



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-09-30 Project #: PT 20240 Run: 3 Manufacturer: Hearthstone Model: 8013
 Tech: JMM Reviewer: SP

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	43	723	724	42
2020-09-30	17:00	1091661	01272	01290	35, 3422
2020-10-01	9:00	1091660	01273	01291	35, 3423

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	43	723	724	42
2020-10-01	16:00	1091662	01271	01282	35, 3451
2020-10-08	8:00	1091661	01271	01282	35, 3450
2020-10-13	8:00	1091661	01271	01282	35, 3450

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	05-10-2020
Technicien	M.M
Project #	PI 20240

Description de l'unité

Manufacturier	HEARTHSTONE	
Modèle	Mansfield 8013	
Combustion system	Cat	
Appliance type	WOOD STOVE	
Firebox volume	2,88	cu ft.
Appliance weight empty	N.A	lbs
Appliance weight full	N.A	lbs

Paramètres du test

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

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	1,007	Dimensionless
Equipment number (DGM #1):	EM 178	
Calibration Factor (DGM #2):	1,008	Dimensionless
Equipment number (DGM #2):	EM 318	
Calibration Factor (DGM #3):	1,014	Dimensionless
Equipment number (DGM #3):	EM 179	Dimensionless

Tunnel

Targeted tunnel flow rate	350	scfm
Tunnel diameter	8	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	PI 20240
Date	05-10-2020
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

FUEL LOAD DATA SHEET, CSA B415

Test Load Weight:

Lower	Ideal	Upper
18,1	20,2	22,2

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

Load Volume: cu. ft Loading Density: 6,4 lbs./ft3
 Number of Spaces: Load Density (wet): 33,0 lbs./ft3
 Spacer weight: lbs Dry Wood Density: 27,3 lbs./ft3

Piece Size (in):			Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x Weight	Volume Cubic Inches	Ave. MC %
Thick	Wide	Length		21,70	21,30	21,00	21,00	20,90	41,5128	99,75	21,2
1,5	3,5	19	1,96	21,70	21,30	21,00	21,00	20,90	41,5128	99,75	21,2
1,5	3,5	19	2,02	21,80	21,00	20,30	20,90	21,00	42,42	99,75	21,0
1,5	3,5	19	1,86	20,30	20,20	20,80	20,60	20,30	38,0184	99,75	20,4
1,5	3,5	19	1,92	21,10	21,00	21,10	21,60	21,30	40,7424	99,75	21,2
3,5	3,5	19	4,16	21,30	21,20	21,10	21,10	21,20	88,1088	232,75	21,2
3,5	3,5	19	4,60	21,40	21,60	21,50	21,30	21,40	98,624	232,75	21,4
										0,00	
1,5	0,75	5	0,10			20,60			2,06	5,63	20,6
1,5	0,75	5	0,10			20,30			2,03	5,63	20,3
1,5	0,75	5	0,10			20,40			2,04	5,63	20,4
1,5	0,75	5	0,10			20,80			2,08	5,63	20,8
1,5	0,75	5	0,08			21,00			1,68	5,63	21,0
1,5	0,75	5	0,08			20,30			1,624	5,63	20,3
1,5	0,75	5	0,12			20,20			2,424	5,63	20,2
1,5	0,75	5	0,10			20,60			2,06	5,63	20,6
1,5	0,75	5	0,12			20,30			2,436	5,63	20,3
1,5	0,75	5	0,08			20,40			1,632	5,63	20,4
1,5	0,75	5	0,10			20,80			2,08	5,63	20,8
1,5	0,75	5	0,10			21,00			2,1	5,63	21,0
1,5	0,75	5	0,1			20,30			2,03	5,63	20,3
1,5	0,75	5	0,1			20,20			2,02	5,63	20,2
1,5	0,75	5	0,16			20,60			3,296	5,63	20,6
1,5	0,75	5	0,08			20,30			1,624	5,63	20,3
1,5	0,75	5	0,12			20,40			2,448	5,63	20,4
1,5	0,75	5	0,1			20,80			2,08	5,63	20,8
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
SUM MCx								387,1704		20,7	%

Test Load Weight: lbs.

Dry Weight: kg.

Average Moisture Content: %

Dry: Dry(EPA) 21,09
 Dry(B415) 21,09

Must be 19-25

Wet:
 must be 15,2-22

Coal Bed Range: lbs. to

lbs.

TEST CHARGE:

Coal bed weight:

lbs.

Project nu.	PI 20240
Date	05-10-2020
Technicien	<input type="text" value="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	6	900	901	2	30	902	903	32	35	904	905	44	906		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,3739	0,1275	0,1265	35,4125	110,2179	0,1267	0,1269	34,4080	109,2839	0,1257	0,1266	35,3760	0,1270	2020-10-01	17:00
Before (6)	61,3738	0,1274	0,1264	35,4124	110,2178	0,1266	0,1270	34,4079	109,2840	0,1257	0,1267	35,3761	0,1269	2020-10-05	10:00
After (1)	61,3741	0,1269	0,1258	35,4145	110,2179	0,1263	0,1264	34,4100	109,2843	0,1257	0,1265	35,3773	0,1270	2020-10-05	18:00
After (2)	61,3738	0,1267	0,1258	35,4139	110,2179	0,1261	0,1263	34,4096	109,2841	0,1255	0,1264	35,3771	0,1269	2020-10-08	08:00
After (3)	61,3738	0,1267	0,1258	35,4139	110,2179	0,1261	0,1263	34,4096	109,2841	0,1256	0,1264	35,3771	0,1269	2020-10-13	08:00
After (4)	61,3738	0,1267	0,1258	35,4139	110,2179	0,1261	0,1263	34,4096	109,2841	0,1256	0,1264	35,3771	0,1269	2020-10-14	08:00
After (5)															
After (6)	61,3738	0,1267	0,1258	35,4139	110,2179	0,1261	0,1263	34,4096	109,2841	0,1256	0,1264	35,3771	0,1269	2020-10-14	08:00
Difference	0,0000	-0,0007	-0,0006	0,0015	0,0001	-0,0005	-0,0007	0,0017	0,0001	-0,0001	-0,0003	0,0010	0,0000		
Total (mg)		0,2				0,8				0,7			0		
Total ajusté (mg)		0,20				0,80				0,70					

Project nu.	PI 20240
Date	05-10-2020
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	6	900	901	2	30	902	903	32	35	904	905	44	906		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,3739	0,1275	0,1265	35,4125	110,2179	0,1267	0,1269	34,4080	109,2839	0,1257	0,1266	35,3760	0,1270	2020-10-01	17:00
Before (6)	61,3738	0,1274	0,1264	35,4124	110,2178	0,1266	0,1270	34,4079	109,2840	0,1257	0,1267	35,3761	0,1269	2020-10-05	10:00
After (1)	61,3741	0,1269	0,1258	35,4145	110,2179	0,1263	0,1264	34,4100	109,2843	0,1257	0,1265	35,3773	0,1270	2020-10-05	18:00
After (2)	61,3738	0,1267	0,1258	35,4139	110,2179	0,1261	0,1263	34,4096	109,2841	0,1255	0,1264	35,3771	0,1269	2020-10-08	08:00
After (3)	61,3738	0,1267	0,1258	35,4139	110,2179	0,1261	0,1263	34,4096	109,2841	0,1256	0,1264	35,3771	0,1269	2020-10-13	08:00
After (4)	61,3738	0,1267	0,1258	35,4139	110,2179	0,1261	0,1263	34,4096	109,2841	0,1256	0,1264	35,3771	0,1269	2020-10-14	08:00
After (5)															
After (6)	61,3738	0,1274	0,1264	35,4139	110,2179	0,1266	0,1270	34,4096	109,2841	0,1257	0,1267	35,3771	0,1269	2020-10-14	08:00
Difference	0,0000	0,0000	0,0000	0,0015	0,0001	0,0000	0,0000	0,0017	0,0001	0,0000	0,0000	0,0010	0,0000		
Total (mg)		1,5				3,3				1,1			0		
Total ajusté (mg)		1,50				3,30				1,10					

Project nu.	PI 20240
Date	05-10-2020
Technicien	M.M

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 0,3 g/hr

Burn Rate : 1,479 Dry kg/hr

Test Duration: 279 min

PRESSURE FACTOR: DGM 1 0,97454
 DGM 2 0,98063
 DGM 3 1,00374

BAROMETRIC PRESSURE
 Average: 30,031999 in Hg
 Start: 30,061529 in Hg
 End: 30,002469 in Hg

TEMPERATURE FACTORS DGM 1 0,99051
 DGM 2 0,96605
 DGM 3 0,99511

DGM CONTROLLER VALUES

DGM 1 Final: 10610,212 Cuft
 Initial: 10560,505 Cuft

VOLUMES SAMPLED DGM 1 48,326 SCft
 DGM 2 47,549 SCft
 DGM 3 38,002 SCft

DGM 2 Final: 2227,795 Cuft
 Initial: 2177,986 Cuft

DGM #3 Final: 7353,614 Cuft
 Initial: 7316,094 Cuft

TOTAL TUNNEL VOLUME : 94268

TEMPERATURES

DGM 1 533,059 °R
 DGM 2 546,556 °R

SAMPLE RATIOS
 Sample Train 1: 1950,659
 Sample Train 2: 1982,556

CALIBRATION FACTORS

DGM 1 1,0072
 DGM 2 1,0077
 DGM #3 1,0140

Paticulate concentration
 Sample Train 1 **0,000017** g/dscf
 Sample Train 2 **0,000015** g/dscf
 Room **0,000000** g/dscf

TUNNEL FLOW RATE: 337,878 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **1,56** g
 Sample Train 2 **1,39** g

PARTICULATE CATCH
 Total Sample Train 1: 0,80 mg
 Total Sample Train 2: 0,70 mg
 Total Sample Train 1 1st hour: 0,20 mg

EMISSION RATES
 Sample Train 1 **0,34** g/hr
 Sample Train 2 **0,30** g/hr

1st hour emission rate **0,39** g/hr

DEVIATION: 5,86%

Cs Train 1 Train 2
 1,655E-05 1,47218E-05

Temps acquisition de données	Flue	Room	Tunnel	Catalyst up	scale	Right	Back	bottom	Top	Left
	temp	temp	dry bulb							
	°F	°F	°F	°F	lbs	°F	°F	°F	°F	°F
1	85,86	64,57	70,53	76,58	4,87	67,95	67,96	83,82	68,25	67,91
2	105,97	64,41	73,82	98,88	4,77	68,10	68,21	105,51	68,27	68,08
3	127,92	64,59	78,10	146,11	4,67	68,75	68,90	120,56	68,42	68,69
4	141,50	64,65	80,89	176,03	4,57	70,35	70,11	139,22	68,64	69,92
5	152,25	64,73	83,48	200,37	4,47	72,75	71,94	157,64	68,96	71,66
6	170,93	64,94	88,85	234,39	4,27	75,75	74,24	174,27	69,40	73,97
7	179,24	64,89	90,23	247,24	4,17	79,42	77,18	188,83	69,93	76,64
8	209,66	64,63	100,09	263,18	3,97	83,60	80,78	203,76	70,62	79,87
9	235,78	64,54	107,00	306,10	3,77	88,25	85,74	217,40	71,42	84,06
10	258,64	64,50	114,76	345,90	3,57	93,56	91,94	231,07	72,40	89,48
11	327,75	64,83	135,46	448,29	3,27	100,26	99,77	242,84	73,61	96,04
12	353,24	64,78	144,75	495,25	2,87	108,50	109,85	253,76	75,12	104,45
13	381,44	64,67	155,92	544,95	2,67	118,02	121,37	264,79	77,01	115,03
14	382,36	65,00	101,69	527,35	2,37	129,17	133,95	276,21	79,26	126,92
15	358,18	64,84	89,67	480,27	2,27	141,61	146,63	286,44	82,04	140,20
16	347,72	64,88	86,69	453,25	2,07	154,17	158,64	298,23	85,32	153,65
17	346,03	65,03	85,51	440,49	1,97	165,82	169,70	310,28	89,09	165,94
18	344,35	65,20	84,70	435,03	1,87	176,24	179,75	323,21	92,83	178,30
19	344,72	65,38	84,51	435,96	1,77	186,46	189,25	337,04	96,72	189,20
20	344,22	65,28	84,52	434,73	1,67	196,27	198,32	350,94	100,67	199,75
21	342,58	65,36	84,10	432,10	1,57	205,59	206,84	365,21	104,59	209,92
22	339,25	65,13	83,90	429,78	1,47	214,47	214,58	379,83	108,26	219,35
23	334,11	65,39	83,53	426,09	1,47	222,48	221,58	392,94	111,84	228,65
24	327,89	65,44	83,36	421,84	1,37	229,86	227,60	405,74	115,55	237,07
25	326,76	65,49	82,72	421,33	1,27	236,59	232,67	418,90	118,91	244,35
26	324,82	65,51	82,33	419,92	1,17	243,40	236,94	431,57	122,04	250,72
27	324,72	65,47	82,82	419,94	1,07	250,31	240,57	443,08	125,18	256,72
28	330,41	65,37	83,33	426,12	1,07	256,91	243,89	453,23	127,88	262,19
29	336,41	65,17	84,03	428,69	0,97	263,72	247,18	462,67	130,80	267,19
30	337,90	65,26	110,47	418,80	4,06	270,66	250,49	474,35	133,70	271,47
31	309,59	65,57	129,87	357,01	9,87	277,91	254,17	481,60	136,51	275,60
32	265,38	65,44	118,75	297,94	20,88	283,46	257,33	475,56	138,82	278,61
33	255,09	65,45	114,91	294,96	20,68	287,11	259,32	465,11	140,58	280,42
34	247,57	65,30	113,48	290,06	20,38	287,82	260,20	452,50	142,01	281,19
35	246,58	65,60	113,41	290,94	20,58	288,68	260,39	439,64	143,08	280,42
36	251,55	65,66	115,40	309,60	20,38	286,94	259,94	427,63	143,78	279,96
37	271,37	65,84	121,05	375,64	20,28	285,31	259,63	417,34	144,57	278,89
38	295,29	65,26	127,45	470,38	20,08	283,45	258,97	409,22	145,22	277,56
39	291,66	65,59	126,06	538,70	19,94	281,97	257,85	404,58	145,76	275,51
40	258,48	65,82	116,22	472,41	19,78	279,77	256,36	404,31	146,37	273,76
41	260,59	65,85	118,98	401,82	19,68	277,89	254,80	405,14	146,97	270,98
42	279,16	65,82	124,83	460,68	19,48	275,95	253,17	409,24	147,55	268,91
43	281,32	65,66	124,91	488,62	19,28	273,43	251,36	413,49	148,24	266,82
44	292,87	65,37	128,61	492,67	19,14	271,53	250,18	415,94	149,09	264,24
45	278,77	65,28	123,74	479,15	18,98	270,08	249,73	418,00	149,93	262,33
46	279,89	65,41	89,68	427,47	18,78	269,18	249,38	420,88	150,21	259,13
47	273,57	65,01	85,00	397,32	18,68	267,49	248,79	425,30	151,54	258,72
48	306,25	65,52	86,35	410,22	18,48	267,90	247,91	429,34	152,48	256,80
49	325,36	65,75	86,77	419,95	18,38	268,40	246,87	432,09	154,18	255,53
50	356,30	65,88	89,17	443,87	18,18	269,14	245,92	433,69	156,55	254,55
51	365,94	66,10	90,38	455,31	17,98	270,11	245,44	434,95	160,04	255,60
52	371,29	66,04	90,30	465,01	17,78	271,21	245,52	436,78	164,23	257,34
53	393,89	66,17	92,12	490,69	17,58	273,92	246,12	438,60	168,81	259,11
54	408,42	66,33	93,08	505,51	17,32	277,14	247,30	439,70	173,64	262,11
55	425,56	66,53	95,25	522,52	17,08	281,24	248,73	440,78	178,88	265,97
56	433,43	66,61	96,21	529,39	16,88	286,21	250,44	441,94	185,17	270,74
57	434,96	66,82	96,40	540,21	16,68	292,25	252,45	443,49	190,81	274,23
58	436,59	66,88	96,75	546,01	16,48	298,67	254,73	445,77	197,23	279,33
59	440,50	66,98	96,89	550,62	16,28	305,49	257,18	448,21	203,43	284,35
60	447,06	67,07	97,73	562,03	16,08	312,26	259,82	450,93	209,44	289,38
61	464,48	67,28	99,79	585,02	15,88	319,34	262,51	453,66	215,59	293,87
62	483,19	67,49	101,61	604,45	15,58	326,32	265,66	455,25	221,48	298,44
63	500,23	67,48	104,14	625,67	15,38	333,41	269,39	456,01	227,87	303,85
64	519,56	67,70	106,38	654,00	15,08	341,08	273,71	456,69	234,58	310,42
65	533,47	67,81	106,69	678,80	14,78	349,23	278,76	457,88	241,98	317,98
66	542,27	67,98	108,74	687,24	14,48	357,84	284,32	460,51	249,58	326,25
67	554,25	68,04	110,06	704,50	14,18	366,58	290,20	464,52	257,89	335,21
68	563,99	68,17	110,83	715,19	13,88	375,45	296,47	469,30	266,21	343,72
69	569,30	68,24	111,65	722,51	13,58	384,51	302,98	474,37	274,91	353,05
70	581,60	68,26	113,79	748,34	13,28	393,78	309,64	479,49	283,71	362,60
71	587,00	68,41	113,93	764,00	13,08	403,33	316,33	483,26	292,66	371,73
72	587,47	68,56	113,76	769,24	12,78	412,66	322,98	486,84	301,41	381,34
73	586,44	68,66	114,87	768,09	12,48	422,21	329,60	491,30	309,95	390,72
74	583,92	68,78	114,23	766,29	12,18	431,86	336,31	497,29	317,35	400,54
75	585,41	68,97	114,86	765,44	11,98	440,99	343,23	504,47	324,46	409,98
76	584,76	68,76	113,79	759,22	11,68	449,59	350,34	511,85	331,19	419,92
77	581,04	69,00	114,42	755,72	11,48	458,53	357,44	518,98	337,29	429,09
78	578,94	68,99	112,95	755,81	11,28	467,23	364,44	525,51	344,46	435,69
79	576,34	68,90	113,76	753,17	10,98	475,74	371,47	531,65	350,11	444,90
80	576,34	69,07	114,67	756,35	10,78	484,14	378,53	537,96	354,78	452,82
81	576,27	68,94	113,22	757,85	10,48	492,07	385,83	543,47	359,98	460,06
82	576,14	69,10	114,23	759,92	10,38	500,08	393,14	548,30	365,18	467,81
83	576,47	69,23	113,88	763,89	10,08	507,90	400,33	553,28	370,14	473,87
84	574,15	69,25	114,44	761,20	9,88	514,91	407,73	558,28	374,60	481,92
85	572,97	69,23	113,90	761,57	9,68	522,30	414,69	564,01	379,31	489,37
86	573,47	68,98	113,40	753,51	9,48	529,37	421,43	571,12	383,67	496,10
87	570,79	69,20	112,85	748,19	9,28	536,66	427,94	578,90	388,33	502,01
88	568,73	68,90	112,87	748,93	9,07	542,79	434,70	586,25	392,18	507,80
89	565,50	69,19	112,76	748,64	8,88	549,01	441,70	593,06	396,21	514,47

90	563,89	69,24	111,79	749,28	8,68	555,01	448,80	600,00	399,65	517,82
91	562,26	69,30	111,55	747,09	8,58	560,29	456,26	606,77	402,97	523,08
92	561,78	69,20	110,53	750,20	8,37	564,63	463,45	613,24	406,26	527,53
93	563,84	69,11	110,41	750,34	8,18	568,09	470,72	621,83	409,53	533,11
94	566,07	69,11	110,88	752,37	7,98	572,35	477,47	630,39	413,20	537,77
95	565,84	69,09	110,57	753,13	7,77	575,88	483,95	635,68	416,32	543,07
96	526,22	69,23	105,19	756,03	13,84	579,29	490,32	640,28	419,42	548,85
97	471,47	68,53	97,44	810,48	7,49	581,31	492,13	640,02	419,82	553,25
98	444,05	68,68	95,59	801,77	7,48	584,52	497,09	633,14	423,79	557,57
99	425,49	69,26	94,16	778,71	7,38	587,83	500,83	624,63	426,48	562,56
100	411,20	69,26	92,84	766,59	7,28	588,78	503,73	616,41	428,28	562,79
101	399,33	69,29	92,45	761,09	7,17	589,89	505,50	609,32	428,73	565,49
102	389,80	69,05	91,33	759,07	7,07	588,50	505,57	603,34	429,27	567,80
103	381,82	69,50	90,97	769,16	7,07	587,04	505,73	598,62	429,37	568,65
104	379,41	69,63	90,49	788,30	6,97	585,82	504,84	595,46	428,99	568,89
105	376,35	69,39	90,55	797,38	6,96	582,29	503,31	594,21	428,51	571,05
106	373,25	69,33	89,97	793,65	6,88	580,32	502,04	593,90	427,96	566,89
107	370,28	69,35	89,64	790,62	6,88	577,13	500,15	596,49	427,26	566,41
108	366,41	69,13	89,11	780,56	6,78	574,34	498,58	599,87	426,23	561,94
109	363,68	68,84	88,88	772,99	6,68	570,86	496,29	599,45	424,66	561,78
110	363,56	68,94	88,65	789,99	6,58	567,85	494,82	594,15	423,54	560,38
111	366,84	68,51	88,70	815,41	6,58	564,36	492,56	588,62	422,30	556,16
112	365,74	69,05	88,05	818,92	6,47	562,06	490,43	583,73	420,86	552,85
113	361,35	69,17	88,65	776,95	6,37	559,18	488,38	578,54	419,60	553,01
114	356,88	69,04	88,09	756,96	6,37	557,04	486,37	573,03	417,65	549,45
115	352,61	68,94	87,68	751,64	6,27	555,17	484,47	567,74	416,46	545,96
116	351,36	69,02	87,84	757,52	6,18	553,25	482,68	563,11	415,18	543,58
117	351,40	68,94	88,15	821,97	6,18	550,81	481,15	559,37	414,00	542,43
118	364,74	69,17	88,06	961,91	6,08	548,89	479,54	557,49	412,69	539,87
119	377,08	68,85	88,50	1008,75	5,98	545,55	477,03	556,97	411,26	539,49
120	387,30	68,92	88,86	1040,08	5,98	542,86	475,32	556,91	410,71	533,45
121	396,83	69,05	88,54	1063,76	5,78	539,12	472,89	557,08	408,46	533,45
122	403,79	69,14	89,03	1076,62	5,77	536,83	470,98	557,32	406,31	527,65
123	409,07	69,07	89,18	1085,16	5,67	532,96	469,19	557,49	404,83	523,33
124	415,28	68,86	88,90	1093,98	5,57	530,13	467,36	557,73	403,33	521,48
125	484,39	69,21	167,54	1045,97	9,46	527,24	466,17	558,36	401,99	518,60
126	446,13	69,09	100,46	891,03	5,28	524,39	466,39	558,34	399,33	512,95
127	421,08	69,20	94,06	867,86	5,17	523,35	467,82	554,28	397,92	510,05
128	405,70	69,31	91,88	832,46	5,07	522,91	469,60	548,06	396,62	508,21
129	390,58	69,14	90,38	780,18	4,97	524,20	472,27	541,92	396,54	507,99
130	377,89	69,06	89,36	756,42	4,87	526,07	474,78	537,76	396,28	508,78
131	368,92	69,13	88,57	753,98	4,78	527,43	477,36	536,36	395,95	510,43
132	361,87	69,37	88,48	754,78	4,78	527,97	479,57	536,82	395,20	510,37
133	356,03	69,08	87,84	752,43	4,68	528,05	481,44	538,18	395,48	508,60
134	349,04	69,11	87,17	747,87	4,68	527,82	482,55	539,92	394,75	512,70
135	343,75	69,17	86,90	744,11	4,58	527,00	483,15	541,53	393,98	515,34
136	338,75	68,74	86,52	741,08	4,58	526,04	484,26	543,04	392,64	514,93
137	334,28	68,84	86,23	738,83	4,47	524,88	484,42	544,66	392,12	513,87
138	330,59	69,01	86,47	734,47	4,47	522,76	483,99	546,34	391,51	515,39
139	327,85	68,67	85,91	732,10	4,37	521,58	484,07	548,12	390,62	514,83
140	324,90	68,87	85,71	727,86	4,37	520,68	483,79	550,08	389,56	514,13
141	321,68	68,85	85,84	725,00	4,27	518,86	483,78	552,14	388,40	512,40
142	319,90	69,03	85,60	722,31	4,26	516,77	482,93	554,27	388,00	512,56
143	317,17	68,99	85,68	718,38	4,17	515,90	482,93	556,36	386,65	511,31
144	315,64	69,21	85,69	714,73	4,08	513,72	482,44	556,41	386,07	511,10
145	313,44	68,82	85,36	709,81	4,08	512,75	482,09	555,45	384,79	508,53
146	310,68	68,48	85,34	705,33	3,98	512,06	481,97	554,92	383,96	505,55
147	307,89	68,48	85,29	702,18	3,98	510,27	481,40	554,77	383,02	505,11
148	306,40	68,52	85,13	699,50	3,98	509,11	480,58	555,02	382,14	504,37
149	303,79	68,64	84,63	694,38	3,87	508,09	480,67	555,79	381,69	503,10
150	300,57	68,72	84,44	688,90	3,87	506,26	480,28	556,97	380,70	503,42
151	299,10	69,03	84,23	685,98	3,69	504,48	480,00	558,26	379,26	503,12
152	296,03	69,00	84,15	682,79	3,77	503,57	478,69	559,66	378,87	503,30
153	293,71	68,98	83,98	678,16	3,77	501,88	477,83	560,99	377,81	502,01
154	291,66	69,19	84,08	674,39	3,67	500,16	477,57	562,46	376,79	500,76
155	318,53	69,28	93,64	645,72	3,67	498,76	475,65	563,67	375,87	501,73

Table with columns: Elapsed Time, Raw data row, Weight Remaining, CO, CO2, O2, Flue Gas, Room Temp, Tunnel Dry Bulb, Unit Top, Unit Back, Unit R Side, Unit L Side, Unit Bottom, Catalyst, Reading, Inlet T, Outlet T, Temp, Reading, Inlet T, Outlet T, Temp, Pressure in wc, Pressure in wc, Surface Temp.

207,00	0,62	0,01	8,02	144,6%	20,41	12,38	142,7	22,1	100,4%	79,5%	79,8%
208,00	0,62	0,01	8,05	143,6%	20,41	12,35	142,6	22,2	100,4%	79,6%	79,9%
209,00	0,62	0,01	8,02	144,6%	20,41	12,38	142,3	22,3	100,4%	79,6%	79,9%
210,00	0,62	0,01	7,96	146,6%	20,41	12,45	142,0	22,3	100,4%	79,5%	79,8%
211,00	0,58	0,01	7,92	147,6%	20,42	12,49	141,7	22,3	100,4%	79,5%	79,8%
212,00	0,58	0,01	7,92	147,7%	20,42	12,49	141,7	22,2	100,4%	79,5%	79,8%
213,00	0,58	0,01	7,99	145,6%	20,41	12,42	141,9	22,3	100,3%	79,6%	79,9%
214,00	0,58	0,01	7,91	148,1%	20,42	12,51	141,9	22,3	100,4%	79,5%	79,8%
215,00	0,58	0,01	7,84	150,2%	20,42	12,58	142,1	22,1	100,4%	79,4%	79,7%
216,00	0,55	0,01	7,86	149,7%	20,42	12,56	142,5	22,1	100,4%	79,4%	79,6%
217,00	0,53	0,01	7,83	150,7%	20,42	12,59	142,7	22,0	100,4%	79,3%	79,6%
218,00	0,53	0,01	7,81	151,3%	20,42	12,61	142,1	22,0	100,4%	79,3%	79,6%
219,00	0,53	0,01	7,87	149,2%	20,42	12,54	142,8	21,9	100,4%	79,3%	79,6%
220,00	0,53	0,01	7,79	151,8%	20,42	12,63	142,3	21,8	100,4%	79,3%	79,6%
221,00	0,53	0,01	7,89	148,7%	20,42	12,52	142,0	21,8	100,4%	79,4%	79,7%
222,00	0,51	0,01	7,94	147,1%	20,42	12,47	142,0	21,9	100,4%	79,5%	79,8%
223,00	0,49	0,01	7,97	146,1%	20,41	12,44	141,8	22,0	100,4%	79,5%	79,8%
224,00	0,49	0,01	7,96	146,6%	20,41	12,45	141,2	22,1	100,4%	79,6%	79,9%
225,00	0,49	0,01	8,02	144,6%	20,41	12,38	141,0	22,1	100,4%	79,7%	80,0%
226,00	0,49	0,01	8,04	144,0%	20,41	12,36	141,6	22,1	100,4%	79,6%	79,9%
227,00	0,44	0,01	8,09	142,6%	20,41	12,31	141,4	22,0	100,3%	79,7%	80,0%
228,00	0,44	0,01	7,92	147,7%	20,42	12,49	141,4	22,0	100,4%	79,5%	79,8%
229,00	0,44	0,01	7,89	148,7%	20,42	12,53	141,1	22,0	100,4%	79,5%	79,8%
230,00	0,44	0,01	7,97	146,1%	20,41	12,44	140,7	22,0	100,4%	79,6%	79,9%
231,00	0,44	0,01	7,97	146,1%	20,41	12,44	140,9	22,1	100,4%	79,6%	79,9%
232,00	0,40	0,01	7,94	147,1%	20,42	12,47	140,4	22,0	100,4%	79,6%	79,9%
233,00	0,40	0,01	7,99	145,6%	20,41	12,42	140,1	22,1	100,4%	79,7%	80,0%
234,00	0,40	0,01	7,91	148,1%	20,42	12,51	140,3	22,0	100,4%	79,6%	79,9%
235,00	0,40	0,01	7,84	150,2%	20,42	12,58	139,8	22,0	100,4%	79,6%	79,9%
236,00	0,35	0,01	7,84	150,3%	20,42	12,58	139,8	22,0	100,4%	79,6%	79,9%
237,00	0,35	0,01	7,73	154,0%	20,43	12,70	139,4	21,9	100,4%	79,5%	79,8%
238,00	0,35	0,01	7,71	154,6%	20,43	12,72	139,4	21,9	100,4%	79,4%	79,8%
239,00	0,35	0,01	7,69	155,1%	20,43	12,74	139,0	22,0	100,4%	79,5%	79,8%
240,00	0,35	0,01	7,69	155,1%	20,43	12,74	139,1	22,0	100,4%	79,5%	79,8%
241,00	0,31	0,01	7,66	156,2%	20,43	12,77	138,8	21,8	100,4%	79,4%	79,7%
242,00	0,31	0,01	7,74	153,4%	20,43	12,68	138,8	21,8	100,4%	79,5%	79,8%
243,00	0,31	0,01	7,69	155,0%	20,43	12,73	138,4	21,9	100,4%	79,5%	79,8%
244,00	0,31	0,01	7,74	153,4%	20,43	12,68	138,3	21,9	100,4%	79,6%	79,9%
245,00	0,31	0,01	7,64	156,7%	20,43	12,79	138,4	21,7	100,4%	79,4%	79,8%
246,00	0,30	0,01	7,64	156,8%	20,43	12,79	138,1	21,8	100,4%	79,5%	79,8%
247,00	0,26	0,01	7,59	158,4%	20,44	12,84	137,9	21,8	100,4%	79,4%	79,8%
248,00	0,26	0,01	7,58	158,9%	20,44	12,86	137,9	21,7	100,4%	79,4%	79,7%
249,00	0,26	0,01	7,53	160,7%	20,44	12,91	137,6	21,7	100,4%	79,4%	79,7%
250,00	0,26	0,01	7,54	160,1%	20,44	12,89	137,2	21,8	100,4%	79,4%	79,8%
251,00	0,22	0,01	7,57	159,1%	20,44	12,86	137,3	21,8	100,4%	79,5%	79,8%
252,00	0,22	0,01	7,58	159,0%	20,44	12,86	137,1	21,9	100,4%	79,5%	79,8%
253,00	0,22	0,01	7,51	161,2%	20,44	12,93	137,2	21,8	100,4%	79,4%	79,7%
254,00	0,22	0,01	7,54	160,1%	20,44	12,89	137,0	21,8	100,4%	79,5%	79,8%
255,00	0,22	0,01	7,53	160,6%	20,44	12,91	136,6	21,8	100,4%	79,5%	79,8%
256,00	0,17	0,01	7,55	160,0%	20,44	12,89	136,6	21,7	100,4%	79,5%	79,8%
257,00	0,17	0,01	7,51	161,2%	20,44	12,93	136,8	21,8	100,4%	79,4%	79,7%
258,00	0,17	0,01	7,50	161,7%	20,44	12,94	137,1	21,8	100,4%	79,4%	79,7%
259,00	0,17	0,01	7,40	165,3%	20,45	13,05	137,5	21,8	100,4%	79,2%	79,5%
260,00	0,17	0,01	7,36	166,4%	20,45	13,09	138,0	21,7	100,4%	79,1%	79,5%
261,00	0,17	0,01	7,38	165,8%	20,45	13,07	138,0	21,8	100,4%	79,2%	79,5%
262,00	0,12	0,01	7,33	167,6%	20,46	13,12	137,9	21,8	100,4%	79,1%	79,4%
263,00	0,12	0,01	7,18	173,2%	20,47	13,28	137,6	22,0	100,4%	79,0%	79,3%
264,00	0,12	0,01	7,15	174,4%	20,47	13,31	137,9	22,0	100,4%	78,9%	79,2%
265,00	0,12	0,01	7,12	175,7%	20,47	13,35	137,8	22,1	100,4%	78,9%	79,2%
266,00	0,12	0,01	7,20	172,6%	20,46	13,26	137,6	22,0	100,4%	79,0%	79,3%
267,00	0,08	0,01	7,13	175,1%	20,47	13,33	137,7	22,1	100,4%	78,9%	79,2%
268,00	0,11	0,01	7,16	173,8%	20,47	13,30	138,0	21,9	100,4%	78,9%	79,2%
269,00	0,08	0,01	7,10	176,2%	20,47	13,36	137,7	22,1	100,4%	78,8%	79,2%
270,00	0,08	0,01	7,07	177,6%	20,47	13,40	137,9	22,1	100,4%	78,8%	79,1%
271,00	0,08	0,01	7,05	178,2%	20,47	13,42	138,5	22,2	100,4%	78,7%	79,1%
272,00	0,03	0,01	7,05	178,3%	20,47	13,42	138,3	22,2	100,4%	78,7%	79,1%
273,00	0,06	0,01	7,05	178,3%	20,47	13,42	138,1	22,1	100,4%	78,7%	79,1%
274,00	0,03	0,01	7,02	179,5%	20,48	13,45	138,0	22,0	100,4%	78,7%	79,0%
275,00	0,03	0,01	7,00	180,2%	20,48	13,47	138,4	22,0	100,4%	78,6%	79,0%
276,00	0,03	0,01	7,00	180,2%	20,48	13,47	138,3	21,9	100,4%	78,6%	79,0%
277,00	0,03	0,01	7,02	179,5%	20,48	13,45	138,3	21,8	100,4%	78,6%	#DIV/0!
278,00	0,03	0,01	6,92	183,5%	20,48	13,56	138,1	21,9	100,5%	78,5%	78,9%
279,00	0,00	0,01	6,95	182,2%	20,48	13,53	138,3	22,0	100,4%	78,6%	78,9%

Date: 2020-10-05 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 4 Tech: MM Reviewer: SP

- kindling 50 LBS start fire
- Door open
- by pass open
- air inlet full open
- Fan off
- At 25 LBS close Door
- At 100 LBS insert load
- After 8 min close Door
- At 77 LBS close air inlet (4.875 in)
- open fan low
- close by pass
- ~~At 38 LBS~~ At 25 min move wood
- At 38 LBS RAKE coal Bed
- At 37 LBS insert load
- close Door immediately
- After 5 min close air inlet (4.875 in)

TEST LOAD CONFIGURATION

PRE / POST CHECKS

Date: 2020-10-05 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 4 Tech: MM Reviewer: DP

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
EM-198	7:30	OK	OK

Pre-Test

Post-Test

Facility Conditions:

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

(max50 Fpm)	(max50 Fpm)
OK	NA
4 sides OK	OK

Wood Heater Conditions:

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

2020-09-29	
2020-09-29	
OK	
OK	
	OK

Temperature System:

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

OK	°F
OK	°F

Proportional Checks:

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

OK
OK
OK

Sampling Train ID Numbers:

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

Train 1 st hour	Train 1	Train 2
006	30	35
900	902	904
901	903	905
h	h	h
OK	OK	OK

SAMPLING EQUIPMENT CHECK OUT

Date: 2020-10-05 Manufacturer: Harmon Systems Model: 8013
 Project #: PI 20240 Run: 4 Tech: MM Reviewer: JP

Leakage Checks Tunnel Samplers

Unplugged Flow Rate = .25cfm	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	29903912	30044873	29903920	30044899	06167298	06308510
Initial 1minute DGM (Liter)	29903902	30044872	29903920	30044890	06167290	06308508
Change © (Liter)	010	001	0	609	909	002
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

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

Leakage Checks Pitot

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

PRE-TEST SCALE AUDIT

Date: 2020-10-05 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 4 Tech: MM Reviewer: DP

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

LIMITS OF WEIGHT RANGES

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

Date: 2020-10-05 Manufacturer: Heartstone Model: 8013
 Project #: PI 20240 Run: 4 Tech: MM Reviewer: D

FOR TUNNELS < 12 in

 Barometric pressure (P_{bar}) 101.8 (KPa.) Static pressure (P_q) 0.18 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.072	68.47
B - Centroid	3.00	3.50	4	0.073 0.059 AM	68.75
A-1	0.40	0.50	0.50	0.059	68.47
A-2	1.50	1.75	2	0.065	68.67
A-3	4.50	5.25	6	0.064	68.67
A-4	5.60	6.5	7.5	0.058	68.72
B-1	0.40	0.50	0.50	0.060	68.75
B-2	1.50	1.75	2	0.059	68.78
B-3	4.50	5.25	6	0.080	68.78
B-4	5.60	6.5	7.5	0.060	68.72
				AVERAGE	

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

Where,

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

 Δ_p = manometer reading (inches H₂O)

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

 P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qg}$
 P_q = static pressure in. H₂O
 { 13.6 }

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

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

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

Date: 2020-10-05 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 4 Tech: MM Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2965	3000	1007	1000
Tolerance CO	0	+/- 0.02	0.015	+/- 0.15	0.007	+/- 0.05
CO ₂	0	0	1811	1800	980	1000
Tolerance CO ₂	0	+/- 0.02	0.11	+/- 0.5	0.20	+/- 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	2970	1001	0	0.02	0.005	0.15	0.006	0.05	✓	
CO ₂	0	1807	984	0	0.02	0.02	0.5	0.04	0.5	✓	

Date: 2020-10-05 Manufacturer: Heardstone Model: 8013
 Project #: PT 20240 Run: 4 Tech: MM Reviewer: DO

RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	300447, 75	063084, 12	208231, 16
Initial (Liter)	299040, 20	061673, 70	207168, 72

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	101.8	101.6
Dry Bulb (F):	67.1	73.3
Humidity (%):	48.3	44.1

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

FUEL DATA

Date: 2020-10-05 Manufacturer: Heartstone Model: 8013
 Project #: pt 20240 Run: 4 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 16 in.	1740 lbs.	206	204	208	207	207
1 1/2 x 3 1/2 x 16 in.	1720 lbs.	209	210	206	206	209
1 1/2 x 3 1/2 x 16 in.	164 lbs.	199	198	200	200	200
1 1/2 x 3 1/2 x 16 in.	168 lbs.	206	204	203	208	204
1 1/2 x 3 1/2 x 16 in.	174 lbs.	203	203	202	202	200
1 1/2 x 3 1/2 x 16 in.	172 lbs.	208	207	206	209	204
1 1/2 x 3 1/2 x 16 in.	180 lbs.	203	203	206	203	202
1 1/2 x 3 1/2 x 19 in.	202 lbs.	204	200	208	204	202
1 1/2 x 3 1/2 x 19 in.	200 lbs.	208	202	202	206	207
1 1/2 x 3 1/2 x 19 in.	202 lbs.	210	211	210	208	209
1 1/2 x 3 1/2 x 19 in.	200 lbs.	203	203	204	204	203
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
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: ~~2080~~ MM lbs
 2008

FUEL DATA

Date: 2020-10-05 Manufacturer: Heartstone Model: 8013
 Project #: PT 20240 Run: 4 Tech: MM Reviewer: [Signature]

FUEL DESCRIPTION:

Type of wood :

TEST LOAD

Piece Size		Weight	Meter Moisture Content (% dry)*				
1 1/2	X 3/4 X 19 in.	1,960 lbs.	217	213	210	210	209
1 1/2	X 3/4 X 19 in.	2,020 lbs.	218	210	203	209	210
1 1/2	X 3/4 X 19 in.	1,860 lbs.	203	202	208	206	203
1 1/2	X 3/4 X 19 in.	1,920 lbs.	211	210	211	216	213
3/4	X 3/4 X 19 in.	416 lbs.	213	212	211	211	212
3/4	X 3/4 X 19 in.	460 lbs.	214	216	215	213	214
	X X in.	lbs.					
1 1/2	X 3/4 X 5 in.	0,100 lbs.			206		
1 1/2	X 3/4 X 5 in.	0,100 lbs.			207		
1 1/2	X 3/4 X 5 in.	0,100 lbs.			204		
1 1/2	X 3/4 X 5 in.	0,100 lbs.			208		
1 1/2	X 3/4 X 5 in.	0,08 lbs.			210		
1 1/2	X 3/4 X 5 in.	0,08 lbs.			203		
1 1/2	X 3/4 X 5 in.	0,120 lbs.			206		
1 1/2	X 3/4 X 5 in.	0,10 lbs.			209		
1 1/2	X 3/4 X 5 in.	0,120 lbs.			211		
1 1/2	X 3/4 X 5 in.	0,08 lbs.			210		
1 1/2	X 3/4 X 5 in.	0,10 lbs.			210		
1 1/2	X 3/4 X 5 in.	0,10 lbs.			213		
1 1/2	X 3/4 X 5 in.	0,10 lbs.			218		
1 1/2	X 3/4 X 5 in.	0,10 lbs.			203		
1 1/2	X 3/4 X 5 in.	0,160 lbs.			203		
1 1/2	X 3/4 X 5 in.	0,080 lbs.			204		
1 1/2	X 3/4 X 5 in.	0,120 lbs.			203		
1 1/2	X 3/4 X 5 in.	0,100 lbs.			202		
	X X in.	lbs.					
	X X in.	lbs.					

TEST LOAD WEIGHT: 1836 lbs Min 20%: 367 Max 25%: 459



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-10-01 Manufacturer: Hearthstone Model: 8013
 Project #: 0120240 Run: 4 Tech: MM Reviewer: DP

		SYSTEM 1 - 1 st hour					SYSTEM 1				
Pre-test Weight Record	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanc	
		006	900	901	02	30	902	903	32	906	
2020-10-01 13:00		G13739	01275	01265	354125	1102179	01267	01269	344080	01270	
2020-10-01 10:00		G13738	01274	01264	354124	1102178	01266	01270	344079	01269	

		SYSTEM 1 - 1 st hour					SYSTEM 1				
Post-test Weight Record	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanc	
		006	900	901	02	30	902	903	32	906	
2020-10-01 18:00		G13741	01269	01258	354145	1102179	01263	01264	344100	01270	
2020-10-08 8:00		G13738	01267	01258	354139	1102179	01261	01263	344096	01269	
2020-10-13 8:00		G13738	01267	01258	354139	1102179	01261	01263	344096	01269	
2020-10-14 8:00		G13738	01267	01258	354139	1102179	01261	01263	344096	01269	



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-10-01 Manufacturer: Heartstrings Model: 8013
 Project #: PI 20240 Run: 4 Tech: MM Reviewer: NO

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time				
2020-10-01	17:00	109 2839	0 1257	0 1266	35 3760
2020-10-05	10:00	109 2840	0 1257	0 1267	35 3761

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time				
2020-10-05	18:00	109 2843	0 1257	0 1265	35 3773
2020-10-08	8:00	109 2841	0 1255	0 1264	35 3771
2020-10-13	8:00	109 2841	0 1256	0 1264	35 3771
2020-10-14	8:00	109 2841	0 1256	0 1264	35 3771

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	06-10-2020
Technicien	M.M
Project #	PI 20240

Description de l'unité

Manufacturier	HEARTHSTONE	
Modèle	Mansfield 8013	
Combustion system	Cat	
Appliance type	WOOD STOVE	
Firebox volume	2,88	cu ft.
Appliance weight empty	N.A	lbs
Appliance weight full	N.A	lbs

Paramètres du test

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

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	1,007	Dimensionless
Equipment number (DGM #1):	EM 178	
Calibration Factor (DGM #2):	1,008	Dimensionless
Equipment number (DGM #2):	EM 318	
Calibration Factor (DGM #3):	1,014	Dimensionless
Equipment number (DGM #3):	EM 179	Dimensionless

Tunnel

Targeted tunnel flow rate	350	scfm
Tunnel diameter	8	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	PI 20240
Date	06-10-2020
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

FUEL LOAD DATA SHEET, CSA B415

Test Load Weight:

Lower	Ideal	Upper
18,1	20,2	22,2

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

Load Volume: cu. ft

Loading Density: 6,4 lbs./ft3

Number of Spaces:
 Spacer weight: lbs

Load Density (wet): 33,2 lbs./ft3
 Dry Wood Density: 27,5 lbs./ft3

Piece Size (in):			Weight lbs	Meter Moisture Content Dry Uncorrected %					Ave. MC x	Volume	Ave. MC
Thick	Wide	Length							Weight	Cubic Inches	%
1,5	3,5	19	1,80	20,40	20,30	20,20	20,30	20,40	36,576	99,75	20,3
1,5	3,5	19	1,84	20,90	20,70	20,70	20,80	20,40	38,088	99,75	20,7
1,5	3,5	19	2,20	21,10	21,60	21,30	21,30	21,00	46,772	99,75	21,3
1,5	3,5	19	2,10	20,80	20,40	20,30	20,20	19,90	42,672	99,75	20,3
3,5	3,5	19	4,58	20,40	20,90	21,00	20,90	20,90	95,3556	232,75	20,8
3,5	3,5	19	4,08	20,80	20,80	20,40	20,40	20,80	84,2112	232,75	20,6
										0,00	
1,5	0,75	5	0,10			20,40			2,04	5,63	20,4
1,5	0,75	5	0,12			20,90			2,508	5,63	20,9
1,5	0,75	5	0,10			20,30			2,03	5,63	20,3
1,5	0,75	5	0,10			20,80			2,08	5,63	20,8
1,5	0,75	5	0,12			20,60			2,472	5,63	20,6
1,5	0,75	5	0,10			20,40			2,04	5,63	20,4
1,5	0,75	5	0,08			20,70			1,656	5,63	20,7
1,5	0,75	5	0,12			20,70			2,484	5,63	20,7
1,5	0,75	5	0,10			20,30			2,03	5,63	20,3
1,5	0,75	5	0,10			20,90			2,09	5,63	20,9
1,5	0,75	5	0,10			20,80			2,08	5,63	20,8
1,5	0,75	5	0,10			20,70			2,07	5,63	20,7
1,5	0,75	5	0,08			20,40			1,632	5,63	20,4
1,5	0,75	5	0,1			20,30			2,03	5,63	20,3
1,5	0,75	5	0,1			20,80			2,08	5,63	20,8
1,5	0,75	5	0,1			20			2	5,63	20,0
1,5	0,75	5	0,08			20			1,6	5,63	20,0
1,5	0,75	5	0,16			20,6			3,296	5,63	20,6
										0,00	
										0,00	
										0,00	
										0,00	
										0,00	
								SUM MCx	381,8928		20,6 %

Test Load Weight: lbs.

Dry Weight: kg.

Average Moisture Content: %

Dry: Dry(EPA) 20,69
 Dry(B415) 20,69

Must be 19-25

Wet:
 must be 15,2-22

Coal Bed Range: lbs. to

lbs.

TEST CHARGE:

Coal bed weight: lbs.

lbs.

Project nu.	PI 20240
Date	06-10-2020
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	2	910	911	16	10	912	913	25	34	914	915	30	916		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,0991	0,1277	0,1257	34,7999	94,6395	0,1277	0,1257	34,9404	110,1053	0,1285	0,1254	34,8861	0,1258	2020-10-05	17:00
Before (6)	61,0991	0,1277	0,1256	34,7998	94,6395	0,1276	0,1256	34,9405	110,1054	0,1284	0,1253	34,8862	0,1258	2020-10-06	09:00
After (1)	61,0997	0,1276	0,1257	34,8027	94,6414	0,1276	0,1250	34,9435	110,1061	0,1290	0,1253	34,8883	0,1260	2020-10-06	20:00
After (2)	61,0992	0,1274	0,1255	34,8006	94,6397	0,1274	0,1250	34,9419	110,1054	0,1288	0,1251	34,8872	0,1256	2020-10-13	08:00
After (3)	61,0992	0,1274	0,1255	34,8006	94,6397	0,1274	0,1250	34,9419	110,1054	0,1288	0,1251	34,8872	0,1256	2020-10-14	08:00
After (4)															
After (5)															
After (6)	61,0992	0,1274	0,1255	34,8006	94,6397	0,1274	0,1250	34,9419	110,1054	0,1288	0,1251	34,8872	0,1256	2020-10-14	08:00
Difference	0,0001	-0,0003	-0,0001	0,0008	0,0002	-0,0002	-0,0006	0,0014	0,0000	0,0004	-0,0002	0,0010	-0,0002		
Total (mg)		0,5				1,3				1,2			-0,2		
Total ajusté (mg)		0,70				1,50				1,40					

Project nu.	PI 20240
Date	06-10-2020
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	2	910	911	16	10	912	913	25	34	914	915	30	916		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,0991	0,1277	0,1257	34,7999	94,6395	0,1277	0,1257	34,9404	110,1053	0,1285	0,1254	34,8861	0,1258	2020-10-05	17:00
Before (6)	61,0991	0,1277	0,1256	34,7998	94,6395	0,1276	0,1256	34,9405	110,1054	0,1284	0,1253	34,8862	0,1258	2020-10-06	09:00
After (1)	61,0997	0,1276	0,1257	34,8027	94,6414	0,1276	0,1250	34,9435	110,1061	0,1290	0,1253	34,8883	0,1260	2020-10-06	20:00
After (2)	61,0992	0,1274	0,1255	34,8006	94,6397	0,1274	0,1250	34,9419	110,1054	0,1288	0,1251	34,8872	0,1256	2020-10-13	08:00
After (3)	61,0992	0,1274	0,1255	34,8006	94,6397	0,1274	0,1250	34,9419	110,1054	0,1288	0,1251	34,8872	0,1256	2020-10-14	08:00
After (4)															
After (5)															
After (6)	61,0992	0,1277	0,1256	34,8006	94,6397	0,1276	0,1256	34,9419	110,1054	0,1288	0,1253	34,8872	0,1258	2020-10-14	08:00
Difference	0,0001	0,0000	0,0000	0,0008	0,0002	0,0000	0,0000	0,0014	0,0000	0,0004	0,0000	0,0010	0,0000		
Total (mg)		0,9				2,5				1,4			0		
Total ajusté (mg)		0,90				2,50				1,40					

Project nu.	PI 20240
Date	06-10-2020
Technicien	M.M

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 0,4 g/hr

Burn Rate : 0,961 Dry kg/hr

Test Duration: 433 min

PRESSURE FACTOR: DGM 1 0,97592
 DGM 2 0,98151
 DGM 3 1,00226

BAROMETRIC PRESSURE
 Average: 29,987704 in Hg
 Start: 29,972939 in Hg
 End: 30,002469 in Hg

TEMPERATURE FACTORS DGM 1 0,97866
 DGM 2 0,95774
 DGM 3 0,98672

DGM CONTROLLER VALUES

DGM 1 Final: 10689,291 Cuft
 Initial: 10610,381 Cuft

VOLUMES SAMPLED DGM 1 75,907 SCft
 DGM 2 74,088 SCft
 DGM 3 58,699 SCft

DGM 2 Final: 2306,154 Cuft
 Initial: 2227,942 Cuft

DGM #3 Final: 7412,152 Cuft
 Initial: 7353,619 Cuft

TOTAL TUNNEL VOLUME : 150229

TEMPERATURES

SAMPLE RATIOS
 Sample Train 1: 1979,114
 Sample Train 2: 2027,703

DGM 1 539,516 °R
 DGM 2 551,297 °R

Paticulate concentration
 Sample Train 1 0,000017 g/dscf
 Sample Train 2 0,000016 g/dscf
 Room -0,000003 g/dscf

CALIBRATION FACTORS

DGM 1 1,0072
 DGM 2 1,0077
 DGM #3 1,0140

TUNNEL FLOW RATE: 346,948 Dscfm

TOTAL EMISSIONS
 Sample Train 1 3,08 g
 Sample Train 2 2,95 g

PARTICULATE CATCH
 Total Sample Train 1: 1,30 mg
 Total Sample Train 2: 1,20 mg
 Total Sample Train 1 1st hour: 0,50 mg

EMISSION RATES
 Sample Train 1 0,43 g/hr
 Sample Train 2 0,41 g/hr

1st hour emission rate 0,99 g/hr

DEVIATION: 2,32%

Cs Train 1 Train 2
 1,713E-05 1,6197E-05

Temps acquisition de données	Flue	Room	Tunnel	Catalyst up	scale	Right	Back	bottom	Top	Left
	temp	temp	dry bulb							
	°F	°F	°F	°F	lbs	°F	°F	°F	°F	°F
1	78,87	71,28	72,30	77,26	4,97	73,98	74,44	90,29	74,09	74,30
2	87,94	71,23	73,75	83,60	4,87	74,06	74,62	99,04	74,08	74,38
3	94,63	71,27	74,51	93,49	4,87	74,22	75,08	107,03	74,12	74,56
4	106,48	71,19	76,61	107,06	4,77	74,52	75,86	114,40	74,16	74,88
5	127,46	71,25	80,79	138,63	4,67	74,99	77,11	118,93	74,25	75,46
6	145,85	71,30	84,35	178,72	4,67	75,84	79,00	122,29	74,45	76,34
7	158,75	71,29	87,25	199,21	4,57	77,19	81,44	126,35	74,75	77,60
8	169,60	71,27	90,48	208,82	4,47	79,12	84,36	135,57	75,15	79,15
9	195,73	71,39	97,65	244,07	4,27	81,54	87,64	151,97	75,64	81,00
10	224,51	71,38	106,15	279,67	4,17	84,89	91,83	179,52	76,29	83,44
11	248,52	71,34	113,04	314,97	3,97	89,46	97,16	209,21	77,14	86,78
12	281,15	71,43	123,70	357,44	3,70	95,25	103,72	235,06	78,14	91,11
13	296,99	71,35	127,94	373,66	3,57	102,40	111,81	261,35	79,37	96,86
14	295,10	71,54	129,70	404,41	3,37	110,73	120,74	283,32	80,81	103,99
15	292,97	71,52	129,85	408,78	3,17	119,64	130,14	301,49	82,33	111,91
16	321,00	71,43	138,50	417,68	2,97	128,96	139,70	324,62	83,90	120,33
17	339,57	71,42	145,68	434,95	2,77	138,39	149,49	349,07	85,57	128,61
18	328,57	71,49	143,05	442,01	7,40	148,45	159,68	371,62	87,38	137,43
19	316,39	71,64	96,49	412,01	2,41	158,83	169,44	388,58	89,28	146,45
20	298,66	71,61	89,41	383,58	2,37	169,18	178,22	400,23	91,37	155,21
21	285,75	71,69	86,88	365,25	2,37	178,23	185,68	408,83	93,58	163,54
22	278,60	71,56	85,54	358,32	2,27	185,94	191,69	414,67	95,84	171,11
23	270,90	71,70	84,54	350,73	2,17	192,44	196,60	418,81	98,01	177,74
24	263,76	71,69	83,71	343,66	2,17	197,66	200,42	422,16	100,22	183,77
25	258,12	71,70	83,14	338,89	2,07	202,06	203,41	425,10	102,43	188,80
26	256,05	71,72	82,86	338,21	1,97	205,94	205,83	430,30	104,39	193,19
27	255,87	71,64	82,73	337,03	1,97	209,24	207,76	435,62	106,32	196,78
28	255,88	71,64	82,82	338,60	1,87	212,53	209,31	441,89	108,24	200,15
29	258,92	71,56	83,02	345,26	1,87	215,10	210,56	448,68	110,34	202,77
30	265,46	71,60	83,58	353,01	1,77	218,41	211,79	454,03	112,23	205,63
31	272,24	71,63	83,85	358,76	1,67	221,99	212,99	457,92	114,10	208,32
32	274,83	71,63	83,89	361,02	1,67	225,93	214,27	461,57	116,16	211,59
33	277,12	71,68	84,24	362,88	1,57	229,98	215,58	465,21	118,41	215,15
34	277,87	71,73	84,25	362,64	1,57	233,65	216,99	469,57	120,52	219,47
35	277,92	71,75	84,21	360,88	1,47	236,75	218,48	474,70	122,70	224,31
36	279,29	71,77	83,90	364,12	1,37	239,11	220,01	479,04	124,82	230,04
37	280,55	71,66	84,20	368,13	1,37	241,00	221,58	481,84	126,85	235,55
38	282,55	71,85	84,01	375,29	1,27	242,74	223,25	483,75	129,10	240,86
39	289,73	71,87	84,50	387,44	1,17	244,49	224,87	484,91	131,20	245,82
40	295,88	71,87	85,04	395,93	1,17	246,44	226,58	486,07	133,25	250,64
41	291,49	71,60	84,61	388,63	1,16	248,60	228,45	486,75	135,53	255,28
42	286,50	71,63	84,46	380,48	1,07	251,52	230,28	486,17	137,78	259,64
43	280,16	71,86	83,78	372,99	1,07	255,06	231,91	484,67	139,60	263,39
44	267,48	71,86	106,43	355,92	3,54	257,46	233,21	484,99	141,79	265,95
45	226,13	72,01	106,50	271,32	20,68	260,33	234,52	489,79	143,75	268,63
46	218,82	71,96	106,69	235,50	20,60	262,27	235,14	489,18	145,25	269,36
47	230,94	72,02	110,14	274,16	20,58	262,70	234,86	482,73	146,27	269,64
48	225,71	71,92	108,92	289,41	20,38	261,35	234,03	474,01	146,97	269,18
49	254,26	72,07	118,22	361,21	20,28	259,93	232,94	464,49	147,64	267,25
50	242,46	71,85	114,13	373,49	20,18	257,63	231,79	454,85	148,25	264,94
51	270,71	71,97	95,51	384,42	19,98	256,13	230,77	446,29	148,45	262,73
52	270,46	71,94	87,87	375,29	19,88	254,18	229,70	442,75	149,23	260,40
53	256,72	71,89	85,92	357,43	19,78	253,19	228,74	446,03	150,45	258,33
54	250,99	72,00	84,16	346,08	19,78	253,05	227,90	449,90	151,38	256,15
55	236,05	72,05	82,63	325,98	19,68	252,95	226,92	451,79	152,24	254,17
56	228,15	71,82	81,93	313,70	19,68	251,54	225,83	450,86	153,55	252,54
57	224,37	71,87	81,60	307,18	19,58	251,34	224,65	450,23	154,39	250,40
58	227,92	71,76	81,85	311,93	19,48	250,21	223,45	450,60	155,11	248,17
59	233,35	71,68	82,64	320,32	19,48	249,60	222,27	451,46	155,92	245,95
60	236,63	71,92	82,66	324,76	19,38	249,65	221,20	451,53	156,60	243,83
61	227,94	72,06	81,96	310,50	19,38	250,23	220,19	452,32	157,32	241,62
62	233,54	72,13	82,77	309,23	19,28	251,23	219,17	453,27	157,63	239,81
63	253,14	71,75	83,36	326,57	19,18	251,21	218,05	452,97	158,55	238,01
64	248,19	71,96	82,74	318,31	19,17	251,15	216,99	452,74	159,08	236,16
65	233,65	72,05	81,66	305,94	19,08	250,78	215,90	453,00	160,47	234,72
66	224,08	72,10	81,24	297,90	19,08	250,24	214,81	454,25	161,31	233,36
67	219,63	72,11	81,07	294,63	18,98	249,27	213,65	456,04	162,16	231,66
68	219,09	72,08	81,47	295,47	18,98	248,14	212,54	457,51	162,87	230,08
69	222,90	71,63	81,62	301,18	18,88	246,19	211,50	459,28	164,14	228,68
70	229,75	71,92	81,93	310,82	18,82	246,00	210,57	460,03	164,82	227,18
71	232,23	71,96	81,61	313,76	18,78	245,63	209,89	458,53	164,58	225,91
72	226,71	71,95	81,37	306,20	18,68	245,37	209,27	457,07	165,44	224,56
73	218,51	72,07	80,81	296,95	18,68	245,54	208,58	456,59	165,96	224,05
74	211,48	72,08	80,43	286,54	18,68	245,48	207,88	456,41	165,73	223,33
75	204,99	72,06	80,20	277,33	18,68	245,08	207,01	456,54	166,19	222,36
76	200,04	72,08	79,80	270,45	18,58	244,16	206,09	456,77	166,22	221,00
77	195,92	72,09	79,68	265,14	18,58	242,90	205,15	457,32	166,30	219,46
78	192,57	72,08	79,44	261,03	18,58	241,10	204,19	458,51	166,74	217,79
79	189,23	72,00	79,14	257,37	18,48	239,37	202,98	460,26	167,03	216,34
80	190,77	71,96	86,58	261,64	18,52	237,75	202,06	460,34	166,84	214,52
81	191,09	72,01	88,61	253,20	18,48	235,94	200,98	454,77	166,99	213,17
82	211,27	72,04	92,44	245,22	18,38	233,73	199,97	457,41	166,74	211,27
83	230,42	72,12	95,27	252,54	18,28	231,83	199,44	467,70	166,54	210,12
84	245,16	72,12	91,21	276,67	18,18	230,05	199,59	478,75	166,08	209,90
85	272,40	72,18	86,12	342,70	17,98	228,55	200,22	486,41	165,34	210,90
86	298,96	72,21	86,93	382,77	17,88	228,30	201,46	491,89	165,57	212,97
87	314,48	72,18	87,77	401,62	17,68	230,22	203,07	498,20	166,29	215,90
88	340,24	71,97	89,61	430,52	17,48	233,07	204,87	505,56	168,44	219,52
89	378,96	72,10	92,28	463,39	17,28	238,64	207,10	512,55	170,85	223,12

90	401,02	71,99	94,98	491,22	17,08	246,26	209,60	519,32	174,32	228,34
91	424,14	72,09	96,74	524,70	16,78	255,99	212,45	525,76	178,87	234,31
92	441,72	72,17	98,47	562,67	16,58	266,37	215,30	532,03	184,12	241,23
93	456,79	72,34	100,33	585,05	16,38	277,33	218,22	538,08	190,39	248,41
94	474,96	72,19	101,89	599,09	16,08	288,03	221,33	545,31	197,57	254,75
95	494,07	72,15	103,54	642,29	15,78	300,21	224,60	550,59	204,73	261,22
96	499,79	72,46	103,91	637,96	15,58	311,70	227,85	556,08	212,36	267,05
97	496,56	72,54	103,58	632,12	15,28	322,22	230,96	563,20	220,78	273,12
98	500,43	72,59	104,27	637,97	15,08	332,62	234,06	571,16	228,66	277,45
99	510,04	72,76	105,58	654,98	14,88	340,78	237,24	579,02	236,37	283,25
100	524,80	72,23	107,82	683,82	14,58	349,68	240,57	587,33	243,77	288,79
101	544,85	72,86	110,64	717,77	14,28	358,71	244,26	593,07	250,18	293,38
102	568,34	72,54	113,24	741,95	13,98	367,49	248,47	596,16	258,29	299,33
103	577,76	72,55	113,03	752,79	13,68	375,52	253,17	598,47	265,90	307,08
104	587,76	72,83	114,86	756,20	13,38	384,14	258,36	600,03	274,62	314,83
105	588,90	72,56	116,17	754,18	13,14	392,66	263,91	602,54	283,51	322,64
106	585,73	72,60	115,17	745,38	12,88	401,09	269,88	606,17	291,83	330,66
107	589,21	72,80	115,46	749,60	12,58	410,38	275,93	610,46	300,29	339,63
108	597,20	73,09	116,92	769,03	12,38	419,46	282,39	614,10	308,30	348,20
109	602,28	72,91	118,30	781,86	12,08	428,54	289,53	616,69	315,43	356,37
110	606,03	72,76	117,92	791,66	11,78	437,27	297,43	620,59	322,93	366,01
111	605,30	73,14	117,28	794,71	11,48	445,99	305,98	626,41	331,27	376,00
112	605,07	73,11	117,73	796,77	11,18	454,86	314,82	633,55	339,19	385,40
113	603,36	73,33	117,74	787,49	10,98	463,86	323,90	642,16	346,26	396,24
114	601,14	73,08	117,86	782,81	10,68	472,01	333,36	651,65	353,71	405,98
115	599,94	73,53	118,99	782,76	10,47	480,82	343,23	661,68	360,78	417,18
116	597,31	73,51	118,38	779,78	10,18	489,87	353,09	672,11	367,35	426,91
117	593,01	73,28	116,87	778,11	9,98	499,17	362,92	682,63	371,87	436,29
118	589,47	73,70	116,37	776,27	9,68	507,96	372,94	692,58	379,13	446,09
119	587,91	73,87	116,55	774,70	9,48	516,43	382,99	701,73	384,37	455,47
120	587,24	74,05	117,29	773,68	9,28	525,00	392,85	711,08	390,02	464,28
121	584,96	73,97	117,37	771,32	8,98	533,15	402,43	719,21	393,28	472,43
122	583,15	74,14	117,02	771,58	8,78	540,55	411,87	724,70	399,44	482,10
123	581,06	74,07	116,73	772,60	8,58	547,65	421,10	727,97	403,59	490,55
124	578,85	73,86	117,04	769,55	8,37	555,14	430,08	730,26	407,25	498,15
125	576,80	74,22	115,38	769,71	8,18	561,94	438,81	732,02	410,90	505,52
126	575,37	73,89	115,38	768,98	7,98	568,40	447,20	729,75	414,45	512,62
127	571,57	73,49	115,47	768,41	7,77	574,01	454,88	721,86	417,99	519,44
128	525,57	74,11	105,01	774,80	6,82	581,10	459,29	713,40	419,96	525,91
129	467,73	74,22	98,33	803,43	7,48	586,53	463,36	695,96	421,85	532,25
130	435,42	73,84	95,53	782,23	7,38	592,01	467,83	677,04	424,26	538,21
131	411,51	73,99	93,66	757,68	7,31	595,76	470,15	660,02	426,09	544,12
132	393,18	73,59	92,28	760,33	7,28	598,03	473,34	646,09	427,04	547,41
133	380,57	73,55	91,31	792,02	7,17	597,45	474,09	635,81	427,70	552,01
134	377,36	74,22	91,50	844,11	7,07	596,84	473,21	629,31	427,56	552,60
135	373,11	74,19	89,97	853,09	7,07	594,90	473,58	624,86	427,08	551,52
136	368,98	74,17	90,34	845,94	6,97	590,75	472,05	621,63	426,10	551,83
137	367,43	73,90	89,98	843,44	6,94	586,25	471,12	618,95	425,45	551,20
138	364,99	73,97	90,15	842,58	6,88	582,22	469,66	616,55	424,68	549,04
139	363,60	73,87	89,50	842,06	6,88	577,93	468,47	614,20	423,75	546,86
140	361,37	73,75	89,39	842,73	6,68	573,40	466,86	611,87	422,60	543,94
141	359,54	74,44	89,35	838,27	6,68	569,66	465,87	609,77	421,62	541,24
142	352,07	74,60	89,39	828,23	6,58	566,16	464,77	607,45	420,46	537,84
143	351,20	74,52	88,97	840,55	6,47	562,29	463,71	605,79	419,28	535,22
144	352,79	74,47	88,78	854,46	6,37	558,68	462,94	604,68	418,22	532,73
145	353,19	74,44	89,19	862,86	6,36	554,99	461,10	603,75	416,95	530,52
146	352,46	74,37	88,63	865,23	6,26	551,44	459,94	602,86	415,88	528,29
147	352,56	74,35	88,97	863,47	6,18	547,67	458,94	602,13	414,75	525,35
148	350,43	74,46	87,91	862,70	6,08	544,38	458,34	601,86	413,44	522,70
149	351,45	74,52	87,89	863,12	6,08	540,97	457,62	602,05	412,23	520,29
150	351,16	74,19	87,78	866,29	5,98	537,73	456,65	602,95	411,10	518,09
151	347,94	74,32	87,20	858,10	5,77	534,52	455,71	603,87	410,01	515,69
152	345,88	74,55	87,40	848,57	5,87	531,70	455,03	604,89	408,58	512,53
153	344,71	74,37	87,20	839,21	5,85	529,10	454,98	606,30	407,12	510,14
154	342,72	74,40	87,03	836,84	5,67	526,15	454,44	608,37	405,70	507,28
155	366,79	74,58	116,32	835,15	5,67	523,84	454,29	611,71	404,53	505,44
156	399,43	74,39	101,92	754,21	5,38	520,70	455,17	613,13	402,80	504,18
157	366,37	74,51	91,61	787,64	5,28	519,90	455,69	604,09	401,58	502,27
158	350,43	74,41	89,82	799,35	5,17	518,95	456,85	592,89	400,87	501,43
159	340,89	74,13	88,20	796,33	5,07	518,10	458,10	581,54	399,86	503,12
160	334,08	74,43	87,57	792,99	4,97	518,96	459,65	570,82	399,66	504,70
161	327,93	74,30	86,68	775,91	4,92	520,43	462,05	560,92	399,31	505,32
162	320,11	74,61	86,85	737,59	4,78	522,65	463,88	551,82	399,25	506,51
163	312,34	74,34	86,66	706,61	4,78	523,62	466,18	543,86	398,80	507,26
164	305,48	74,27	84,89	690,93	4,78	524,98	468,13	536,94	398,25	507,35
165	298,86	74,34	85,08	680,31	4,68	525,14	469,50	531,44	397,70	509,49
166	292,69	74,52	85,03	672,98	4,66	525,34	470,06	527,61	397,22	510,31
167	287,80	74,46	84,84	668,70	4,67	525,04	470,45	525,20	396,69	510,71
168	285,25	73,93	84,55	673,64	4,57	523,87	470,91	524,10	395,88	511,17
169	283,93	74,36	84,60	707,41	4,57	522,69	471,04	524,26	395,20	510,16
170	282,85	74,65	85,01	730,25	4,47	521,30	470,11	525,37	393,92	508,45
171	280,81	74,30	83,99	742,66	4,47	519,71	468,53	527,22	392,37	506,03
172	279,03	74,36	84,51	751,05	4,47	516,74	467,90	529,74	391,04	505,31
173	278,40	74,64	84,70	760,07	4,37	514,00	466,70	532,69	389,81	503,67
174	277,35	74,75	84,54	757,58	4,37	511,09	464,71	535,86	387,92	501,86
175	276,43	74,70	84,06	750,16	4,37	508,49	463,09	539,12	386,22	499,78
176	274,97	74,72	83,97	744,13	4,37	505,39	462,09	542,35	384,68	497,35
177	273,50	74,34	83,89	741,14	4,27	501,87	460,32	545,55	382,92	494,97
178	272,10	74,21	83,83	741,83	4,27	498,49	458,17	548,81	381,02	492,41
179	271,48	74,59	83,70	740,63	4,27	495,84	456,06	552,04	379,51	490,14
180	270,29	74,79	83,78	736,01	4,17	493,27	455,12	555,21	377,54	488,44
181	268,68	74,80	83,52	737,56	4,17	490,75	453,92	558,44	375,66	485,99
182	267,22	74,40	83,11	739,62	4,17	487,79	452,26	561,78	373,92	484,03

183	266,60	74,76	83,50	740,16	4,17	485,66	450,39	564,93	372,55	481,96
184	264,99	74,81	83,02	739,53	4,08	482,38	449,27	567,96	370,88	480,41
185	263,52	74,78	83,17	735,50	4,08	480,59	448,32	570,77	369,06	478,26
186	262,09	74,71	83,33	727,12	4,08	477,94	447,77	573,14	367,17	476,87
187	261,02	74,36	82,77	717,72	4,08	475,73	446,03	574,91	365,43	474,29
188	258,60	74,49	82,68	707,84	4,08	472,60	445,65	576,35	363,93	473,43
189	256,04	74,10	82,75	693,32	3,98	470,87	444,61	577,64	362,22	471,55
190	254,02	74,40	82,62	682,67	3,98	469,43	443,41	578,99	360,48	469,80
191	251,86	74,51	82,84	676,42	3,98	467,66	443,23	580,35	358,78	467,95
192	250,12	74,61	82,44	670,60	3,87	466,38	442,41	581,68	357,33	466,39
193	248,50	74,62	82,46	666,48	3,88	464,91	441,96	583,12	355,78	464,41
194	246,81	74,45	82,38	662,89	3,87	462,82	441,13	584,59	354,05	463,67
195	244,95	74,62	82,29	658,70	3,80	461,67	440,74	586,02	352,57	462,14
196	243,26	74,74	82,42	654,78	3,78	460,56	440,58	587,56	351,03	460,72
197	241,71	74,69	82,13	651,58	3,87	459,38	439,38	589,17	349,42	459,23
198	240,14	74,66	82,26	648,56	3,77	458,05	438,67	590,70	347,97	457,70
199	238,37	74,74	81,96	645,42	3,77	456,88	438,18	592,16	346,63	456,72
200	276,17	74,64	111,03	648,75	3,79	455,13	437,07	594,18	345,11	454,52
201	264,13	74,53	86,32	557,08	3,67	454,17	436,42	589,59	343,89	453,61
202	248,07	74,63	83,17	564,34	3,68	452,95	435,78	581,49	342,09	452,12
203	241,07	74,79	82,39	595,27	3,67	451,53	434,02	572,71	340,37	450,61

Table with columns: Elapsed Time, Raw data row, Weight, CO, CO2, O2, Gas, Flue, Room, Tunnel, Unit, Unit, Unit, Unit, Unit, Unit, Mass flow 1, DGM 1, DGM 1, Filter 1, Mass flow 2, DGM 2, DGM 2, Filter 2, Tunnel Vel, Flue draft, Change in. Rows 0-101.

Table with 25 columns of numerical data. The first column contains a range of values from 102.0 to 207.0. The remaining 24 columns contain various numerical values, likely representing different parameters or measurements for each row.

208.0	471.0	4.5	1.2	15.6	0.0	321.8	75.7	86.1	353.2	458.8	507.4	507.1	397.1	1009.5	0.17	78.00	82.97	77.67	0.17	94.55	90.49	78.92	0.07	0.01	-2.34162
209.0	472.0	4.4	1.2	15.6	0.0	326.2	75.7	86.0	352.8	458.7	505.1	505.2	399.1	1013.7	0.17	77.72	82.94	77.68	0.17	94.26	90.63	78.92	0.07	0.01	-2.85894
210.0	473.0	4.3	1.2	15.6	0.0	331.6	75.8	86.0	353.5	458.7	507.4	507.4	399.1	1013.7	0.17	77.72	82.94	77.68	0.17	94.04	90.79	78.92	0.07	0.01	-2.84493
211.0	474.0	4.3	1.1	15.6	0.0	333.3	75.8	86.3	352.8	461.3	501.2	501.5	400.0	1019.8	0.17	77.32	82.77	77.71	0.17	93.84	90.84	78.96	0.07	0.01	-3.277319
212.0	475.0	4.2	1.0	15.6	0.0	334.9	75.8	86.6	351.3	461.5	499.1	499.9	405.0	1020.1	0.17	77.25	82.76	77.72	0.17	93.84	90.90	79.00	0.07	0.01	-3.689276
213.0	476.0	4.1	0.8	15.6	0.0	337.1	75.8	86.7	350.9	463.8	497.1	497.8	406.8	1020.1	0.17	77.20	82.75	77.72	0.17	93.77	90.99	79.02	0.08	0.01	-3.748248
214.0	477.0	4.1	0.6	15.6	0.0	338.3	75.3	86.6	350.1	465.2	495.8	496.3	408.6	1024.4	0.17	77.10	82.66	77.73	0.17	93.64	91.07	79.01	0.07	0.01	-3.837915
215.0	478.0	4.0	0.4	15.6	0.0	338.8	75.4	86.6	349.7	465.8	495.8	495.8	410.1	1026.9	0.17	77.13	82.57	77.75	0.17	93.49	91.09	79.04	0.07	0.01	-3.78785
216.0	479.0	3.9	0.3	15.4	0.0	339.5	75.2	86.4	349.4	469.8	491.2	494.3	411.6	1028.2	0.17	77.29	82.66	77.74	0.17	93.72	90.98	79.08	0.07	0.01	-3.808459
217.0	480.0	3.9	0.2	15.2	0.0	339.3	75.6	86.3	348.9	471.9	490.2	492.8	412.9	1030.9	0.17	77.62	82.81	77.75	0.17	94.17	90.95	79.09	0.08	0.01	-3.684503
218.0	481.0	3.9	0.2	15.1	0.0	343.4	75.3	87.1	348.4	474.3	488.5	492.2	414.2	1025.5	0.17	78.28	82.98	77.83	0.17	94.80	91.03	79.16	0.08	0.01	-3.508514
219.0	482.0	3.8	0.0	14.5	0.0	337.8	75.5	86.9	347.7	476.9	487.5	490.6	416.2	926.2	0.17	78.36	83.09	77.85	0.17	94.64	91.08	79.17	0.07	0.01	-3.274316
220.0	483.0	3.8	0.0	13.5	0.0	340.2	74.9	86.6	347.3	479.9	486.5	490.2	418.6	948.3	0.17	78.11	83.05	77.87	0.17	94.39	91.16	79.20	0.07	0.01	-2.518072
221.0	484.0	3.8	0.0	13.3	0.0	322.4	75.4	86.8	347.2	482.5	485.6	489.8	421.1	814.1	0.17	78.02	83.09	77.91	0.17	94.49	91.11	79.17	0.07	0.01	-1.802179
222.0	485.0	3.7	0.0	13.2	0.0	315.1	75.7	86.2	347.2	484.8	485.4	489.5	423.6	789.9	0.17	77.85	83.09	77.92	0.17	94.47	91.06	79.21	0.07	0.01	-0.95849
223.0	486.0	3.7	0.0	12.7	0.0	309.0	75.5	85.9	347.2	487.6	486.1	490.3	425.8	766.3	0.17	77.72	83.07	77.93	0.17	94.49	91.03	79.19	0.07	0.01	0.3903382
224.0	487.0	3.6	0.0	12.3	0.0	303.3	75.5	85.7	347.2	490.0	486.0	490.8	427.8	752.7	0.17	77.73	83.04	77.94	0.17	94.38	90.97	79.17	0.07	0.01	1.3372558
225.0	488.0	3.6	0.0	12.1	0.0	297.2	75.8	85.4	347.1	491.7	487.1	491.4	429.8	739.7	0.17	77.70	83.06	77.95	0.17	94.38	91.01	79.15	0.07	0.01	2.3780764
226.0	489.0	3.6	0.0	12.0	0.0	291.3	75.8	85.1	347.1	493.1	487.3	491.9	431.7	727.6	0.17	77.59	83.06	77.97	0.17	94.22	91.05	79.17	0.08	0.01	3.1690184
227.0	490.0	3.5	0.0	11.9	0.0	286.7	75.9	85.3	346.8	494.8	487.9	492.8	433.6	720.6	0.17	77.46	83.02	77.96	0.17	94.18	91.12	79.12	0.07	0.01	4.1438658
228.0	491.0	3.5	0.0	11.8	0.0	282.4	75.8	84.9	346.9	496.3	488.8	492.4	435.4	717.2	0.17	77.45	82.96	77.97	0.17	94.23	91.16	79.13	0.08	0.01	4.8887822
229.0	492.0	3.5	0.0	11.6	0.0	278.5	75.4	85.1	346.4	496.9	488.6	493.5	437.1	714.9	0.17	77.36	82.87	77.98	0.17	93.93	91.22	79.15	0.07	0.01	5.4458007
230.0	493.0	3.5	0.0	11.5	0.0	275.4	75.5	84.3	346.1	496.8	489.7	493.0	438.8	711.7	0.17	77.47	82.79	77.97	0.17	94.06	91.18	79.11	0.07	0.01	5.8448304
231.0	494.0	3.4	0.0	11.5	0.0	271.9	75.3	84.9	345.8	497.7	490.0	493.4	440.4	707.0	0.17	77.64	82.75	77.97	0.17	94.09	91.19	79.10	0.08	0.01	6.422632
232.0	495.0	3.4	0.0	11.5	0.0	268.0	75.6	84.9	345.9	499.4	490.1	494.4	441.9	704.2	0.17	77.83	82.84	77.98	0.17	94.37	91.20	79.14	0.07	0.01	7.2984984
233.0	496.0	3.4	0.0	11.5	0.0	265.0	75.9	84.5	345.4	498.3	490.7	493.6	443.4	701.7	0.17	77.81	82.93	77.96	0.17	94.49	91.22	79.10	0.07	0.01	7.2468948
234.0	497.0	3.4	0.0	11.4	0.0	261.6	75.9	84.1	344.6	497.8	489.4	492.1	445.8	699.0	0.17	77.82	82.84	77.98	0.17	94.49	91.23	79.08	0.07	0.01	4.22389
235.0	498.0	3.4	0.0	11.3	0.0	258.8	75.9	84.4	344.3	497.6	490.0	492.7	446.0	698.2	0.17	77.56	83.05	77.97	0.17	94.32	91.25	79.08	0.07	0.01	7.0652832
236.0	499.0	3.3	0.0	11.3	0.0	258.0	75.9	83.8	343.9	497.7	490.4	492.3	447.3	696.3	0.17	77.57	83.14	77.98	0.17	94.47	91.31	79.04	0.07	0.01	7.2769776
237.0	500.0	3.3	0.0	11.3	0.0	255.7	75.9	84.4	343.3	497.0	490.4	492.4	448.4	693.7	0.17	77.55	83.16	77.96	0.17	94.49	91.27	79.04	0.07	0.01	7.2526246
238.0	501.0	3.3	0.0	11.2	0.0	253.7	75.9	84.6	342.7	497.0	490.2	492.0	449.5	693.3	0.17	77.57	83.04	77.98	0.17	94.41	91.29	79.05	0.07	0.01	7.222325
239.0	502.0	3.3	0.0	11.2	0.0	251.8	75.4	84.2	342.4	496.8	489.8	492.0	450.8	692.0	0.17	77.62	82.94	77.96	0.17	94.23	91.32	79.05	0.08	0.01	6.689942
240.0	503.0	3.2	0.0	11.3	0.0	249.9	75.7	83.8	341.8	495.5	489.4	490.7	451.5	691.5	0.17	77.78	83.03	77.96	0.17	94.47	91.39	79.02	0.08	0.01	6.7440186
241.0	504.0	3.2	0.0	11.2	0.0	248.1	75.8	83.7	341.1	495.0	489.2	489.9	452.4	690.0	0.17	77.75	83.10	77.94	0.17	94.53	91.36	79.01	0.07	0.01	6.4897828
242.0	505.0	3.2	0.0	11.2	0.0	246.7	75.7	83.8	340.6	494.0	488.3	489.0	453.3	689.1	0.17	77.69	83.10	77.93	0.17	94.48	91.39	78.97	0.07	0.01	5.992273
243.0	506.0	3.2	0.0	11.2	0.0	245.6	75.9	83.5	340.1	493.2	487.5	488.7	454.2	688.5	0.17	77.81	83.07	77.94	0.17	94.48	91.42	78.97	0.07	0.01	4.8519629
244.0	507.0	3.1	0.0	11.2	0.0	244.1	75.7	83.4	339.2	492.9	487.5	487.9	454.9	687.8	0.17	77.44	82.93	77.92	0.17	93.98	91.52	78.94	0.07	0.01	5.4457338
245.0	508.0	3.1	0.0	11.2	0.0	242.9	75.6	84.0	338.5	492.0	486.6	487.1	455.6	686.2	0.17	77.44	82.88	77.91	0.17	94.12	91.51	78.94	0.07	0.01	4.9194396
246.0	509.0	3.1	0.0	11.2	0.0	240.9	75.5	83.5	337.8	491.0	486.5	486.2	456.2	684.8	0.17	77.52	82.86	77.89	0.17	94.18	91.45	78.91	0.08	0.01	4.4779542
247.0	510.0	3.1	0.0	11.2	0.0	240.3	75.6	83.5	337.2	490.2	485.4	485.5	456.7	684.6	0.17	77.73	82.99	77.88	0.17	94.34	91.43	78.88	0.07	0.01	3.9637024
248.0	511.0	3.1	0.0	11.2	0.0	239.0	75.9	83.0	336.8	489.6	485.6	485.6	457.2	683.7	0.17	77.66	82.99	77.89	0.17	94.57	91.46	78.85	0.07	0.01	4.0291447
249.0	512.0	3.1	0.0	11.1	0.0	238.3	75.9	83.3	336.0	488.6	483.6	485.1	457.7	682.3	0.17	77.55	82.82	77.87	0.17	93.80	91.67	78.83	0.08	0.01	3.1481202
250.0	513.0	3.0	0.0	11.1	0.0	237.0	75.8	82.9	335.1	488.1	483.5	483.7	458.0	681.5	0.17	77.71	82.90	77.87	0.17	94.25	91.65	78.83	0.07	0.01	2.6437012
251.0	514.0	3.0	0.0	11.1	0.0	235.8	75.9	83.6	334.4	486.5	482.6	483.3	458.4	680.7	0.17	77.66	82.97	77.85	0.17	94.25	91.59	78.81	0.08	0.01	1.9790896
252.0	515.0	3.0	0.0	11.1	0.0	235.1	76.0	82.6	333.6	485.4	482.0	482.3	458.7	681.6	0.17	77.55	82.95	77.84	0.17	93.95	91.63	78.80	0.08	0.01	1.3651246
253.0	516.0	3.0	0.0	11.0	0.0	233.6	75.9	82.5	332.8	484.1	480.9	481.1	459.2	680.6	0.17	77.60	82.96	77.85	0.17	94.01	91.65	78.82	0.07	0.01	0.851336
254.0	517.0	3.0	0.0	11.1	0.0	233.3	75.9	82.4	332.1	483.1	480.0	480.6	459.1	680.4	0.17	77.59	82.90	77.84	0.17	94.17	91.61	78.75	0.07	0.01	0.101587
255.0	518.0	2.9	0.0	11.0	0.0	233.0	76.0	83.1	331.5	481.8	480.1	480.5	459.3	678.8	0.17	77.65	82.88	77.81	0.17	94.21	91.62	78.73	0.08	0.01	-0.424585
256.0	519.																								

Table with 25 columns of numerical data, representing various measurements or calculations across different categories.

420,0	683,0	0,3	0,0	7,8	0,0	202,4	75,5	80,3	241,7	357,6	361,1	362,6	464,8	613,6	0,17	76,83	82,01	76,80	0,17	93,34	91,25	77,43	0,08	0,01	-89,48077
421,0	684,0	0,3	0,0	7,7	0,0	202,0	75,5	80,4	241,3	357,0	360,5	362,1	464,0	612,5	0,17	76,85	82,03	76,80	0,17	93,37	91,23	77,42	0,07	0,01	-90,03818
422,0	685,0	0,2	0,0	7,7	0,0	201,9	75,5	80,0	241,0	356,2	359,8	361,5	463,2	610,8	0,17	76,86	82,04	76,80	0,17	93,41	91,25	77,42	0,07	0,01	-90,68768
423,0	686,0	0,2	0,0	7,6	0,0	202,0	75,5	80,1	240,6	355,3	359,3	360,7	462,6	609,0	0,17	76,86	82,03	76,78	0,17	93,46	91,25	77,41	0,07	0,01	-91,32658
424,0	687,0	0,2	0,0	7,5	0,0	201,6	75,5	80,0	240,2	354,7	358,8	359,9	462,0	607,7	0,17	76,85	82,04	76,78	0,17	93,44	91,29	77,41	0,07	0,01	-91,93443
425,0	688,0	0,2	0,0	7,6	0,0	201,2	75,5	80,3	239,9	354,2	358,2	359,1	461,1	607,2	0,17	76,85	82,01	76,75	0,17	93,46	91,32	77,39	0,07	0,01	-92,52743
426,0	689,0	0,2	0,0	7,5	0,0	201,1	75,5	80,0	239,5	353,5	357,8	358,4	460,9	606,6	0,17	76,85	82,00	76,78	0,17	93,42	91,33	77,39	0,07	0,01	-93,02704
427,0	690,0	0,2	0,0	7,6	0,0	201,2	75,5	80,1	239,1	352,9	357,4	357,5	461,0	606,4	0,17	76,82	81,97	76,76	0,17	93,34	91,32	77,37	0,07	0,01	-93,44617
428,0	691,0	0,2	0,0	7,5	0,0	200,6	75,4	80,5	238,7	352,1	356,9	357,1	460,8	605,5	0,17	76,82	81,97	76,74	0,17	93,35	91,32	77,37	0,07	0,01	-93,91143
429,0	692,0	0,2	0,0	7,4	0,0	200,2	75,4	80,1	238,5	351,6	356,5	356,5	460,2	603,4	0,17	76,82	81,93	76,74	0,17	93,36	91,26	77,35	0,08	0,01	-94,40322
430,0	693,0	0,1	0,0	7,3	0,0	200,5	75,5	80,2	238,0	350,9	355,7	355,6	459,4	601,4	0,17	76,81	81,92	76,74	0,17	93,35	91,28	77,36	0,08	0,01	-95,10634
431,0	694,0	0,1	0,0	7,2	0,0	200,2	75,4	80,1	237,6	349,9	355,1	354,7	458,5	599,4	0,17	76,82	81,94	76,75	0,17	93,40	91,26	77,34	0,07	0,01	-95,87445
432,0	695,0	0,1	0,0	7,2	0,0	199,5	75,4	80,2	237,3	349,5	354,4	354,3	457,5	599,1	0,17	76,81	81,92	76,73	0,17	93,39	91,29	77,35	0,08	0,01	-96,43963
433,0	696,0	0,0	0,0	7,2	0,0	199,5	75,4	79,9	237,0	349,3	353,8	353,3	456,5	600,2	0,17	76,81	81,89	76,72	0,17	93,35	91,33	77,32	0,07	0,01	-97,06196

Manufacturer: HEARTHSTONE
Model: Mansfield 8013

Run: 5
Project #: PI 20240
Test Duration: 433 min

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

Overall Heating Efficiency: 79,95%
Combustion Efficiency: 98,49%
Heat Transfer Efficiency: 81,17%

	HHV	LHV
Eff	79,95%	86,41%
Comb Eff	98,49%	98,49%
HT Eff	81,17%	87,73%
Output	15 230	kJ/h
Burn Rate	0.96	kg/h
Grams CO	178	g
Input	19 050	kJ/h
MC wet	17,14	

Ultimate CO₂
CO_{2-ult} 19,64
F₀
1,062

Heat Output:	14 447 Btu/h
Heat Input:	18 071 Btu/h
Burn Duration:	7,22 h
Burn Rate:	2,12 lb/h
Stack Temp:	250,2 Deg. F

Averages		0,14	9,56	1,63	20,30	10,67	121,25	23,78	99,4%	80,3%	#DIV/0!
INPUT DATA		Oxygen Calculation				Input Data		Combust	Heat	Net	
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO ₂ [d]	Excess Air EA	Total O ₂	Calc. % O ₂ [g]	Flue Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %
0,00	8,38	0,05	4,75	309,8%	20,62	15,85	135,0	23,8	100,2%	74,7%	74,8%
1,00	8,29	0,12	3,09	511,1%	20,73	17,57	138,8	23,6	98,4%	65,5%	65,5%
2,00	8,25	0,02	2,32	739,6%	20,79	18,46	150,5	23,6	101,7%	56,1%	57,0%
3,00	8,25	0,01	2,63	644,1%	20,77	18,13	158,6	23,5	101,7%	57,9%	58,9%
4,00	8,20	0,01	2,63	645,4%	20,77	18,14	164,3	23,7	101,8%	56,5%	57,5%
5,00	8,19	0,01	3,09	533,0%	20,74	17,64	147,7	23,5	101,5%	64,7%	65,6%
6,00	8,18	0,01	3,52	457,8%	20,71	17,19	133,1	23,6	101,3%	70,2%	71,1%
7,00	8,18	0,01	2,31	749,5%	20,79	18,48	124,9	23,8	102,1%	62,8%	64,2%
8,00	8,18	0,01	2,13	821,1%	20,80	18,67	119,6	23,7	102,4%	62,2%	63,7%
9,00	8,16	0,01	2,10	832,6%	20,80	18,70	115,7	23,6	102,4%	63,0%	64,5%
10,00	8,16	0,01	2,12	824,2%	20,80	18,68	112,5	23,1	102,4%	64,0%	65,6%
11,00	8,16	0,01	2,13	821,1%	20,80	18,67	109,8	23,1	102,4%	64,9%	66,4%
12,00	8,12	0,01	2,16	808,1%	20,80	18,64	107,8	23,6	102,3%	65,9%	67,5%
13,00	8,11	0,01	2,24	775,2%	20,79	18,55	106,2	23,6	102,2%	67,2%	68,7%
14,00	8,11	0,01	2,26	765,1%	20,79	18,52	104,8	23,6	102,2%	67,9%	69,3%
15,00	8,11	0,01	2,39	721,1%	20,78	18,39	103,8	23,7	102,1%	69,2%	70,6%
16,00	8,07	0,01	2,47	693,4%	20,78	18,30	103,0	23,7	102,0%	70,0%	71,4%
17,00	8,07	0,01	2,59	656,6%	20,77	18,18	102,2	23,6	101,9%	71,1%	72,4%
18,00	8,07	0,01	2,73	616,9%	20,76	18,02	101,7	23,6	101,7%	72,1%	73,4%
19,00	8,07	0,01	2,89	578,5%	20,75	17,86	101,2	23,6	101,6%	73,1%	74,3%
20,00	8,02	0,01	2,97	559,0%	20,74	17,77	100,8	23,6	101,6%	73,7%	74,8%
21,00	8,02	0,01	3,06	539,9%	20,74	17,67	100,6	23,7	101,5%	74,2%	75,3%
22,00	8,02	0,01	3,11	529,6%	20,73	17,62	100,5	23,6	101,5%	74,4%	75,5%
23,00	7,98	0,01	3,11	530,6%	20,73	17,62	100,2	23,6	101,5%	74,4%	75,5%
24,00	7,98	0,01	3,09	533,0%	20,74	17,64	99,7	23,6	101,5%	74,5%	75,6%
25,00	7,93	0,01	3,09	533,6%	20,74	17,64	99,2	23,6	101,5%	74,6%	75,7%
26,00	7,94	0,01	3,13	525,6%	20,73	17,60	98,9	23,6	101,4%	74,8%	75,9%
27,00	7,93	0,01	3,13	526,4%	20,73	17,60	98,5	23,6	101,4%	74,9%	76,0%
28,00	7,93	0,01	3,12	526,8%	20,73	17,60	98,2	23,6	101,4%	74,9%	76,0%
29,00	7,88	0,01	3,09	532,8%	20,74	17,64	97,7	23,6	101,4%	74,9%	76,0%
30,00	7,89	0,01	3,13	524,6%	20,73	17,59	97,2	23,6	101,4%	75,2%	76,2%
31,00	7,88	0,01	3,14	522,9%	20,73	17,58	96,9	23,6	101,4%	75,3%	76,3%
32,00	7,84	0,01	3,17	516,9%	20,73	17,55	96,7	23,5	101,4%	75,4%	76,5%
33,00	7,84	0,01	3,19	512,2%	20,73	17,53	96,1	23,6	101,2%	75,6%	76,6%
34,00	7,84	0,03	3,22	504,7%	20,73	17,49	95,7	23,5	100,9%	75,8%	76,5%
35,00	7,80	0,06	3,25	493,6%	20,72	17,44	95,4	23,5	100,1%	76,0%	76,0%
36,00	7,80	0,09	3,29	481,7%	20,72	17,39	95,1	23,5	99,2%	76,1%	75,6%
37,00	7,79	0,12	3,34	467,9%	20,71	17,31	94,7	23,5	98,4%	76,4%	75,2%
38,00	7,75	0,15	3,41	450,7%	20,70	17,22	94,5	23,5	97,7%	76,6%	74,9%
39,00	7,75	0,24	3,41	437,4%	20,70	17,17	94,7	23,5	95,7%	76,5%	73,3%
40,00	7,70	0,26	3,45	429,6%	20,70	17,11	95,1	23,5	95,5%	76,6%	73,1%
41,00	7,70	0,26	3,48	425,1%	20,69	17,08	95,3	23,5	95,5%	76,7%	73,3%
42,00	7,70	0,25	3,53	419,7%	20,69	17,03	95,4	23,5	95,8%	76,8%	73,6%
43,00	7,68	0,23	3,58	415,3%	20,69	16,99	95,4	23,5	96,1%	77,0%	74,0%
44,00	7,66	0,22	3,66	406,6%	20,68	16,91	95,8	23,5	96,6%	77,2%	74,6%
45,00	7,66	0,20	3,74	399,3%	20,68	16,84	96,1	23,5	97,0%	77,4%	75,1%
46,00	7,61	0,18	3,79	395,2%	20,68	16,80	96,4	23,4	97,5%	77,5%	75,6%
47,00	7,61	0,16	3,88	387,2%	20,67	16,72	96,4	23,5	97,9%	77,8%	76,2%
48,00	7,60	0,13	3,91	386,0%	20,67	16,70	96,8	23,4	98,4%	77,8%	76,6%
49,00	7,57	0,11	3,97	381,2%	20,67	16,64	97,0	23,4	98,9%	78,0%	77,1%
50,00	7,57	0,09	4,00	381,1%	20,67	16,63	97,5	23,2	99,4%	78,0%	77,5%
51,00	7,56	0,07	4,04	378,4%	20,67	16,60	98,0	23,3	99,8%	78,0%	77,9%
52,00	7,52	0,05	4,08	375,1%	20,67	16,56	98,1	23,4	100,2%	78,2%	78,3%
53,00	7,52	0,04	4,12	372,6%	20,67	16,53	98,6	23,5	100,4%	78,2%	78,6%
54,00	7,51	0,03	4,16	369,3%	20,66	16,49	98,9	23,5	100,6%	78,3%	78,8%
55,00	7,48	0,02	4,15	371,3%	20,66	16,51	99,4	23,5	100,8%	78,2%	78,8%
56,00	7,48	0,01	4,17	370,1%	20,66	16,49	99,6	23,5	100,9%	78,2%	78,9%
57,00	7,43	0,01	4,29	356,9%	20,66	16,36	100,0	23,5	100,9%	78,4%	79,2%
58,00	7,43	0,01	4,35	350,7%	20,65	16,30	100,0	23,5	100,9%	78,6%	79,3%
59,00	7,39	0,01	4,41	344,0%	20,65	16,23	100,2	23,4	100,9%	78,7%	79,4%
60,00	7,39	0,01	4,46	339,1%	20,64	16,18	100,7	23,5	100,9%	78,7%	79,4%
61,00	7,39	0,01	4,55	330,8%	20,64	16,08	101,0	23,4	100,9%	78,9%	79,6%
62,00	7,34	0,01	4,58	328,4%	20,64	16,06	101,5	23,5	100,9%	78,9%	79,6%
63,00	7,34	0,01	4,63	323,6%	20,63	16,00	101,9	23,4	100,9%	78,9%	79,6%
64,00	7,34	0,01	4,71	315,8%	20,63	15,91	102,1	23,3	100,8%	79,1%	79,7%
65,00	7,29	0,01	4,72	315,0%	20,63	15,90	102,0	23,4	100,8%	79,1%	79,8%
66,00	7,29	0,01	4,75	313,0%	20,63	15,87	102,6	23,5	100,8%	79,1%	79,8%
67,00	7,29	0,01	4,78	310,2%	20,62	15,84	102,9	23,6	100,8%	79,1%	79,8%
68,00	7,25	0,01	4,85	304,4%	20,62	15,77	103,3	23,4	100,8%	79,2%	79,8%
69,00	7,25	0,01	4,86	303,8%	20,62	15,76	103,9	23,5	100,8%	79,1%	79,8%
70,00	7,21	0,01	4,92	298,4%	20,61	15,69	103,9	23,5	100,8%	79,3%	79,9%
71,00	7,21	0,01	4,92	298,7%	20,61	15,69	104,4	23,5	100,8%	79,2%	79,8%
72,00	7,21	0,01	4,95	296,3%	20,61	15,66	104,7	23,4	100,8%	79,2%	79,9%
73,00	7,16	0,01	4,98	294,3%	20,61	15,63	104,7	23,5	100,8%	79,3%	79,9%
74,00	7,16	0,01	4,99	293,3%	20,61	15,62	104,6	23,5	100,8%	79,3%	80,0%
75,00	7,12	0,01	4,99	293,2%	20,61	15,62	104,8	23,5	100,8%	79,3%	79,9%
76,00	7,11	0,01	4,97	294,6%	20,61	15,64	105,0	23,4	100,8%	79,2%	79,9%
77,00	7,07	0,01	4,97	294,6%	20,61	15,64	104,9	23,5	100,8%	79,2%	79,9%
78,00	7,07	0,01	4,99	293,3%	20,61	15,62	104,8	23,4	100,8%	79,3%	79,9%
79,00	7,07	0,01	4,99	293,4%	20,61	15,62	104,7	23,3	100,8%	79,3%	79,9%
80,00	7,07	0,01	5,05	288,4%	20,61	15,55	104,7	23,5	100,8%	79,4%	80,0%
81,00	7,02	0,01	5,08	285,9%	20,60	15,52	105,0	23,5	100,8%	79,5%	80,1%
82,00	6,99	0,01	5,08	286,0%	20,60	15,52	105,1	23,5	100,8%	79,4%	80,0%
83,00	6,98	0,01	5,16	279,7%	20,60	15,43	105,0	23,4	100,7%	79,6%	80,2%
84,00	6,97	0,01	5,15	281,1%	20,60	15,45	105,1	23,4	100,7%	79,5%	80,1%
85,00	6,95	0,01	5,21	276,3%	20,60	15,38	105,2	23,4	100,7%	79,6%	80,2%
86,00	6,93	0,01	5,28	271,7%	20,59	15,31	105,3	23,5	100,7%	79,8%	80,3%
87,00	6,93	0,01	5,36	266,0%	20,59	15,22	105,3	23,5	100,7%	79,9%	80,5%
88,00	6,89	0,01	5,46	259,5%	20,58	15,12	105,8	23,4	100,7%	80,0%	80,5%
89,00	6,89	0,01	5,56	253,1%	20,57	15,01	106,5	23,5	100,7%	80,1%	80,6%
90,00	6,84	0,01	5,70	244,0%	20,56	14,86	106,9	23,6	100,6%	80,3%	80,8%
91,00	6,84	0,01	5,85	235,2%	20,55	14,70	107,9	23,5	100,6%	80,4%	80,9%
92,00	6,80	0,01	6,01	226,1%	20,54	14,52	109,0	23,6	100,6%	80,5%	81,0%

93,00	6,80	0,01	6,16	218,4%	20,53	14,37	109,7	23,6	100,6%	80,6%	81,1%
94,00	6,80	0,01	6,35	208,8%	20,52	14,16	111,0	23,5	100,5%	80,7%	81,1%
95,00	6,75	0,01	6,45	203,9%	20,51	14,06	112,0	23,4	100,5%	80,7%	81,1%
96,00	6,70	0,01	6,52	200,8%	20,51	13,98	112,9	23,5	100,5%	80,7%	81,1%
97,00	6,70	0,01	6,65	194,9%	20,50	13,84	114,5	23,5	100,5%	80,7%	81,1%
98,00	6,70	0,01	6,82	187,8%	20,49	13,67	115,9	23,5	100,5%	80,8%	81,2%
99,00	6,66	0,01	6,88	185,0%	20,48	13,60	117,5	23,5	100,5%	80,7%	81,1%
100,00	6,66	0,01	7,00	180,3%	20,48	13,48	118,7	23,4	100,5%	80,7%	81,1%
101,00	6,61	0,01	7,18	173,3%	20,47	13,28	120,2	23,3	100,4%	80,8%	81,1%
102,00	6,57	0,01	7,31	168,4%	20,46	13,14	121,6	23,3	100,4%	80,8%	81,1%
103,00	6,57	0,01	7,44	163,7%	20,45	13,00	122,9	23,4	100,4%	80,8%	81,1%
104,00	6,52	0,01	7,54	160,2%	20,44	12,90	124,6	23,4	100,4%	80,8%	81,1%
105,00	6,52	0,01	7,69	155,1%	20,43	12,74	126,3	23,4	100,4%	80,8%	81,1%
106,00	6,48	0,01	7,82	150,9%	20,42	12,60	128,0	23,4	100,4%	80,7%	81,0%
107,00	6,43	0,01	7,92	147,7%	20,42	12,49	129,0	23,5	100,4%	80,8%	81,1%
108,00	6,43	0,01	8,10	142,2%	20,40	12,30	130,9	23,5	100,3%	80,8%	81,1%
109,00	6,43	0,01	8,30	136,4%	20,39	12,09	132,6	23,4	100,3%	80,8%	81,1%
110,00	6,39	0,01	8,58	128,7%	20,37	11,79	134,0	23,5	100,3%	81,0%	81,2%
111,00	6,34	0,01	8,76	123,9%	20,36	11,59	136,3	23,5	100,3%	81,0%	81,2%
112,00	6,30	0,01	8,99	118,2%	20,35	11,35	138,8	23,5	100,3%	81,0%	81,2%
113,00	6,30	0,01	9,22	112,7%	20,33	11,10	141,2	23,6	100,2%	81,0%	81,2%
114,00	6,25	0,01	9,62	103,9%	20,30	10,68	143,2	23,6	100,2%	81,1%	81,3%
115,00	6,21	0,01	9,97	96,8%	20,28	10,31	145,6	23,5	100,2%	81,2%	81,4%
116,00	6,16	0,01	10,40	88,7%	20,25	9,85	148,5	23,6	100,2%	81,3%	81,5%
117,00	6,16	0,02	10,74	82,6%	20,23	9,48	150,7	23,6	100,1%	81,4%	81,5%
118,00	6,11	0,02	11,01	78,1%	20,21	9,19	152,8	23,6	100,1%	81,4%	81,5%
119,00	6,07	0,02	11,30	80,0%	20,22	9,32	155,1	23,6	100,1%	81,2%	81,3%
120,00	6,02	0,02	11,60	80,3%	20,22	9,33	157,4	23,6	100,1%	81,1%	81,2%
121,00	6,02	0,02	11,90	81,7%	20,23	9,42	158,5	23,6	100,1%	80,9%	81,0%
122,00	5,98	0,02	12,20	82,3%	20,23	9,46	159,9	23,5	100,1%	80,8%	80,9%
123,00	5,93	0,02	12,50	81,7%	20,23	9,42	160,6	23,6	100,1%	80,8%	80,9%
124,00	5,93	0,02	12,80	82,3%	20,23	9,46	161,5	23,7	100,1%	80,7%	80,8%
125,00	5,89	0,02	13,10	80,6%	20,22	9,35	162,6	23,7	100,1%	80,7%	80,8%
126,00	5,84	0,02	13,40	74,5%	20,20	8,95	163,9	23,7	100,1%	80,9%	81,0%
127,00	5,80	0,02	13,70	68,8%	20,17	8,54	165,7	23,6	100,1%	81,0%	81,1%
128,00	5,75	0,02	14,00	62,4%	20,14	8,05	167,4	23,6	100,1%	81,2%	81,2%
129,00	5,71	0,02	14,30	54,0%	20,10	7,35	169,8	23,4	100,0%	81,4%	81,4%
130,00	5,66	0,02	14,60	47,5%	20,06	6,76	172,9	23,2	100,0%	81,5%	81,5%
131,00	5,62	0,02	14,90	42,4%	20,03	6,25	176,0	23,2	100,0%	81,6%	81,6%
132,00	5,57	0,02	15,20	37,7%	20,00	5,74	178,9	23,2	100,0%	81,6%	81,6%
133,00	5,53	0,02	15,50	32,8%	19,96	5,19	181,5	23,0	100,0%	81,7%	81,7%
134,00	5,48	0,02	15,80	29,2%	19,94	4,75	184,4	23,0	100,0%	81,7%	81,7%
135,00	5,43	0,02	16,10	26,6%	19,92	4,41	187,4	23,0	100,0%	81,7%	81,7%
136,00	5,39	0,02	16,40	23,9%	19,89	4,04	189,8	23,1	99,9%	81,7%	81,7%
137,00	5,33	0,02	16,70	21,4%	19,87	3,71	196,9	23,2	99,9%	81,5%	81,5%
138,00	5,25	0,81	16,91	10,9%	19,77	2,46	195,8	23,3	96,2%	81,6%	78,5%
139,00	5,16	5,25	15,05	-3,2%	19,60	1,93	192,1	23,3	78,8%	79,7%	62,9%
140,00	5,12	1,61	15,98	11,6%	19,78	2,99	193,4	23,4	92,4%	81,1%	74,9%
141,00	5,07	0,28	16,37	18,0%	19,84	3,33	200,2	23,5	98,6%	81,4%	80,3%
142,00	5,03	0,20	16,76	15,8%	19,82	2,96	196,6	23,5	99,0%	81,7%	80,9%
143,00	4,94	0,67	16,09	17,2%	19,83	3,41	191,3	23,5	96,7%	81,6%	78,8%
144,00	4,84	5,25	14,44	-0,2%	19,64	2,58	193,7	23,6	78,2%	79,4%	62,1%
145,00	4,80	1,50	16,73	7,8%	19,74	2,26	193,5	23,6	93,1%	81,5%	75,9%
146,00	4,75	0,58	16,91	12,3%	19,79	2,58	192,1	23,5	97,2%	81,9%	79,6%
147,00	4,66	3,29	15,72	3,3%	19,68	2,32	191,2	23,6	85,7%	80,7%	69,1%
148,00	4,62	1,88	16,14	9,0%	19,75	2,67	191,6	23,7	91,3%	81,2%	74,2%
149,00	4,57	1,59	17,22	4,4%	19,70	1,68	187,1	23,6	92,9%	81,9%	76,1%
150,00	4,48	3,16	15,94	2,8%	19,68	2,16	184,1	23,6	86,3%	81,1%	70,0%
151,00	4,44	2,63	15,48	8,5%	19,74	2,96	190,0	23,5	88,0%	80,8%	71,1%
152,00	4,39	0,19	16,22	19,8%	19,86	3,55	187,3	23,7	99,1%	82,0%	81,2%
153,00	4,33	0,07	16,49	18,6%	19,85	3,32	184,0	23,7	99,7%	82,3%	82,0%
154,00	4,25	1,30	16,84	8,3%	19,74	2,25	181,4	23,7	94,0%	82,1%	77,2%
155,00	4,21	1,95	16,37	7,3%	19,73	2,39	180,5	23,8	91,1%	81,8%	74,6%
156,00	4,12	2,13	16,25	6,9%	19,73	2,41	179,4	23,8	90,4%	81,8%	73,9%
157,00	4,07	2,30	16,08	6,8%	19,73	2,49	178,2	23,7	89,6%	81,7%	73,2%
158,00	4,03	2,24	16,08	7,2%	19,73	2,52	176,8	23,8	89,8%	81,8%	73,5%
159,00	3,94	1,73	16,31	8,8%	19,75	2,57	174,8	23,8	92,0%	82,1%	75,6%
160,00	3,89	1,34	16,48	10,3%	19,76	2,62	173,2	23,8	93,7%	82,4%	77,2%
161,00	3,85	0,82	16,71	12,0%	19,78	2,66	171,7	23,7	96,1%	82,7%	79,5%
162,00	3,80	0,46	16,82	13,6%	19,80	2,74	170,0	23,8	97,8%	82,9%	81,1%
163,00	3,71	0,22	16,70	16,1%	19,82	3,02	168,3	23,8	98,9%	83,0%	82,2%
164,00	3,66	0,06	16,59	17,9%	19,84	3,22	166,9	23,8	99,7%	83,1%	82,9%
165,00	3,62	0,03	16,51	18,7%	19,85	3,32	165,8	23,9	99,9%	83,2%	83,1%
166,00	3,57	0,01	16,14	21,7%	19,87	3,73	164,0	23,9	100,0%	83,1%	83,2%
167,00	3,53	0,01	15,97	22,9%	19,88	3,91	162,1	23,9	100,0%	83,2%	83,2%
168,00	3,48	0,01	15,52	26,5%	19,91	4,39	160,1	23,9	100,0%	83,1%	83,2%
169,00	3,44	0,01	15,19	29,2%	19,94	4,74	157,8	23,9	100,1%	83,1%	83,2%
170,00	3,39	0,01	14,87	32,1%	19,96	5,09	155,6	23,9	100,1%	83,1%	83,2%
171,00	3,35	0,01	14,73	33,3%	19,97	5,23	153,9	23,9	100,1%	83,2%	83,2%
172,00	3,30	0,01	14,65	34,0%	19,97	5,32	152,7	23,8	100,1%	83,2%	83,3%
173,00	3,30	0,01	14,80	32,7%	19,96	5,16	151,7	23,8	100,1%	83,3%	83,4%
174,00	3,24	0,01	14,96	31,2%	19,95	4,98	151,0	23,9	100,1%	83,4%	83,5%
175,00	3,21	0,01	14,95	31,4%	19,95	5,00	150,2	24,0	100,1%	83,4%	83,5%
176,00	3,16	0,01	15,00	30,9%	19,95	4,95	149,7	24,0	100,1%	83,5%	83,5%
177,00	3,12	0,01	15,00	30,9%	19,95	4,95	149,1	23,8	100,1%	83,5%	83,6%
178,00	3,07	0,01	15,11	29,9%	19,94	4,83	148,7	23,9	100,1%	83,6%	83,6%
179,00	3,03	0,01	15,13	29,8%	19,94	4,81	148,4	23,9	100,1%	83,6%	83,6%
180,00	2,98	0,01	15,20	29,2%	19,94	4,74	148,0	23,8	100,0%	83,6%	83,7%
181,00	2,94	0,01	15,08	30,2%	19,94	4,86	147,4	23,8	100,1%	83,6%	83,7%
182,00	2,89	0,01	15,08	30,2%	19,94	4,86	146,5	23,9	100,1%	83,7%	83,7%
183,00	2,85	0,01	15,08	30,2%	19,94	4,86	146,3	24,0	100,1%	83,7%	83,7%
184,00	2,85	0,01	14,98	31,1%	19,95	4,97	145,6	24,0	100,1%	83,7%	83,7%
185,00	2,80	0,01	15,03	30,6%	19,95	4,91	145,3	24,0	100,1%	83,7%	83,8%
186,00	2,76	0,01	15,05	30,5%	19,95	4,89	145,2	24,0	100,1%	83,7%	83,8%
187,00	2,71	0,01	15,06	30,3%	19,94	4,88	144,6	23,9	100,1%	83,8%	83,8%
188,00	2,67	0,01	15,05	30,5%	19,95	4,90	144,3	23,8	100,1%	83,8%	83,8%
189,00	2,62	0,01	14,91	31,6%	19,95	5,04	143,2	24,0	100,1%	83,8%	83,8%
190,00	2,62	0,01	14,70	33,6%	19,97	5,27	142,3	24,0	100,1%	83,8%	83,8%
191,00	2,57	0,01	14,70	33,6%	19,97	5,26	141,4	24,0	100,1%	83,8%	83,9%
192,00	2,53	0,01	14,42	36,2%	19,99	5,57	140,6	24,1	100,1%	83,8%	83,8%
193,00	2,48	0,01	14,42	36,2%	19,99	5,56	139,5	24,0	100,1%	83,8%	83,9%
194,00	2,48	0,01	14,42	36,2%	19,99	5,57	138,6	24,1	100,1%	83,9%	83,9%
195,00	2,44	0,01	14,47	35,7%	19,98	5,51	137,7	24,2	100,1%	83,9%	84,0%
196,00	2,39	0,01	14,58	34,6%	19,98						

207,00	2,08	1,10	15,65	17,3%	19,83	3,63	158,6	23,7	94,5%	82,9%	78,4%
208,00	2,03	1,25	15,59	16,7%	19,83	3,61	161,0	24,3	93,8%	82,7%	77,6%
209,00	1,98	1,24	15,56	17,0%	19,83	3,66	163,4	24,3	93,9%	82,6%	77,5%
210,00	1,94	1,18	15,56	17,4%	19,83	3,69	165,4	24,3	94,1%	82,5%	77,7%
211,00	1,94	1,08	15,57	17,9%	19,84	3,73	167,4	24,3	94,6%	82,5%	78,0%
212,00	1,89	0,97	15,57	18,7%	19,85	3,79	168,3	24,3	95,1%	82,5%	78,4%
213,00	1,85	0,82	15,57	19,8%	19,86	3,87	169,5	24,3	95,8%	82,4%	79,0%
214,00	1,85	0,62	15,56	21,4%	19,87	4,00	170,2	24,0	96,8%	82,5%	79,8%
215,00	1,81	0,40	15,54	23,2%	19,89	4,15	170,4	24,1	98,0%	82,5%	80,8%
216,00	1,76	0,28	15,39	25,3%	19,91	4,37	170,8	24,0	98,5%	82,5%	81,3%
217,00	1,76	0,23	15,24	26,9%	19,92	4,56	170,7	24,2	98,8%	82,4%	81,4%
218,00	1,76	0,16	15,06	29,1%	19,94	4,79	173,0	24,0	99,2%	82,3%	81,6%
219,00	1,71	0,05	14,50	35,0%	19,98	5,46	169,9	24,2	99,8%	82,2%	82,1%
220,00	1,71	0,01	13,51	45,3%	20,05	6,53	165,6	23,9	100,1%	82,0%	82,1%
221,00	1,71	0,01	13,28	47,8%	20,06	6,78	161,3	24,1	100,1%	82,2%	82,3%
222,00	1,67	0,01	13,20	48,7%	20,07	6,86	157,3	24,3	100,1%	82,4%	82,5%
223,00	1,67	0,01	12,72	54,3%	20,10	7,37	153,9	24,2	100,1%	82,4%	82,5%
224,00	1,62	0,01	12,29	59,7%	20,13	7,83	150,7	24,2	100,1%	82,3%	82,4%
225,00	1,62	0,01	12,10	62,3%	20,14	8,04	147,4	24,3	100,1%	82,4%	82,6%
226,00	1,62	0,01	11,97	64,1%	20,15	8,18	144,1	24,4	100,1%	82,6%	82,7%
227,00	1,58	0,01	11,87	65,4%	20,16	8,28	141,5	24,4	100,1%	82,7%	82,8%
228,00	1,58	0,01	11,75	67,0%	20,16	8,41	139,1	24,3	100,2%	82,8%	82,9%
229,00	1,58	0,01	11,64	68,7%	20,17	8,53	137,0	24,1	100,2%	82,8%	83,0%
230,00	1,58	0,01	11,54	70,1%	20,18	8,63	135,2	24,2	100,2%	82,9%	83,0%
231,00	1,53	0,01	11,49	70,8%	20,18	8,68	133,3	24,1	100,2%	83,0%	83,1%
232,00	1,53	0,01	11,54	70,1%	20,18	8,64	131,1	24,2	100,2%	83,2%	83,3%
233,00	1,53	0,01	11,46	71,3%	20,18	8,72	129,4	24,4	100,2%	83,2%	83,4%
234,00	1,53	0,01	11,38	72,5%	20,19	8,81	127,6	24,4	100,2%	83,3%	83,5%
235,00	1,53	0,01	11,31	73,6%	20,19	8,88	126,6	24,4	100,2%	83,4%	83,5%
236,00	1,49	0,01	11,28	74,0%	20,19	8,91	125,5	24,4	100,2%	83,4%	83,5%
237,00	1,49	0,01	11,26	74,3%	20,20	8,93	124,3	24,4	100,2%	83,5%	83,6%
238,00	1,49	0,01	11,21	75,1%	20,20	8,98	123,1	24,4	100,2%	83,5%	83,7%
239,00	1,44	0,01	11,31	73,5%	20,19	8,88	122,1	23,9	100,2%	83,6%	83,8%
240,00	1,44	0,01	11,26	74,3%	20,20	8,93	121,0	24,3	100,2%	83,7%	83,8%
241,00	1,44	0,01	11,21	75,1%	20,20	8,98	120,0	24,4	100,2%	83,7%	83,9%
242,00	1,44	0,01	11,18	75,6%	20,20	9,02	119,3	24,3	100,2%	83,8%	83,9%
243,00	1,44	0,01	11,20	75,3%	20,20	9,00	118,7	24,4	100,2%	83,8%	84,0%
244,00	1,39	0,01	11,18	75,6%	20,20	9,02	117,8	24,3	100,2%	83,9%	84,0%
245,00	1,39	0,01	11,21	75,1%	20,20	8,98	117,2	24,2	100,2%	83,9%	84,0%
246,00	1,39	0,01	11,23	74,8%	20,20	8,96	116,1	24,2	100,2%	84,0%	84,1%
247,00	1,39	0,01	11,21	75,0%	20,20	8,98	115,7	24,2	100,2%	84,0%	84,1%
248,00	1,39	0,01	11,16	75,8%	20,20	9,04	115,0	24,4	100,2%	84,0%	84,2%
249,00	1,39	0,01	11,13	76,3%	20,20	9,07	114,6	24,0	100,2%	84,0%	84,2%
250,00	1,35	0,01	11,12	76,5%	20,21	9,08	113,9	24,3	100,2%	84,1%	84,2%
251,00	1,35	0,01	11,08	77,1%	20,21	9,12	113,2	24,4	100,2%	84,1%	84,2%
252,00	1,35	0,01	11,08	77,1%	20,21	9,12	112,9	24,5	100,2%	84,1%	84,3%
253,00	1,35	0,01	11,00	78,5%	20,21	9,21	112,4	24,3	100,2%	84,1%	84,3%
254,00	1,35	0,01	11,06	77,4%	20,21	9,14	111,8	24,4	100,2%	84,2%	84,3%
255,00	1,30	0,01	11,00	78,5%	20,21	9,21	111,7	24,4	100,2%	84,2%	84,3%
256,00	1,30	0,01	11,04	77,7%	20,21	9,16	111,4	24,4	100,2%	84,2%	84,4%
257,00	1,30	0,01	10,98	78,8%	20,21	9,23	110,9	24,5	100,2%	84,2%	84,4%
258,00	1,30	0,01	11,00	78,5%	20,21	9,21	110,4	24,4	100,2%	84,3%	84,4%
259,00	1,30	0,01	10,93	79,6%	20,22	9,28	110,1	24,2	100,2%	84,2%	84,4%
260,00	1,26	0,01	10,89	80,1%	20,22	9,32	109,8	24,3	100,2%	84,2%	84,4%
261,00	1,26	0,01	10,90	80,1%	20,22	9,32	109,7	24,3	100,2%	84,2%	84,4%
262,00	1,26	0,01	10,86	80,7%	20,22	9,36	109,7	24,3	100,2%	84,2%	84,4%
263,00	1,26	0,01	10,85	80,9%	20,22	9,37	109,7	24,2	100,2%	84,2%	84,4%
264,00	1,26	0,01	10,80	81,8%	20,23	9,42	109,3	24,4	100,2%	84,2%	84,4%
265,00	1,21	0,01	10,76	82,3%	20,23	9,46	109,2	24,4	100,2%	84,2%	84,4%
266,00	1,21	0,01	10,76	82,3%	20,23	9,46	109,2	24,3	100,2%	84,2%	84,4%
267,00	1,21	0,01	10,71	83,2%	20,23	9,52	109,0	24,2	100,2%	84,2%	84,4%
268,00	1,21	0,01	10,69	83,5%	20,23	9,53	109,1	24,3	100,2%	84,2%	84,3%
269,00	1,21	0,01	10,61	84,9%	20,24	9,62	108,9	24,4	100,2%	84,2%	84,3%
270,00	1,17	0,01	10,63	84,6%	20,24	9,60	109,2	24,2	100,2%	84,2%	84,3%
271,00	1,17	0,01	10,56	85,7%	20,24	9,67	109,0	24,4	100,2%	84,2%	84,3%
272,00	1,17	0,01	10,53	86,3%	20,24	9,71	108,8	24,0	100,2%	84,1%	84,3%
273,00	1,17	0,01	10,51	86,6%	20,24	9,72	109,0	24,2	100,2%	84,1%	84,3%
274,00	1,17	0,01	10,45	87,8%	20,25	9,80	109,2	23,9	100,2%	84,1%	84,2%
275,00	1,17	0,01	10,45	87,8%	20,25	9,80	109,2	24,4	100,2%	84,1%	84,2%
276,00	1,12	0,01	10,45	87,8%	20,25	9,80	108,9	24,3	100,2%	84,1%	84,3%
277,00	1,12	0,01	10,45	87,8%	20,25	9,79	109,0	24,4	100,2%	84,1%	84,3%
278,00	1,12	0,01	10,45	87,8%	20,25	9,80	108,9	24,4	100,2%	84,1%	84,3%
279,00	1,12	0,01	10,40	88,7%	20,25	9,85	108,9	24,4	100,2%	84,1%	84,2%
280,00	1,12	0,01	10,35	89,6%	20,26	9,90	108,6	23,8	100,2%	84,1%	84,2%
281,00	1,12	0,01	10,35	89,5%	20,26	9,90	108,5	23,7	100,2%	84,0%	84,2%
282,00	1,08	0,01	10,32	90,2%	20,26	9,93	108,3	23,4	100,2%	84,0%	84,2%
283,00	1,08	0,01	10,31	90,2%	20,26	9,94	108,5	23,5	100,2%	84,0%	84,2%
284,00	1,08	0,01	10,27	91,1%	20,26	9,99	108,9	23,7	100,2%	84,0%	84,1%
285,00	1,08	0,01	10,23	91,7%	20,26	10,02	109,1	23,8	100,2%	84,0%	84,1%
286,00	1,08	0,01	10,27	91,1%	20,26	9,99	108,9	23,8	100,2%	84,0%	84,1%
287,00	1,03	0,02	10,17	92,9%	20,27	10,09	108,8	23,9	100,2%	84,0%	84,1%
288,00	1,03	0,01	10,14	93,5%	20,27	10,13	108,8	24,0	100,2%	83,9%	84,1%
289,00	1,03	0,02	9,89	98,4%	20,29	10,39	109,2	24,0	100,2%	83,8%	83,9%
290,00	1,03	0,02	9,82	99,7%	20,29	10,46	109,5	24,0	100,2%	83,7%	83,9%
291,00	1,03	0,02	9,74	101,4%	20,30	10,55	109,7	24,1	100,2%	83,7%	83,8%
292,00	0,99	0,02	9,69	102,4%	20,30	10,60	110,1	24,2	100,2%	83,6%	83,8%
293,00	1,03	0,02	9,70	102,1%	20,30	10,59	110,2	24,2	100,2%	83,6%	83,8%
294,00	0,99	0,02	9,69	102,4%	20,30	10,60	110,7	24,2	100,2%	83,6%	83,7%
295,00	0,99	0,02	9,69	102,4%	20,30	10,60	110,8	24,2	100,2%	83,6%	83,7%
296,00	0,99	0,02	9,67	102,8%	20,30	10,62	110,7	24,3	100,2%	83,6%	83,7%
297,00	0,99	0,02	9,72	101,8%	20,30	10,57	110,7	24,3	100,2%	83,6%	83,8%
298,00	0,99	0,02	9,70	102,1%	20,30	10,59	110,6	24,3	100,2%	83,6%	83,8%
299,00	0,99	0,01	9,62	103,9%	20,30	10,68	111,0	24,3	100,2%	83,5%	83,7%
300,00	0,94	0,02	9,65	103,2%	20,30	10,64	110,8	24,3	100,2%	83,6%	83,7%
301,00	0,94	0,02	9,72	101,8%	20,30	10,57	110,9	24,4	100,2%	83,6%	83,8%
302,00	0,97	0,02	9,72	101,8%	20,30	10,57	110,9	24,3	100,2%	83,6%	83,8%
303,00	0,94	0,02	9,72	101,8%	20,30	10,57	110,8	24,4	100,2%	83,6%	83,8%
304,00	0,94	0,02	9,70	102,1%	20,30	10,59	110,9	24,4	100,2%	83,6%	83,8%
305,00	0,93	0,02	9,65	103,1%	20,30	10,64	110,4	24,4	100,2%	83,6%	83,8%
306,00	0,90	0,02	9,66	103,1%	20,30	10,64	110,8	24,4	100,2%	83,6%	83,7%
307,00	0,90	0,02	9,65	103,2%	20,30	10,64	110,7	24,4	100,2%	83,6%	83,7%
308,00	0,90	0,02	9,62	103,8%	20,30	10,67	110,8	24,4	100,2%	83,6%	83,7%
309,00	0,90	0,02	9,56	105,2%	20,31	10,74	110,5	24,4	100,2%	83,6%	83,7%
310,00	0,90	0									

321,00	0,80	0,01	9,77	100,8%	20,29	10,52	108,0	24,4	100,2%	83,8%	84,0%
322,00	0,80	0,01	9,77	100,9%	20,29	10,52	107,2	24,4	100,2%	83,9%	84,1%
323,00	0,76	0,01	9,79	100,5%	20,29	10,50	106,6	24,4	100,5%	84,0%	84,1%
324,00	0,76	0,01	9,83	99,5%	20,29	10,45	105,9	24,4	100,2%	84,0%	84,2%
325,00	0,76	0,01	9,85	99,2%	20,29	10,43	105,4	24,4	100,2%	84,1%	84,2%
326,00	0,76	0,01	9,87	98,8%	20,29	10,41	104,6	24,4	100,2%	84,1%	84,3%
327,00	0,76	0,01	9,88	98,5%	20,29	10,40	104,4	24,4	100,2%	84,2%	84,3%
328,00	0,75	0,01	9,87	98,7%	20,29	10,41	104,1	24,4	100,2%	84,2%	84,3%
329,00	0,71	0,01	9,82	99,8%	20,29	10,46	103,8	24,4	100,2%	84,2%	84,3%
330,00	0,71	0,01	9,83	99,4%	20,29	10,45	103,9	24,4	100,2%	84,2%	84,3%
331,00	0,71	0,01	9,82	99,8%	20,29	10,47	103,7	24,4	100,2%	84,2%	84,3%
332,00	0,71	0,01	9,79	100,4%	20,29	10,50	103,4	24,4	100,2%	84,2%	84,3%
333,00	0,71	0,01	9,67	102,8%	20,30	10,62	103,3	24,4	100,2%	84,1%	84,3%
334,00	0,68	0,01	9,49	106,7%	20,31	10,82	103,6	24,4	100,2%	84,0%	84,2%
335,00	0,67	0,01	9,41	108,5%	20,32	10,91	103,6	24,4	100,2%	84,0%	84,1%
336,00	0,67	0,01	9,32	110,3%	20,32	10,99	103,4	24,4	100,2%	83,9%	84,1%
337,00	0,67	0,01	9,32	110,4%	20,32	10,99	103,7	24,4	100,2%	83,9%	84,1%
338,00	0,67	0,01	9,31	110,7%	20,32	11,01	103,9	24,4	100,2%	83,9%	84,1%
339,00	0,67	0,01	9,32	110,4%	20,32	10,99	103,8	24,4	100,2%	83,9%	84,1%
340,00	0,67	0,01	9,34	110,0%	20,32	10,97	103,6	24,4	100,2%	83,9%	84,1%
341,00	0,62	0,01	9,31	110,7%	20,32	11,01	103,4	24,4	100,2%	83,9%	84,1%
342,00	0,62	0,01	9,39	108,9%	20,32	10,92	103,1	24,4	100,2%	84,0%	84,2%
343,00	0,62	0,01	9,37	109,3%	20,32	10,94	103,0	24,3	100,2%	84,0%	84,2%
344,00	0,62	0,01	9,32	110,4%	20,32	10,99	102,9	24,3	100,2%	84,0%	84,2%
345,00	0,62	0,01	9,32	110,4%	20,32	10,99	102,6	24,3	100,2%	84,0%	84,2%
346,00	0,58	0,01	9,32	110,4%	20,32	10,99	102,5	24,3	100,2%	84,0%	84,2%
347,00	0,58	0,01	9,31	110,7%	20,32	11,01	102,3	24,3	100,2%	84,0%	84,2%
348,00	0,58	0,01	9,26	111,8%	20,33	11,06	102,3	24,3	100,2%	84,0%	84,2%
349,00	0,58	0,01	9,21	113,0%	20,33	11,12	102,2	24,3	100,2%	84,0%	84,2%
350,00	0,58	0,01	9,18	113,7%	20,33	11,15	102,2	24,3	100,2%	83,9%	84,1%
351,00	0,58	0,01	9,16	114,2%	20,33	11,17	102,5	24,3	100,2%	83,9%	84,1%
352,00	0,58	0,01	9,19	113,4%	20,33	11,13	102,1	24,3	100,2%	84,0%	84,2%
353,00	0,58	0,01	9,17	113,8%	20,33	11,15	101,9	24,3	100,2%	84,0%	84,2%
354,00	0,53	0,01	9,13	114,9%	20,34	11,20	101,6	24,3	100,2%	84,0%	84,2%
355,00	0,53	0,01	9,13	114,9%	20,34	11,20	101,6	24,3	100,2%	84,0%	84,2%
356,00	0,53	0,01	9,08	116,1%	20,34	11,26	101,6	24,3	100,2%	83,9%	84,1%
357,00	0,53	0,01	9,11	115,3%	20,34	11,22	101,7	24,3	100,2%	84,0%	84,1%
358,00	0,51	0,01	9,08	116,1%	20,34	11,26	101,5	24,3	100,2%	84,0%	84,1%
359,00	0,53	0,01	9,06	116,5%	20,34	11,27	101,4	24,3	100,2%	83,9%	84,1%
360,00	0,53	0,01	9,06	116,5%	20,34	11,28	101,4	24,3	100,2%	83,9%	84,1%
361,00	0,49	0,01	9,01	117,7%	20,34	11,33	101,3	24,3	100,2%	83,9%	84,1%
362,00	0,49	0,01	8,99	118,0%	20,35	11,34	101,3	24,3	100,2%	83,9%	84,1%
363,00	0,49	0,01	8,96	118,9%	20,35	11,38	101,0	24,3	100,2%	83,9%	84,1%
364,00	0,49	0,01	8,98	118,5%	20,35	11,36	100,9	24,3	100,2%	83,9%	84,1%
365,00	0,49	0,01	8,98	118,5%	20,35	11,36	101,0	24,3	100,2%	83,9%	84,1%
366,00	0,46	0,01	9,06	116,5%	20,34	11,27	100,5	24,3	100,3%	84,0%	84,2%
367,00	0,44	0,01	9,04	117,0%	20,34	11,30	100,1	24,3	100,3%	84,0%	84,3%
368,00	0,44	0,01	8,93	119,7%	20,35	11,41	99,4	24,3	100,3%	84,0%	84,3%
369,00	0,44	0,01	8,88	121,0%	20,35	11,47	98,7	24,3	100,3%	84,1%	84,3%
370,00	0,44	0,01	8,81	122,7%	20,36	11,54	98,3	24,3	100,3%	84,0%	84,3%
371,00	0,44	0,01	8,88	120,9%	20,35	11,46	97,8	24,3	100,3%	84,1%	84,4%
372,00	0,40	0,01	8,84	121,8%	20,36	11,51	97,7	24,3	100,3%	84,1%	84,3%
373,00	0,44	0,01	8,91	120,2%	20,35	11,44	97,1	24,3	100,3%	84,2%	84,4%
374,00	0,40	0,01	8,93	119,8%	20,35	11,42	96,7	24,3	100,3%	84,2%	84,5%
375,00	0,40	0,01	8,93	119,8%	20,35	11,42	96,6	24,3	100,3%	84,2%	84,5%
376,00	0,40	0,01	8,91	120,1%	20,35	11,43	96,6	24,3	100,3%	84,2%	84,4%
377,00	0,40	0,01	8,94	119,3%	20,35	11,40	96,1	24,3	100,3%	84,3%	84,5%
378,00	0,35	0,01	8,91	120,1%	20,35	11,43	96,1	24,3	100,3%	84,3%	84,5%
379,00	0,40	0,01	8,90	120,5%	20,35	11,45	96,4	24,3	100,3%	84,2%	84,5%
380,00	0,35	0,01	8,83	122,2%	20,36	11,52	95,8	24,3	100,3%	84,2%	84,5%
381,00	0,35	0,01	8,78	123,4%	20,36	11,57	96,0	24,3	100,3%	84,2%	84,4%
382,00	0,35	0,01	8,71	125,1%	20,36	11,64	95,7	24,3	100,3%	84,2%	84,4%
383,00	0,35	0,01	8,69	125,6%	20,37	11,66	95,8	24,3	100,3%	84,2%	84,4%
384,00	0,35	0,01	8,70	125,5%	20,36	11,66	95,6	24,3	100,3%	84,2%	84,4%
385,00	0,34	0,01	8,56	129,0%	20,37	11,80	95,3	24,3	100,3%	84,1%	84,4%
386,00	0,35	0,01	8,55	129,4%	20,37	11,82	95,6	24,3	100,3%	84,1%	84,3%
387,00	0,30	0,01	8,46	131,7%	20,38	11,91	95,6	24,3	100,3%	84,1%	84,3%
388,00	0,30	0,01	8,50	130,8%	20,38	11,87	95,6	24,2	100,3%	84,1%	#DIV/0!
389,00	0,30	0,01	8,42	133,0%	20,38	11,96	95,6	24,3	100,3%	84,0%	84,3%
390,00	0,30	0,01	8,33	135,3%	20,39	12,05	95,4	24,2	100,3%	84,0%	84,2%
391,00	0,30	0,01	8,56	129,0%	20,37	11,80	95,6	24,2	100,3%	84,1%	84,3%
392,00	0,30	0,01	8,75	124,2%	20,36	11,61	95,3	24,2	100,2%	84,2%	84,4%
393,00	0,28	0,01	8,60	128,1%	20,37	11,77	95,2	24,2	100,3%	84,2%	84,4%
394,00	0,26	0,02	8,42	132,9%	20,38	11,96	95,5	24,2	100,3%	84,0%	84,2%
395,00	0,26	0,02	8,31	135,8%	20,39	12,07	95,7	24,2	100,3%	84,0%	84,2%
396,00	0,26	0,02	8,33	135,4%	20,39	12,05	96,0	24,2	100,3%	83,9%	84,2%
397,00	0,26	0,02	8,27	137,2%	20,39	12,12	96,4	24,2	100,3%	83,9%	84,1%
398,00	0,26	0,02	8,28	136,7%	20,39	12,10	96,2	24,2	100,3%	83,9%	84,1%
399,00	0,22	0,02	8,27	137,2%	20,39	12,12	96,7	24,3	100,3%	83,8%	84,1%
400,00	0,22	0,02	8,25	137,6%	20,39	12,14	96,8	24,3	100,3%	83,8%	84,1%
401,00	0,22	0,02	8,20	139,1%	20,40	12,19	96,7	24,2	100,3%	83,8%	84,0%
402,00	0,22	0,01	8,18	139,6%	20,40	12,21	96,4	24,2	100,3%	83,8%	84,1%
403,00	0,22	0,01	8,32	135,8%	20,39	12,07	96,6	24,3	100,3%	83,9%	84,1%
404,00	0,22	0,01	8,30	136,2%	20,39	12,08	96,6	24,3	100,3%	83,9%	84,1%
405,00	0,22	0,01	8,33	135,3%	20,39	12,05	96,5	24,2	100,3%	83,9%	84,1%
406,00	0,17	0,01	8,27	137,2%	20,39	12,12	96,2	24,2	100,3%	83,9%	84,1%
407,00	0,21	0,01	8,27	137,2%	20,39	12,12	96,2	24,2	100,3%	83,9%	84,1%
408,00	0,17	0,01	8,27	137,2%	20,39	12,12	96,0	24,2	100,3%	83,9%	84,1%
409,00	0,17	0,01	8,12	141,5%	20,40	12,28	96,0	24,2	100,3%	83,8%	84,1%
410,00	0,17	0,01	8,13	141,1%	20,40	12,26	96,2	24,3	100,3%	83,8%	84,0%
411,00	0,17	0,01	8,14	141,0%	20,40	12,26	95,9	24,2	100,3%	83,8%	84,1%
412,00	0,17	0,01	8,14	141,0%	20,40	12,26	96,0	24,2	100,3%	83,8%	84,1%
413,00	0,17	0,01	8,10	142,0%	20,40	12,29	95,9	24,2	100,3%	83,8%	84,0%
414,00	0,12	0,01	8,04	144,0%	20,41	12,36	95,8	24,2	100,3%	83,8%	84,0%
415,00	0,12	0,01	8,04	144,0%	20,41	12,37	95,4	24,2	100,3%	83,8%	84,0%
416,00	0,12	0,01	7,99	145,5%	20,41	12,42	95,5	24,2	100,3%	83,8%	84,0%
417,00	0,12	0,01	7,94	147,1%	20,42	12,47	95,2	24,2	100,3%	83,8%	84,0%
418,00	0,12	0,01	7,82	150,7%	20,42	12,60	94,8	24,2	100,3%	83,7%	84,0%
419,00	0,12	0,01	7,80	151,2%	20,42	12,61	94,6	24,2	100,3%	83,7%	84,0%
420,00	0,12	0,01	7,77	152,3%	20,43	12,65	94,6	24,2	100,3%	83,7%	84,0%
421,00	0,12	0,01	7,70	154,5%	20,43	12,72	94,4	24,2	100,3%	83,7%	83,9%
422,00	0,08	0,01	7,67	155,6%	20,43	12,75	94,4	24,2	100,3%	83,6%	83,9%
423,00	0,08	0,01	7,56	159,5%	20,44	12,88	94,4	24,2	100,3%	83,6%	83

Date: 2020-10-06 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 5 Tech: MM Reviewer: JP

- kindling 50 LBS start fire	
- Door open	
- by pass open	
- air inlet full open	
- fan off	
- At 25 LBS close door	
- At 100 LBS insert load	
- After 6 min close door	
- At 76 LBS close air inlet	
- close by pass	
- open fan low	
mm - At 35 LBS After 25 min move wood	
At 38 LBS rake coal bed	
At 37 LBS insert load	
At 5 min close air inlet	
TEST LOAD CONFIGURATION	

PRE / POST CHECKS

Date: 2020-10-06 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 5 Tech: MM Reviewer: DP

Moisture Meter Calibration Check:

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

Pre-Test

Post-Test

Facility Conditions:

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

	Pre-Test	Post-Test
Air Velocity (max50 Fpm)	0	0
Smoke Capture	OK	NA
4 sides	OK	OK

Wood Heater Conditions:

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

2020-09-29
2020-09-29
OK
OK

OK

Temperature System:

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

OK	°F
OK	°F

Proportional Checks:

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

OK
OK
OK

Sampling Train ID Numbers:

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

Train 1 st hour	Train 1	Train 2
002	10	34
910	912	914
911	913	915
MC OK 11	11	12
OK	OK	OK

SAMPLING EQUIPMENT CHECK OUT

 Date: 2020-10-06 Manufacturer: Hearthsense Model: 8013
 Project #: PL 20240 Run: 5 Tech: MM Reviewer: DP
Leakage Checks Tunnel Samplers

	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Unplugged Flow Rate = .25cfm						
Vacuum (inches Hg.)	- 15	- 15	- 15	- 15	- 15	- 15
Final 1minute DGM (Liter)	300451.89	302687.56	300452.25	302687.70	063088.34	065304.99
Initial 1minute DGM (Liter)	300451.85	302687.56	300452.10	302687.65	063088.31	065304.95
Change © (Liter)	004	∅	015	005	003	004
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

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

Leakage Checks Pitot

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

PRE-TEST SCALE AUDIT

Date: 2020-10-06 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 5 Tech: MM Reviewer: DP

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Wood	EM-090	440 lbs, Class F	440 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

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

Date: 2020-10-06 Manufacturer: Heardstone Model: 8013
 Project #: PI 20240 Run: 5 Tech: MM Reviewer: NP

FOR TUNNELS < 12 in

 Barometric pressure (P_{bar}) 101.5 (KPa.) Static pressure (P_q) 0.17 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0073	71.78
B - Centroid	3.00	3.50	4	0074	71.81
A-1	0.40	0.50	0.50	0060	71.78
A-2	1.50	1.75	2	0068	71.74
A-3	4.50	5.25	6	0069	71.74
A-4	5.60	6.5	7.5	0059	71.76
B-1	0.40	0.50	0.50	0060	71.81
B-2	1.50	1.75	2	0066	71.80
B-3	4.50	5.25	6	0078	71.80
B-4	5.60	6.5	7.5	0061	71.79
				AVERAGE	

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

Where,

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

 Δ_p = manometer reading (inches H₂O)

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

 P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qg}$
 P_q = static pressure in. H₂O
 { 13.6 }

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

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

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

Date: 2020-10-06 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 5 Tech: MM Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2971	3000	1011	1000
Tolerance CO	0	+/- 0.02	0029	+/- 0.15	0011	+/- 0.05
CO ₂	0	0	1807	1800	978	1000
Tolerance CO ₂	0	+/- 0.02	007	+/- 0.5	000	+/- 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	2969	1003	0	0.02	0.002	0.15	0.008	0.05	✓	
CO ₂	0	1802	981	0	0.02	0.005	0.5	0.03	0.5	✓	

Date: 2020-10-06 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 5 Tech: MM Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	302687.00	065303.02	209888.78
Initial (Liter)	300452.53	063088.29	208231.31

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	101.5	101.6
Dry Bulb (F):	72.6	74.3
Humidity (%):	41.5	39.9

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

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

FUEL DATA

Date: 2020-10-06 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 5 Tech: _____ 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 16 in.	1680 lbs.	20.9	19.9	20.0	20.1	20.3
1 1/2 x 3 1/2 x 16 in.	1680 lbs.	20.6	20.4	20.8	20.3	20.8
1 1/2 x 3 1/2 x 16 in.	1660 lbs.	20.9	20.7	20.7	20.9	21.0
1 1/2 x 3 1/2 x 16 in.	1660 lbs.	19.9	19.8	19.7	19.8	19.9
1 1/2 x 3 1/2 x 16 in.	1700 lbs.	20.0	20.3	20.6	20.8	20.9
1 1/2 x 3 1/2 x 16 in.	1680 lbs.	20.0	20.4	20.3	20.4	20.5
1 1/2 x 3 1/2 x 16 in.	1700 lbs.	20.6	20.3	20.2	20.4	20.3
1 1/2 x 3 1/2 x 19 in.	190 lbs.	21.0	21.3	21.3	21.6	21.0
1 1/2 x 3 1/2 x 19 in.	202 lbs.	20.3	20.4	20.7	20.6	20.8
1 1/2 x 3 1/2 x 19 in.	194 lbs.	20.9	21.0	21.0	21.1	21.0
1 1/2 x 3 1/2 x 19 in.	206 lbs.	19.9	19.3	19.9	19.9	20.0
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
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: 19,68 lbs

FUEL DATA

Date: 2020-10-06 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 5 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 19 in.	180 lbs.	204	203	202	203	204
1 1/2 x 3 1/2 x 19 in.	184 lbs.	209	207	207	208	204
1 1/2 x 3 1/2 x 19 in.	220 lbs.	211	210	213	213	210
1 1/2 x 3 1/2 x 19 in.	210 lbs.	208	204	203	202	199
3 1/2 x 3 1/2 x 19 in.	458 lbs.	204	209	21	209	209
3 1/2 x 3 1/2 x 19 in.	408 lbs.	208	208	209	204	208
x x in.	lbs.					
3 1/2 x 3/4 x 5 in.	0100 lbs.			204		
1 1/2 x 3/4 x 5 in.	0120 lbs.			209		
1 1/2 x 3/4 x 5 in.	0100 lbs.			203		
1 1/2 x 3/4 x 5 in.	0100 lbs.			208		
1 1/2 x 3/4 x 5 in.	0120 lbs.			206		
1 1/2 x 3/4 x 5 in.	0100 lbs.			204		
1 1/2 x 3/4 x 5 in.	0080 lbs.			207		
1 1/2 x 3/4 x 5 in.	0120 lbs.			207		
1 1/2 x 3/4 x 5 in.	0100 lbs.			203		
1 1/2 x 3/4 x 5 in.	0100 lbs.			209		
1 1/2 x 3/4 x 5 in.	0100 lbs.			208		
1 1/2 x 3/4 x 5 in.	0100 lbs.			207		
1 1/2 x 3/4 x 5 in.	0080 lbs.			204		
1 1/2 x 3/4 x 5 in.	0100 lbs.			203		
1 1/2 x 3/4 x 5 in.	0100 lbs.			208		
1 1/2 x 3/4 x 5 in.	0100 lbs.			200		
1 1/2 x 3/4 x 5 in.	0080 lbs.			200		
1 1/2 x 3/4 x 5 in.	0160 lbs.			206		
1 1/2 x 3/4 x 5 in.	0100 lbs.			207		
x x in.	lbs.					

TEST LOAD WEIGHT: 1846 lbs Min 20%: 369 Max 25%: 461



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-10-05 Manufacturer: HaasTech Model: 8013

Project #: PT 2240 Run: S Tech: MM Reviewer: DP

		SYSTEM 1 - 1 st hour					SYSTEM 1				
Pre-test Weight Record	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanc	
		002	910	911	16	10	912	913	25	916	
2020-10-05 17:00		610991	01277	01257	347999	946395	01277	01257	349404	01258	
2020-10-05 19:00		610991	01277	01256	347998	946395	01276	01256	349405	01258	

		SYSTEM 1 - 1 st hour					SYSTEM 1				
Post-test Weight Record	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanc	
		002	910	911	16	10	912	913	25	916	
2020-10-06 20:00		610997	01276	01257	348027	946414	01276	01250	349435	01260	
2020-10-13 8:00		610992	01274	01255	348006 348006	946397	01274	01250	349419	01256	
2020-10-14 8:00		610992	01274	01255	348006	946397	01274	01250	349419	01256	



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-10-05 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 5 Tech: MM Reviewer: DO

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	34	914	915	30
2020-10-05	17:00	110 1053	01285	01254	34 8861
2020-10-06	9:00	110 1054	01284	01253	34 8862

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	34	914	915	30
2020-10-06	20:00	110 1061	01290	01253	34 8883
2020-10-13	8:00	110 1054	01288	01251	34 8872
2020-10-14	8:00	110 1054	01288	01251	34 8872

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	07-10-2020
Technicien	M.M
Project #	PI 20240

Description de l'unité

Manufacturier	HEARTHSTONE	
Modèle	8013	
Combustion system	Cat	
Appliance type	WOOD STOVE	
Firebox volume	2,88	cu ft.
Appliance weight empty	N.A	lbs
Appliance weight full	N.A	lbs

Paramètres du test

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

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	1,007	Dimensionless
Equipment number (DGM #1):	EM 178	
Calibration Factor (DGM #2):	1,008	Dimensionless
Equipment number (DGM #2):	EM 318	
Calibration Factor (DGM #3):	1,014	Dimensionless
Equipment number (DGM #3):	EM 179	Dimensionless

Tunnel

Targeted tunnel flow rate	350	scfm
Tunnel diameter	8	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	PI 20240
Date	07-10-2020
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

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	1000	1001	12	37	1002	1003	15	50	1004	1005	29	1006		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	108,9511	0,1255	0,1280	35,0898	107,9748	0,1261	0,1284	34,6071	107,6481	0,1256	0,1260	35,1584	0,1249	2020-10-06	17:00
Before (6)	108,9512	0,1254	0,1279	35,0899	107,9747	0,1260	0,1285	34,6070	107,6480	0,1255	0,1261	35,1585	0,1250	2020-10-07	09:00
After (1)	108,9520	0,1249	0,1274	35,0933	107,9757	0,1260	0,1284	34,6106	107,6487	0,1260	0,1263	35,1606	0,1252	2020-10-07	20:00
After (2)	108,9515	0,1248	0,1273	35,0914	107,9749	0,1257	0,1283	34,6084	107,6481	0,1259	0,1262	35,1592	0,1251	2020-10-12	08:00
After (3)	108,9515	0,1248	0,1273	35,0914	107,9748	0,1257	0,1283	34,6084	107,6481	0,1260	0,1263	35,1592	0,1251	2020-10-15	08:00
After (4)															
After (5)															
After (6)	108,9515	0,1248	0,1273	35,0914	107,9748	0,1257	0,1283	34,6084	107,6481	0,1260	0,1263	35,1592	0,1251	2020-10-15	08:00
Difference	0,0003	-0,0006	-0,0006	0,0015	0,0001	-0,0003	-0,0002	0,0014	0,0001	0,0005	0,0002	0,0007	0,0001		
Total (mg)		0,6				1,6				1,5			0,1		
Total ajusté (mg)		0,50				1,50				1,40					

Project nu.	PI 20240
Date	07-10-2020
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	1000	1001	12	37	1002	1003	15	50	1004	1005	29	1006			
Before (1)																
Before (2)																
Before (3)																
Before (4)																
Before (5)	108,9511	0,1255	0,1280	35,0898	107,9748	0,1261	0,1284	34,6071	107,6481	0,1256	0,1260	35,1584	0,1249	2020-10-06	17:00	
Before (6)	108,9512	0,1254	0,1279	35,0899	107,9747	0,1260	0,1285	34,6070	107,6480	0,1255	0,1261	35,1585	0,1250	2020-10-07	09:00	
After (1)	108,9520	0,1249	0,1274	35,0933	107,9757	0,1260	0,1284	34,6106	107,6487	0,1260	0,1263	35,1606	0,1252	2020-10-07	20:00	
After (2)	108,9515	0,1248	0,1273	35,0914	107,9749	0,1257	0,1283	34,6084	107,6481	0,1259	0,1262	35,1592	0,1251	2020-10-12	08:00	
After (3)	108,9515	0,1248	0,1273	35,0914	107,9748	0,1257	0,1283	34,6084	107,6481	0,1260	0,1263	35,1592	0,1251	2020-10-15	08:00	
After (4)																
After (5)																
After (6)	108,9515	0,1254	0,1279	35,0914	107,9748	0,1260	0,1285	34,6084	107,6481	0,1260	0,1263	35,1592	0,1251	2020-10-15	08:00	
Difference	0,0003	0,0000	0,0000	0,0015	0,0001	0,0000	0,0000	0,0014	0,0001	0,0005	0,0002	0,0007	0,0001			
Total (mg)		1,8				3,3					1,5			0,1		
Total ajusté (mg)		1,70				3,20					1,40					

Project nu.	PI 20240
Date	07-10-2020
Technicien	M.M

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 0,4 g/hr
 Burn Rate : 1,046 Dry kg/hr

Test Duration: 401 min

PRESSURE FACTOR: DGM 1 0,97147
 DGM 2 0,97684
 DGM 3 0,99980

BAROMETRIC PRESSURE
 Average: 29,913879 in Hg
 Start: 29,943409 in Hg
 End: 29,884349 in Hg

TEMPERATURE FACTORS DGM 1 0,98418
 DGM 2 0,96312
 DGM 3 0,99257

DGM CONTROLLER VALUES
 DGM 1 Final: 10763,635 Cuft
 Initial: 10691,081 Cuft

VOLUMES SAMPLED DGM 1 69,867 SCft
 DGM 2 68,232 SCft
 DGM 3 53,204 SCft

DGM 2 Final: 2379,890 Cuft
 Initial: 2307,919 Cuft

DGM #3 Final: 7466,721 Cuft
 Initial: 7413,850 Cuft

TOTAL TUNNEL VOLUME : 138869

TEMPERATURES
 DGM 1 536,485 °R
 DGM 2 548,218 °R

SAMPLE RATIOS
 Sample Train 1: 1987,626
 Sample Train 2: 2035,245

CALIBRATION FACTORS
 DGM 1 1,0072
 DGM 2 1,0077
 DGM #3 1,0140

Paticulate concentration
 Sample Train 1 **0,000023** g/dscf
 Sample Train 2 **0,000022** g/dscf
 Room **0,000002** g/dscf

TUNNEL FLOW RATE: 346,308 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **2,92** g
 Sample Train 2 **2,79** g

PARTICULATE CATCH
 Total Sample Train 1: 1,60 mg
 Total Sample Train 2: 1,50 mg
 Total Sample Train 1 1st hour: 0,60 mg

EMISSION RATES
 Sample Train 1 **0,44** g/hr
 Sample Train 2 **0,42** g/hr

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

DEVIATION: 2,23%

Cs Train 1 Train 2
 2,29E-05 2,19837E-05

Temps
acquisition
minutes

	Flue	Room	Tunnel	Catalyst up	scale	Right	Back	bottom	Top	Left
	temp	temp	dry bulb							
	°F	°F	°F	°F	lbs	°F	°F	°F	°F	°F
1	67,71	67,76	67,70	67,86	5,08	67,83	67,67	68,14	67,86	67,75
2	75,35	67,79	68,62	72,22	5,08	67,83	67,69	68,24	67,91	67,76
3	88,72	67,72	70,62	81,08	4,97	67,97	67,82	80,78	67,91	67,79
4	114,98	67,76	76,27	114,12	4,89	68,49	68,18	97,35	67,99	68,00
5	144,34	67,74	82,78	197,30	4,87	69,85	68,97	114,13	68,16	68,50
6	178,59	67,74	91,54	253,58	4,58	72,74	70,34	132,79	68,48	69,53
7	215,37	67,72	100,75	308,61	4,48	77,11	72,70	144,52	68,98	71,45
8	260,10	67,78	114,03	390,41	4,27	83,19	76,20	154,77	69,80	74,75
9	319,11	67,74	132,93	470,03	3,98	90,59	80,64	170,71	70,94	79,67
10	378,54	67,84	151,08	515,74	3,64	99,24	86,13	193,54	72,65	86,54
11	433,18	67,91	170,77	578,28	3,28	108,99	92,76	216,10	74,98	95,68
12	467,53	68,00	184,49	617,85	2,87	119,80	100,77	233,43	78,07	106,90
13	499,42	67,95	198,23	627,42	2,48	131,89	110,70	247,77	81,86	119,89
14	457,63	68,04	114,07	570,08	2,27	144,78	122,13	262,00	86,00	134,80
15	412,51	68,02	98,61	515,41	2,16	158,74	134,26	275,73	90,59	150,83
16	385,61	68,09	92,89	481,86	1,98	172,66	146,23	291,48	95,29	165,82
17	374,24	67,92	90,68	467,98	1,98	186,05	157,79	306,92	99,85	178,85
18	366,14	68,11	89,29	459,78	1,77	198,43	168,57	322,84	104,13	190,06
19	359,46	68,08	87,92	454,61	1,67	209,65	178,54	341,21	108,25	200,86
20	354,60	68,09	86,89	453,50	1,57	219,22	187,79	359,21	112,19	211,44
21	351,29	68,16	86,57	451,96	1,47	228,04	196,31	377,57	115,94	221,08
22	350,02	68,20	86,67	453,87	1,47	235,71	204,27	396,29	119,56	231,02
23	351,94	68,19	86,78	459,50	1,32	242,47	211,67	416,03	123,08	240,58
24	348,02	68,16	86,41	455,07	1,28	248,50	218,46	436,31	126,57	250,88
25	344,21	68,26	85,72	449,85	1,18	254,01	224,78	452,76	129,97	260,68
26	339,03	68,27	85,24	441,98	1,07	259,09	230,76	467,44	133,32	269,96
27	336,23	68,25	85,43	439,29	1,07	263,79	236,48	483,13	136,41	278,42
28	332,54	68,21	85,11	434,88	0,97	268,38	242,13	499,30	139,52	285,07
29	333,08	68,39	132,70	400,18	15,41	272,70	247,76	514,47	142,41	291,36
30	300,55	68,17	124,30	327,34	20,88	276,26	253,38	511,46	145,00	296,57
31	298,01	68,38	127,35	333,95	20,68	278,96	257,22	498,77	147,04	300,23
32	288,65	68,50	125,28	336,92	20,58	279,92	259,49	484,57	148,63	302,09
33	289,36	68,46	127,10	354,44	20,38	280,19	260,65	473,80	150,16	303,60
34	282,56	68,39	124,70	379,61	20,18	279,73	261,08	465,65	151,14	304,47
35	283,25	68,45	125,70	379,32	20,08	278,26	261,08	460,40	152,11	304,58
36	292,14	68,36	127,98	425,38	19,88	277,13	260,86	457,09	152,97	303,65
37	303,69	68,38	122,46	463,75	19,48	275,75	260,55	454,14	153,73	301,93
38	324,48	68,39	93,34	468,94	19,38	274,69	260,33	455,68	154,79	300,00
39	312,11	68,35	88,45	446,87	19,28	274,60	260,54	459,84	155,94	298,07
40	302,14	68,26	86,17	429,28	19,18	275,31	261,05	463,45	157,56	296,58
41	300,25	68,27	85,64	420,72	19,08	276,82	261,65	466,09	159,09	295,18
42	294,35	68,28	84,41	410,43	18,98	277,76	261,59	467,88	160,69	293,23
43	283,22	68,31	83,42	397,78	18,88	278,96	261,13	469,28	162,34	291,76
44	276,05	68,30	83,18	388,37	18,78	280,32	260,48	470,38	163,89	289,71
45	277,90	68,14	83,37	385,42	18,68	281,29	259,86	470,27	165,14	287,44
46	286,61	68,37	83,88	389,17	18,58	281,61	259,96	470,70	166,36	285,52
47	291,72	68,27	84,34	394,10	18,44	281,76	261,22	473,20	167,51	283,79
48	296,71	68,22	84,10	403,29	18,38	281,44	263,30	476,99	168,84	282,58
49	300,36	68,40	84,07	406,40	18,28	281,33	265,96	481,70	170,08	281,75
50	285,37	68,39	82,77	391,38	18,18	280,77	268,28	486,22	171,55	281,66
51	272,23	68,40	82,19	379,72	18,08	280,25	269,43	490,16	172,92	281,67
52	261,17	68,41	81,43	369,60	17,98	279,37	269,76	495,97	174,13	281,29
53	255,03	68,45	81,08	362,72	17,88	278,36	269,48	503,87	175,18	280,45
54	256,60	68,47	81,60	362,18	17,88	276,97	268,72	512,86	175,97	279,05
55	266,35	68,19	81,49	372,48	17,78	275,65	267,89	523,55	176,30	277,11
56	284,59	68,29	82,58	392,63	17,58	274,48	267,30	534,18	176,95	274,92
57	309,01	68,25	84,40	416,50	17,48	272,93	267,52	543,15	178,14	274,45
58	354,86	68,32	88,83	463,28	17,28	272,38	269,19	547,67	179,28	274,15
59	380,81	68,38	90,65	496,12	16,98	273,51	272,20	549,22	181,05	275,42
60	388,46	68,58	91,00	512,94	16,78	275,78	275,82	549,66	183,87	278,90
61	392,35	68,56	90,94	515,94	16,68	280,65	279,17	552,05	187,48	283,87
62	407,28	68,65	93,23	516,42	16,38	286,93	281,86	556,53	191,19	288,92
63	433,06	68,64	95,50	531,46	16,18	294,36	284,21	560,52	195,26	294,09
64	440,29	68,57	95,72	539,88	15,98	301,80	285,82	562,04	200,15	299,12
65	439,70	68,66	95,33	546,49	15,78	309,22	286,95	562,95	205,76	303,91
66	440,77	68,53	95,78	548,81	15,58	315,71	287,64	563,89	211,98	308,90
67	446,20	68,61	96,91	562,46	15,38	322,31	288,31	565,32	217,96	313,53
68	454,67	68,67	97,70	584,62	15,18	328,95	289,22	567,59	223,60	318,11
69	463,44	68,69	98,93	601,53	14,98	336,08	290,45	571,19	229,13	322,67
70	474,08	68,56	100,00	617,35	14,78	343,02	291,95	576,44	234,43	326,94
71	479,97	68,96	100,61	622,25	14,48	350,71	294,17	582,58	240,23	331,97
72	480,90	68,75	100,66	614,83	14,28	358,58	297,10	589,01	245,75	336,93
73	485,27	68,72	100,96	619,85	14,08	366,05	300,68	596,16	251,15	342,15
74	494,05	68,80	102,10	632,60	13,88	373,70	304,69	603,81	256,55	347,74
75	506,88	68,56	104,15	650,97	13,58	381,48	309,02	608,83	261,89	353,86
76	518,37	68,67	105,00	671,57	13,38	389,26	313,76	610,38	267,56	360,38
77	526,63	68,93	105,88	686,91	13,14	397,27	318,91	610,37	273,95	367,81
78	541,29	69,12	107,80	712,16	12,88	406,28	324,32	609,72	280,67	375,89
79	553,00	68,73	108,70	724,85	12,58	415,27	330,07	608,19	287,66	384,46
80	560,80	68,78	109,23	729,60	12,28	424,63	335,80	605,70	295,45	393,71
81	564,94	69,18	110,50	735,90	12,08	434,61	341,71	602,02	303,03	402,77
82	565,36	68,90	109,24	742,22	11,88	444,60	347,52	598,10	310,55	412,61
83	563,52	68,77	109,21	741,83	11,58	454,52	353,57	598,03	318,90	422,36
84	559,84	69,42	108,95	738,96	11,38	464,97	359,87	599,63	325,67	431,71
85	559,58	69,29	109,10	738,46	11,08	474,45	366,26	605,28	332,56	441,08
86	559,55	69,35	108,57	742,63	10,98	484,69	373,14	610,55	338,88	450,47
87	558,95	69,28	109,26	745,96	10,68	494,12	380,30	618,55	344,49	459,03
88	557,64	69,18	108,91	745,02	10,48	503,53	388,04	627,24	350,26	467,95

89	557,16	69,62	109,10	745,70	10,28	511,65	396,48	635,42	355,71	475,79
90	558,67	69,14	108,92	748,19	10,08	520,63	404,82	642,72	361,31	484,72
91	559,64	69,08	109,27	749,33	9,88	528,70	413,50	649,12	366,02	492,71
92	560,48	69,32	108,99	755,91	9,68	536,98	422,39	654,00	370,64	500,73
93	562,72	69,57	109,41	758,30	9,38	545,74	431,44	657,80	375,17	508,47
94	565,68	69,39	110,21	764,38	9,18	553,65	440,19	661,34	380,10	516,40
95	568,55	69,70	110,94	772,91	8,98	561,05	449,02	664,42	384,31	524,15
96	571,61	69,89	110,49	777,02	8,78	569,07	457,56	667,41	388,89	531,93
97	573,58	69,26	111,51	780,32	8,58	576,01	465,84	670,96	393,03	539,80
98	573,84	70,15	111,25	782,93	8,28	583,26	474,04	674,91	397,84	547,27
99	573,76	69,99	110,91	785,95	8,10	591,47	481,88	679,53	400,80	553,73
100	573,16	69,78	110,26	786,82	7,88	597,68	489,32	683,00	406,12	562,34
101	571,37	70,20	110,61	784,96	7,73	605,51	496,78	686,30	410,83	569,26
102	569,01	70,46	110,64	782,58	7,48	612,52	503,84	691,42	414,42	576,22
103	567,29	69,67	109,83	779,43	7,38	618,39	510,55	697,98	418,53	583,86
104	564,28	69,87	109,91	775,40	7,18	624,77	517,02	705,56	422,67	590,75
105	500,03	69,96	96,46	768,06	6,97	630,59	523,38	704,48	425,40	596,36
106	448,57	70,49	93,25	818,26	6,88	635,24	529,54	687,10	427,93	602,91
107	420,54	70,19	91,02	838,38	6,78	638,52	534,80	668,56	431,06	608,60
108	400,14	70,22	89,83	827,47	6,70	640,40	539,06	651,86	432,62	611,77
109	383,12	70,07	88,91	793,83	6,68	641,38	542,43	637,54	434,41	614,94
110	368,18	70,23	87,40	762,63	6,58	641,39	545,02	624,89	435,16	615,60
111	355,50	70,59	87,40	740,29	6,48	640,32	546,78	613,73	435,82	615,65
112	344,30	70,74	86,32	724,82	6,48	637,73	547,72	603,69	436,13	615,37
113	334,40	70,81	86,25	714,61	6,37	636,13	548,13	594,59	435,90	613,52
114	326,09	70,99	85,43	706,84	6,37	632,74	547,91	585,49	435,22	611,47
115	318,80	70,57	85,20	699,96	6,27	628,23	547,13	576,78	434,65	608,57
116	312,10	70,45	84,81	696,54	6,27	624,03	545,90	568,73	434,04	605,83
117	306,05	69,78	84,70	693,14	6,18	618,83	544,37	561,38	432,75	603,05
118	300,58	69,79	83,85	690,03	6,17	613,11	542,48	554,70	431,72	600,83
119	295,70	70,09	83,82	687,39	6,08	608,20	540,38	548,59	431,22	598,04
120	291,30	69,94	83,63	684,22	6,08	602,87	538,14	542,89	430,11	594,48
121	287,43	69,79	82,93	679,97	5,98	597,50	535,81	537,52	428,83	591,02
122	284,03	69,73	83,22	675,65	5,98	592,85	533,53	532,41	427,44	587,00
123	280,83	70,44	82,70	671,49	5,88	587,34	531,27	527,57	426,27	583,56
124	277,67	69,51	82,81	667,93	5,88	582,81	528,94	523,09	424,50	580,97
125	274,84	70,59	82,63	667,84	5,77	578,82	526,78	518,87	423,19	576,27
126	272,00	70,05	82,73	668,00	5,77	573,44	524,76	515,03	421,73	573,86
127	270,09	69,59	82,58	669,49	5,67	568,64	522,83	511,48	420,93	571,07
128	268,08	70,52	82,13	670,67	5,67	565,24	520,98	508,19	419,03	568,05
129	266,65	70,36	81,74	672,99	5,67	560,30	519,01	505,12	417,62	564,72
130	315,52	70,48	127,13	677,80	5,90	557,13	517,21	503,01	415,70	561,91
131	337,90	70,54	96,70	607,62	5,38	553,05	516,01	503,75	413,98	558,78
132	312,89	70,45	84,98	665,39	5,28	548,65	515,54	502,23	412,05	556,85
133	301,90	69,54	84,17	677,84	5,18	545,39	515,37	499,55	411,18	555,16
134	295,27	70,37	83,66	674,39	5,07	543,23	515,54	496,21	409,76	552,79
135	291,15	70,12	81,40	702,58	4,98	541,60	515,93	492,47	406,66	550,34
136	287,47	70,46	81,71	712,32	4,97	540,14	516,29	488,57	406,54	549,98
137	283,13	70,81	82,00	699,62	4,87	540,16	516,69	484,76	404,71	548,15
138	278,68	69,64	80,83	685,61	4,87	539,24	516,87	481,19	404,41	547,66
139	273,20	70,35	80,52	676,52	4,78	539,56	516,93	478,19	402,88	546,60
140	268,19	70,47	80,12	664,42	4,78	540,00	516,67	475,73	401,67	545,41
141	263,78	70,06	80,06	660,26	4,68	538,37	516,40	473,94	401,23	543,37
142	259,83	70,24	80,03	659,04	4,68	536,39	515,80	472,74	400,94	543,59
143	255,06	70,13	80,56	653,06	4,62	535,64	514,91	471,90	399,50	541,68
144	250,83	70,30	81,13	647,78	4,68	533,63	514,12	471,56	398,66	539,47
145	247,86	70,27	81,04	649,35	4,58	530,40	512,72	471,80	397,81	537,57
146	246,14	69,91	79,58	666,72	4,58	527,61	510,82	472,49	394,51	534,73
147	244,73	70,64	79,80	688,13	4,58	525,00	508,57	473,56	394,51	532,43
148	245,06	70,63	80,08	707,10	4,48	521,42	505,92	474,91	392,26	529,20
149	245,21	70,62	80,11	715,35	4,58	518,07	502,94	476,12	391,68	525,66
150	245,54	69,75	79,44	715,54	4,47	514,23	499,73	477,05	389,46	522,03
151	244,44	70,04	80,13	711,31	4,47	510,51	496,60	477,90	388,22	518,16
152	243,77	70,68	79,69	706,10	4,47	507,05	493,41	478,88	386,86	514,28
153	242,92	70,78	80,34	700,31	4,47	503,59	490,31	480,15	385,28	510,80
154	241,86	70,87	79,91	694,45	4,37	500,33	487,39	481,58	382,85	507,20
155	241,01	70,92	79,28	689,38	4,37	496,78	484,57	483,06	381,43	504,07
156	239,47	70,85	79,30	682,96	4,37	493,76	481,88	484,54	379,58	500,81
157	238,24	70,98	79,47	677,10	4,37	491,23	479,26	485,94	377,40	497,41
158	236,27	71,03	79,76	673,45	4,35	488,32	476,88	487,36	375,18	494,32
159	234,55	71,07	79,57	670,53	4,27	485,67	474,52	488,73	373,77	491,61
160	233,15	71,01	79,58	667,23	4,27	482,93	472,16	490,05	372,20	488,62
161	231,96	70,88	79,33	663,85	4,27	480,31	470,13	491,36	370,49	486,01
162	231,66	71,01	79,19	660,95	4,27	477,51	467,84	492,64	367,69	483,28
163	230,17	70,86	79,00	660,89	4,27	474,94	465,86	493,83	365,20	480,70
164	228,93	70,45	78,58	658,35	4,27	472,30	464,04	494,90	365,49	478,37
165	227,75	70,25	77,96	655,74	4,17	469,01	461,94	495,84	363,06	475,80
166	226,96	70,17	78,47	653,11	4,17	467,16	460,28	496,71	362,11	473,16

Table with 25 columns and 400 rows of numerical data. Columns 1-3 are primary identifiers, columns 4-25 are numerical values. The data represents various measurements across different categories.

Table with 32 columns and 401 rows of numerical data. Each row contains a sequence of values from various columns, including indices and numerical measurements.

Manufacturer: HEARTHSTONE
 Model: 8013

Run: 6
 Project #: PI 20240
 Test Duration: 401 min

	HHV	LHV
Eff	80,50%	87,01%
Comb Eff	97,82%	97,82%
HT Eff	82,30%	88,95%
Output	16 635	kJ/h
Burn Rate	1,04	kg/h
Grams CO	229	g
Input	20 663	kJ/h
MC wet	16,86	

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

Ultimate CO₂
 CO_{2-ut} 19,64
 F_o
 1,063

	Air Fuel Ratio (A/F)	
Overall Heating Efficiency:	80,50%	Dry Molecular Weight (M _d) 30,15
Combustion Efficiency:	97,82%	Dry Moles Exhaust Gas (N _g): 346,04
Heat Transfer Efficiency:	82,30%	Air Fuel Ratio (A/F) 9,92

Heat Output:	15 780 Btu/h	16 635 kJ/h
Heat Input:	19 601 Btu/h	20 663 kJ/h
Burn Duration:	6,68 h	
Burn Rate:	2,30 lb/h	1,043 kg/h
Stack Temp:	246,3 Deg. F	119,1 Deg. C

321,00	0,53	0,01	10,00	96,1%	20,28	10,27	93,0	22,9	100,2%	85,0%	85,1%
322,00	0,53	0,01	10,04	95,5%	20,28	10,24	92,6	22,8	100,2%	85,0%	85,2%
323,00	0,53	0,01	9,86	99,1%	20,29	10,43	92,7	22,8	100,2%	84,9%	85,1%
324,00	0,53	0,01	9,74	101,5%	20,30	10,55	92,8	22,8	100,2%	84,9%	85,1%
325,00	0,53	0,01	9,65	103,2%	20,30	10,64	92,8	22,7	100,2%	84,8%	85,0%
326,00	0,53	0,01	9,61	104,3%	20,31	10,69	93,0	22,8	100,2%	84,8%	85,0%
327,00	0,53	0,01	9,69	102,5%	20,30	10,61	93,0	22,8	100,2%	84,8%	85,0%
328,00	0,49	0,01	9,72	101,8%	20,30	10,57	92,7	22,7	100,2%	84,9%	85,0%
329,00	0,49	0,01	9,75	101,1%	20,30	10,53	92,5	22,8	100,2%	84,9%	85,1%
330,00	0,49	0,01	9,72	101,8%	20,30	10,57	92,3	22,7	100,2%	84,9%	85,1%
331,00	0,49	0,01	9,76	101,1%	20,29	10,53	92,5	22,8	100,2%	84,9%	85,1%
332,00	0,49	0,01	9,74	101,4%	20,30	10,55	92,4	22,7	100,2%	84,9%	85,1%
333,00	0,44	0,01	9,77	100,8%	20,29	10,52	92,2	22,8	100,2%	84,9%	85,1%
334,00	0,44	0,01	9,79	100,4%	20,29	10,50	91,6	22,6	100,2%	85,0%	85,1%
335,00	0,44	0,01	9,80	100,1%	20,29	10,48	92,0	22,7	100,2%	84,9%	85,1%
336,00	0,44	0,01	9,79	100,4%	20,29	10,50	91,9	22,8	100,2%	84,9%	85,1%
337,00	0,44	0,01	9,84	99,4%	20,29	10,45	92,1	22,8	100,2%	84,9%	85,1%
338,00	0,44	0,01	9,87	98,8%	20,29	10,41	92,2	22,8	100,2%	85,0%	85,1%
339,00	0,44	0,01	9,90	98,1%	20,29	10,37	92,1	22,7	100,2%	85,0%	85,2%
340,00	0,42	0,01	9,89	98,4%	20,29	10,39	92,4	22,8	100,2%	85,0%	85,1%
341,00	0,44	0,01	9,95	97,1%	20,28	10,32	92,1	22,8	100,2%	85,0%	85,2%
342,00	0,40	0,01	9,87	98,8%	20,29	10,41	92,6	22,8	100,2%	84,9%	85,1%
343,00	0,40	0,01	9,89	98,4%	20,29	10,39	92,3	22,8	100,2%	85,0%	85,1%
344,00	0,40	0,01	9,89	98,4%	20,29	10,39	92,6	22,8	100,2%	84,9%	85,1%
345,00	0,40	0,01	9,92	97,7%	20,28	10,36	92,8	22,8	100,2%	84,9%	85,1%
346,00	0,40	0,01	9,94	97,4%	20,28	10,34	92,6	22,9	100,2%	85,0%	85,1%
347,00	0,35	0,01	9,90	98,1%	20,29	10,38	92,7	22,9	100,2%	84,9%	85,1%
348,00	0,35	0,01	9,77	100,7%	20,29	10,51	92,9	22,9	100,2%	84,9%	85,0%
349,00	0,35	0,01	9,79	100,4%	20,29	10,50	93,0	22,9	100,2%	84,9%	85,1%
350,00	0,35	0,01	9,80	100,1%	20,29	10,48	92,9	22,9	100,2%	84,9%	85,1%
351,00	0,35	0,01	9,89	98,4%	20,29	10,39	92,8	22,9	100,2%	84,9%	85,1%
352,00	0,35	0,01	9,79	100,4%	20,29	10,50	93,1	22,9	100,2%	84,9%	85,1%
353,00	0,35	0,01	9,76	101,1%	20,30	10,53	92,8	22,9	100,2%	84,9%	85,1%
354,00	0,30	0,01	9,80	100,1%	20,29	10,48	92,7	22,9	100,2%	84,9%	85,1%
355,00	0,30	0,01	9,81	100,1%	20,29	10,48	92,7	22,9	100,2%	84,9%	85,1%
356,00	0,30	0,01	9,79	100,4%	20,29	10,50	92,4	22,9	100,2%	84,9%	85,1%
357,00	0,30	0,01	9,77	100,8%	20,29	10,52	92,1	22,9	100,2%	84,9%	85,1%
358,00	0,30	0,01	9,85	99,1%	20,29	10,43	91,7	22,9	100,2%	85,0%	85,2%
359,00	0,30	0,01	9,87	98,8%	20,29	10,41	91,8	22,9	100,2%	85,0%	85,2%
360,00	0,30	0,01	9,85	99,1%	20,29	10,43	92,0	22,9	100,2%	85,0%	85,2%
361,00	0,26	0,01	10,00	96,2%	20,28	10,27	91,7	22,9	100,2%	85,1%	85,2%
362,00	0,26	0,01	9,70	102,1%	20,30	10,59	91,9	23,0	100,2%	84,9%	85,1%
363,00	0,26	0,01	9,67	102,9%	20,30	10,62	92,0	23,0	100,2%	84,9%	85,1%
364,00	0,26	0,01	9,57	104,9%	20,31	10,73	91,9	22,9	100,2%	84,9%	85,1%
365,00	0,26	0,01	9,51	106,4%	20,31	10,80	92,2	23,0	100,2%	84,8%	85,0%
366,00	0,26	0,01	9,54	105,6%	20,31	10,76	92,3	23,0	100,2%	84,8%	85,0%
367,00	0,26	0,01	9,57	105,1%	20,31	10,74	92,5	22,9	100,2%	84,8%	85,0%
368,00	0,22	0,01	9,57	105,0%	20,31	10,73	92,3	22,9	100,2%	84,8%	85,0%
369,00	0,25	0,01	9,59	104,7%	20,31	10,71	92,2	22,9	100,2%	84,8%	85,0%
370,00	0,21	0,01	9,59	104,6%	20,31	10,71	92,1	22,9	100,2%	84,9%	85,0%
371,00	0,21	0,01	9,66	103,2%	20,30	10,64	91,9	22,9	100,2%	84,9%	85,1%
372,00	0,21	0,01	9,64	103,5%	20,30	10,66	92,0	22,8	100,2%	84,9%	85,1%
373,00	0,21	0,01	9,56	105,3%	20,31	10,75	91,9	22,8	100,2%	84,8%	85,0%
374,00	0,21	0,01	9,42	108,2%	20,32	10,89	91,5	22,8	100,2%	84,8%	85,0%
375,00	0,17	0,01	9,36	109,6%	20,32	10,96	91,7	22,8	100,2%	84,8%	85,0%
376,00	0,17	0,01	9,34	110,0%	20,32	10,98	91,7	22,8	100,2%	84,8%	85,0%
377,00	0,17	0,01	9,26	111,9%	20,33	11,06	91,8	22,8	100,2%	84,7%	84,9%
378,00	0,17	0,01	9,29	111,1%	20,33	11,03	91,8	22,8	100,2%	84,7%	84,9%
379,00	0,17	0,01	9,22	112,7%	20,33	11,10	91,8	22,8	100,2%	84,7%	84,9%
380,00	0,17	0,01	9,21	113,1%	20,33	11,12	91,6	22,8	100,2%	84,7%	84,9%
381,00	0,17	0,01	9,11	115,3%	20,34	11,22	91,9	22,8	100,2%	84,6%	84,8%
382,00	0,13	0,01	9,01	117,6%	20,34	11,33	92,3	22,8	100,2%	84,6%	84,8%
383,00	0,12	0,01	8,99	118,1%	20,35	11,35	92,1	22,8	100,2%	84,6%	84,8%
384,00	0,12	0,01	8,98	118,5%	20,35	11,36	92,2	22,8	100,3%	84,5%	84,8%
385,00	0,12	0,01	9,03	117,2%	20,34	11,31	92,1	22,8	100,2%	84,6%	84,8%
386,00	0,12	0,01	9,00	118,0%	20,35	11,34	92,4	22,8	100,2%	84,5%	84,7%
387,00	0,12	0,01	8,96	118,9%	20,35	11,38	92,6	22,8	100,2%	84,5%	84,7%
388,00	0,12	0,01	8,83	122,1%	20,36	11,52	92,8	22,8	100,3%	84,4%	84,6%
389,00	0,08	0,01	8,81	122,6%	20,36	11,54	92,5	22,8	100,3%	84,4%	84,7%
390,00	0,08	0,01	8,83	122,1%	20,36	11,52	92,7	22,8	100,3%	84,4%	84,7%
391,00	0,08	0,01	8,73	124,6%	20,36	11,62	92,7	22,8	100,3%	84,4%	84,6%
392,00	0,08	0,01	8,63	127,2%	20,37	11,73	92,8	22,7	100,3%	84,3%	84,5%
393,00	0,08	0,01	8,65	126,8%	20,37	11,71	93,0	22,7	100,3%	84,3%	84,5%
394,00	0,08	0,01	8,65	126,7%	20,37	11,71	92,9	22,8	100,3%	84,3%	84,5%
395,00	0,08	0,01	8,58	128,5%	20,37	11,78	92,6	22,8	100,3%	84,3%	84,5%
396,00	0,06	0,01	8,53	129,8%	20,38	11,84	92,8	22,8	100,3%	84,3%	84,5%
397,00	0,08	0,01	8,49	131,1%	20,38	11,89	93,1	22,7	100,3%	84,2%	84,4%
398,00	0,08	0,01	8,47	131,6%	20,38	11,91	93,3	22,7	100,3%	84,2%	84,4%
399,00	0,03	0,01	8,42	133,0%	20,38	11,96	93,1	22,7	100,3%	84,2%	84,4%
400,00	0,03	0,01	8,40	133,4%	20,38	11,98	93,1	22,8	100,3%	84,2%	84,4%
401,00	0,00	0,01	8,27	137,2%	20,39	12,12	93,3	22,7	100,3%	84,1%	84,3%

Date: 2020-10-07 Manufacturer: Hearthstone Model: 8013
Project #: PI 20240 Run: 6 Tech: MM Reviewer: TD

- kindling 5 LBS START FIRE
- Door open
- bypass open
- Fan off
- air inlet Full open
- At 25 LBS close Door
- At 100 LBS insert prebad
- After 5 min close Door
- At 71 LBS close air inlet and bypass
- After 25 min move wood
- At 42 LBS MAKE COAL Bed
- At 41 LBS insert load
- After 5 min close air inlet

TEST LOAD CONFIGURATION

PRE / POST CHECKS

Date: 2020-10-07 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 6 Tech: MM Reviewer: DP

Moisture Meter Calibration Check:

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

Pre-Test

Post-Test

Facility Conditions:

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

	Pre-Test	Post-Test
(max50 Fpm)	○	○
	ok	NA
4 sides	ok	ok

Wood Heater Conditions:

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

2020-09-29	
2020-09-29	
ok	
ok	
Flow Rate 140 cfm ±10%	ok

Temperature System:

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

ok	°F
ok	°F

Proportional Checks:

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

ok
ok
ok

Sampling Train ID Numbers:

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

	Train 1 st hour	Train 1	Train 2
Probe	17	37	50
Filter Front	1000	1002	1004
Filter Back	1001	1003	1005
Filter Thermocouple	11	11	12
Filter (<90°F)	ok	ok	ok

SAMPLING EQUIPMENT CHECK OUT

Date: 2020-10-07 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 6 Tech: MM Reviewer: [Signature]

Leakage Checks Tunnel Samplers

	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	302733.90	304793.06	302734.10	304993.51	065348.98	067391.41
Initial 1minute DGM (Liter)	302733.90	304792.98	302734.10	304993.51	065348.98	067391.41
Change © (Liter)	∅	0.08	∅	∅	∅	∅
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

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

Leakage Checks Pitot

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

PRE-TEST SCALE AUDIT

Date: 2020-10-07 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: C Tech: MM Reviewer: [Signature]

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Wood	EM-090	440 lbs, Class F	440 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

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

Date: 2020-10-07 Manufacturer: Hearthstone Model: 8013
 Project #: PT 20240 Run: 6 Tech: MM Reviewer: DP

FOR TUNNELS < 12 in

 Barometric pressure (P_{bar}) 1014 (KPa.) Static pressure (P_q) 0.19 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.074	67.88
B - Centroid	3.00	3.50	4	0.073	67.84
A-1	0.40	0.50	0.50	0.060	67.88
A-2	1.50	1.75	2	0.068	67.82
A-3	4.50	5.25	6	0.070	67.82
A-4	5.60	6.5	7.5	0.061	67.88
B-1	0.40	0.50	0.50	0.060	67.84
B-2	1.50	1.75	2	0.062	67.83
B-3	4.50	5.25	6	0.079	67.83
B-4	5.60	6.5	7.5	0.061	67.78
				AVERAGE	

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

Where,

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

 Δ_p = manometer reading (inches H₂O)

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

 P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qg}$
 P_q = static pressure in. H₂O
 { 13.6 }

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

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

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

CONTINUOUS ANALYZERS

Date: 2020-10-07 Manufacturer: Hearthstone Model: 8013
 Project #: PT 2240 Run: 6 Tech: mm Reviewer: [Signature]

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2970	3000	1008	1000
Tolerance CO	0	+/- 0.02	0030	+/- 0.15	0008	+/- 0.05
CO ₂	0	0	1806	1800	980	1000
Tolerance CO ₂	0	+/- 0.02	006	+/- 0.5	020	+/- 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	2972	1009	0	0.02	0.002	0.15	0.001	0.05	✓	
CO ₂	0	1801	986	0	0.02	0.005	0.5	0.06	0.5	✓	

Date: 2020-10-07 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 6 Tech: MM Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	304 793, 20	067 390, 97	211 433, 99
Initial (Liter)	302 737, 70	065 352, 99	209 936, 84

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	101,4	101,2
Dry Bulb (F):	69,6	72,3
Humidity (%):	40,1	38,6

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

FUEL DATA

Date: 2020-10-07 Manufacturer: Hearthstone Model: 8013
 Project #: PI 20240 Run: 6 Tech: MM Reviewer: JD

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 16 in.	174 lbs.	204	203	204	206	203
1 1/2 x 3 1/2 x 16 in.	166 lbs.	209	208	210	213	210
1 1/2 x 3 1/2 x 16 in.	168 lbs.	203	203	204	206	203
1 1/2 x 3 1/2 x 16 in.	172 lbs.	204	208	203	203	206
1 1/2 x 3 1/2 x 16 in.	172 172 lbs. MM	203	202	207	206	203
1 1/2 x 3 1/2 x 16 in.	174 lbs.	204	208	204	203	202
1 1/2 x 3 1/2 x 16 in.	206 174 lbs. MM	203	20	209	199	198
1 1/2 x 3 1/2 x 19 in.	206 lbs.	193	196	193	198	194
1 1/2 x 3 1/2 x 19 in.	206 lbs.	200	203	202	203	206
1 1/2 x 3 1/2 x 19 in.	194 lbs.	203	203	202	203	203
1 1/2 x 3 1/2 x 19 in.	200 lbs.	200	203	202	204	203
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
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: 206 MM lbs
2006

FUEL DATA

Date: 2020-10-07 Manufacturer: Hearthstone Model: 8013
 Project #: PT 2240 Run: 6 Tech: MM Reviewer: [Signature]

FUEL DESCRIPTION:

Type of wood :

TEST LOAD

Piece Size		Weight		Meter Moisture Content (% dry)*				
1 1/2	x 2 1/2 x 19 in.	202	lbs.	20 ¹	20 ²	20 ²	20 ⁴	20 ⁴
1 1/2	x 3 1/2 x 19 in.	180	lbs.	25	20 ⁰	20 ¹	20 ²	20 ³
1 1/2	x 3 1/2 x 19 in.	188	lbs.	20 ⁴	20 ⁰	20 ³	20 ⁴	20 ³
1 1/2	x 3 1/2 x 19 in.	190	lbs.	20 ⁰	20 ³	20 ⁴	20 ⁶	20 ³
3 1/2	x 3 1/2 x 19 in.	444	lbs.	20 ¹	20 ²	20 ⁴	20 ³	20 ³
2 1/2	x 3 1/2 x 19 in.	466	lbs.	20 ³	20 ²	20 ³	20 ³	20 ³
	x x in.		lbs.					
1 1/2	x 3/4 x 5 in.	0 100	lbs.			20 ⁰		
1 1/2	x 3/4 x 5 in.	0 140	lbs.			20 ⁴		
1 1/2	x 3/4 x 5 in.	0 100	lbs.			20 ⁸		
1 1/2	x 3/4 x 5 in.	0 100	lbs.			20 ⁷		
1 1/2	x 3/4 x 5 in.	0 100	lbs.			20 ³		
1 1/2	x 3/4 x 5 in.	0 100	lbs.			20 ⁹		
1 1/2	x 3/4 x 5 in.	0 100	lbs.			21 ⁰		
1 1/2	x 3/4 x 5 in.	0 120	lbs.			21 ⁰		
1 1/2	x 3/4 x 5 in.	0 08	lbs.			21 ¹		
1 1/2	x 3/4 x 5 in.	0 080	lbs.			20 ⁸		
1 1/2	x 3/4 x 5 in.	0 10	lbs.			20 ⁶		
1 1/2	x 3/4 x 5 in.	0 100	lbs.			20 ³		
1 1/2	x 3/4 x 5 in.	0 100	lbs.			20 ²		
1 1/2	x 3/4 x 5 in.	0 100	lbs.			20 ⁴		
1 1/2	x 3/4 x 5 in.	0 080	lbs.			20 ⁵		
1 1/2	x 3/4 x 5 in.	0 100	lbs.			20 ⁶		
1 1/2	x 3/4 x 5 in.	0 120	lbs.			20 ⁴		
1 1/2	x 3/4 x 5 in.	0 120	lbs.			20 ²		
	x x in.		lbs.					
	x x in.		lbs.					

TEST LOAD WEIGHT: 1854 lbs Min 20%: 3.71..... Max 25%: 463

Date: 2020-10-06 Manufacturer: Heartsong Model: 8013

Project #: PI 20240 Run: 6 Tech: MR Reviewer: DR

Pre-test Weight Record		SYSTEM 1 - 1 st hour							SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank	
2020-10-06	17:00	108 9511	01255	01280	35 0898	107 9748	01261	01284	34 6071	107 9748	01261	01284	34 6071	01249	
2020-10-07	9:00	108 9512	01254	01279	35 0899	107 9747	01260	01285	34 6070	107 9747	01260	01285	34 6070	01250	

Post-test Weight Record		SYSTEM 1 - 1 st hour							SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank	
2020-10-07	20:00	108 9520	01249	01274	35 0933	107 9757	01260	01284	34 6106	107 9757	01260	01284	34 6106	01252	
2020-10-12	8:00	108 9515	01248	01273	35 0914	107 9749	01257	01283	34 6084	107 9749	01257	01283	34 6084	01251	
2020-10-15	8:00	108 9515	01248	01273	35 0914	107 9748	01257	01283	34 6084	107 9748	01257	01283	34 6084	01251	



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2020-10-06 Manufacturer: Heathstone Model: 8013
 Project #: PI 20240 Run: 6 Tech: MM Reviewer: D

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	50	1004	1005	29
2020-10-06	17:00	1076481	01256	01260	35/584
2020-10-07	9:00	1076480	01255	01261	35/585

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	50	1004	1005	29
2020-10-07	20:00	1076487	01260	01263	35/606
2020-10-12	8:00	1076481	01259	01262	35/592
2020-10-15	8:00	1076481	01260	01263	35/592

APPENDIX 2: Proportionality results

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	98,45	101,24	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
18,173	534,7	535,5			0,170	0,169	0	0,276724
17,694	534,7	535,9	99,04	103,83	0,170	0,169	1	0,2763706
17,440	534,7	536,1	99,92	104,70	0,170	0,169	2	0,2731937
17,681	534,6	536,4	98,36	103,32	0,170	0,169	3	0,2771135
17,604	534,5	536,7	98,74	103,38	0,170	0,169	4	0,2763697
16,831	534,5	537,2	102,43	107,39	0,170	0,169	5	0,2649957
17,206	534,6	537,8	99,92	104,65	0,170	0,169	6	0,2713086
17,565	534,6	538,3	98,01	102,50	0,170	0,169	7	0,2768852
17,970	534,6	538,7	95,66	100,13	0,170	0,169	8	0,283304
17,887	534,6	539,2	96,18	100,24	0,170	0,168	9	0,2820704
18,094	534,6	539,7	95,02	99,22	0,170	0,168	10	0,2853864
18,097	534,8	540,3	94,92	98,71	0,170	0,168	11	0,2855107
18,092	534,9	540,8	95,08	99,00	0,170	0,168	12	0,2855067
17,866	534,8	541,0	95,95	100,12	0,170	0,168	13	0,2820731
17,304	534,8	541,2	99,21	103,21	0,170	0,168	14	0,273156
17,948	534,8	541,7	95,64	99,32	0,170	0,168	15	0,2833254
17,976	534,9	542,3	95,48	99,04	0,170	0,167	16	0,2837728
17,618	534,8	542,5	97,43	101,31	0,170	0,167	17	0,2780408
17,817	534,8	542,6	96,34	99,85	0,170	0,167	18	0,28138
17,760	534,7	543,0	96,68	99,97	0,170	0,167	19	0,2804301
17,278	534,9	543,5	99,46	102,99	0,170	0,167	20	0,2728219
17,375	534,9	543,7	98,76	102,18	0,170	0,167	21	0,2743209
17,864	534,8	544,0	96,07	99,47	0,170	0,167	22	0,2820731
17,463	534,8	544,2	98,13	101,45	0,170	0,167	23	0,275813
17,944	534,7	544,3	95,67	98,81	0,170	0,167	24	0,2833457
17,866	534,7	544,6	96,18	99,17	0,170	0,167	25	0,2820729
18,162	534,7	544,8	94,43	97,57	0,170	0,167	26	0,2868456
17,679	534,7	545,0	97,04	100,12	0,170	0,167	27	0,2793291
17,142	534,7	545,4	100,09	103,21	0,170	0,166	28	0,2708355
17,376	534,7	545,8	98,86	101,71	0,170	0,166	29	0,2745078
17,293	535,0	546,4	99,16	102,24	0,170	0,166	30	0,2731937
17,271	535,0	546,3	99,21	102,41	0,170	0,166	31	0,2728198
17,766	535,0	546,3	96,54	99,39	0,170	0,166	32	0,2806137
17,710	534,9	546,4	97,01	99,78	0,170	0,166	33	0,2796562
17,820	534,8	546,3	96,39	99,38	0,170	0,166	34	0,281372
17,567	534,8	546,5	97,80	100,53	0,170	0,166	35	0,2774402
17,280	534,8	546,7	99,36	102,14	0,170	0,166	36	0,2728254
17,472	534,8	546,7	98,28	100,98	0,170	0,166	37	0,2758131
18,084	534,8	546,8	94,90	97,70	0,170	0,166	38	0,2855129
17,769	534,9	547,2	96,77	99,47	0,170	0,166	39	0,2805184
17,366	535,0	547,3	98,76	101,77	0,170	0,166	40	0,2741311
17,388	535,1	547,6	98,79	101,45	0,170	0,166	41	0,2745077
17,275	535,2	547,9	99,10	102,08	0,170	0,166	42	0,2728188
17,722	535,4	548,2	96,87	99,42	0,170	0,166	43	0,2798205
17,947	535,5	548,2	95,69	98,21	0,170	0,166	44	0,2833393
17,139	535,5	548,0	100,17	102,90	0,170	0,166	45	0,2705541
17,950	535,6	548,1	95,57	98,33	0,170	0,166	46	0,2833474
18,048	535,7	548,5	95,01	97,75	0,170	0,166	47	0,2849278
17,614	535,8	548,6	97,37	100,10	0,170	0,166	48	0,2780442
17,533	535,7	548,4	97,93	100,64	0,170	0,166	49	0,276745
18,094	535,6	548,6	94,65	97,22	0,170	0,166	50	0,2857486
17,508	535,5	548,5	97,99	100,63	0,170	0,166	51	0,2764255
17,756	535,5	548,6	96,77	99,19	0,170	0,165	52	0,2802496
17,472	535,6	548,8	98,15	100,72	0,170	0,165	53	0,2758164
17,670	535,6	548,7	97,07	99,88	0,170	0,166	54	0,2789161
17,373	535,7	548,8	98,71	101,47	0,170	0,166	55	0,2742132

17,141	535,8	549,0	99,90	102,56	0,169	0,165	56	0,2705543
17,502	535,9	549,0	97,92	100,61	0,169	0,165	57	0,2762592
17,370	536,0	549,3	98,70	101,41	0,169	0,165	58	0,2741349
17,731	536,1	549,5	96,80	99,40	0,170	0,165	59	0,2798021
18,060	536,1	549,5	94,91	97,59	0,169	0,165	60	0,284974
18,000	536,0	549,3	95,33	97,77	0,169	0,165	61	0,2840719
17,374	536,1	549,5	98,75	101,34	0,170	0,165	62	0,274137
17,788	535,9	549,2	96,44	99,11	0,169	0,165	63	0,2806121
17,425	535,9	549,2	98,60	101,17	0,170	0,165	64	0,2748839
17,986	536,0	549,5	95,52	97,92	0,170	0,165	65	0,28371
17,379	536,0	549,5	98,82	101,43	0,170	0,165	66	0,2741366
17,720	536,3	550,1	96,94	99,15	0,170	0,165	67	0,2796713
17,476	536,3	550,2	97,96	100,63	0,169	0,165	68	0,2758159
17,372	536,5	550,4	98,74	101,19	0,169	0,165	69	0,2741364
17,173	536,4	550,1	99,72	102,54	0,169	0,165	70	0,270933
17,629	536,3	549,8	97,27	99,75	0,169	0,165	71	0,2781572
17,682	536,3	549,9	96,81	99,70	0,169	0,165	72	0,2789634
17,959	536,3	550,1	95,40	98,01	0,169	0,165	73	0,2833472
17,519	536,3	550,3	97,87	100,66	0,169	0,165	74	0,2763738
17,730	536,4	550,4	96,66	99,43	0,169	0,165	75	0,2796728
17,827	536,5	550,2	96,22	98,76	0,169	0,165	76	0,2811638
17,713	536,4	549,8	96,95	99,45	0,169	0,165	77	0,2793339
17,626	536,3	549,8	97,52	99,61	0,170	0,165	78	0,2780208
16,979	536,3	549,7	101,17	103,76	0,170	0,165	79	0,2678035
17,056	536,3	549,7	100,57	103,28	0,169	0,165	80	0,2690274
17,522	536,3	549,8	97,95	100,54	0,169	0,165	81	0,2763756
17,688	536,3	549,8	97,09	99,67	0,169	0,165	82	0,2789635
17,814	536,2	549,8	96,51	98,95	0,170	0,165	83	0,2810467
17,880	536,1	549,7	95,79	98,53	0,169	0,165	84	0,2820793
17,541	536,1	549,7	97,81	100,37	0,169	0,165	85	0,2767492
17,787	536,2	550,0	96,62	99,03	0,170	0,165	86	0,2806175
17,461	536,1	550,0	98,30	101,04	0,170	0,165	87	0,2754831
17,180	536,0	549,7	100,02	102,86	0,170	0,166	88	0,2709488
17,790	535,9	549,6	96,67	99,02	0,170	0,166	89	0,2806172
17,490	536,0	549,8	98,38	100,78	0,170	0,165	90	0,2758192
17,891	535,9	549,6	96,04	98,47	0,170	0,165	91	0,2820813
17,582	536,0	549,7	97,87	100,31	0,170	0,165	92	0,2771176
17,503	535,9	549,6	98,41	100,98	0,170	0,165	93	0,2758191
18,003	535,8	549,3	95,67	98,38	0,170	0,166	94	0,2837123
17,574	535,8	549,3	97,97	100,53	0,170	0,166	95	0,2769378
17,481	535,8	549,5	98,38	100,93	0,170	0,165	96	0,275448
17,319	535,8	549,6	99,50	101,99	0,170	0,165	97	0,2728227
17,260	535,9	549,6	99,95	102,21	0,170	0,165	98	0,2718811
17,652	535,9	549,6	97,60	100,12	0,170	0,165	99	0,2779835
17,461	535,9	549,6	98,84	101,45	0,170	0,165	100	0,2749317
18,153	536,0	549,7	94,88	97,50	0,170	0,166	101	0,2858798
17,738	536,0	549,8	97,02	99,59	0,169	0,165	102	0,279334
18,258	536,0	549,7	94,43	96,97	0,169	0,165	103	0,2874381
17,885	536,0	549,6	96,28	98,72	0,169	0,165	104	0,2815319
17,926	536,0	549,7	96,23	98,79	0,169	0,165	105	0,2820798
17,367	536,1	549,7	99,46	102,29	0,170	0,166	106	0,273197
17,955	536,0	549,6	96,21	98,77	0,170	0,166	107	0,282445
17,227	536,1	549,8	100,16	102,87	0,169	0,165	108	0,2709401
18,235	536,0	549,5	94,66	97,26	0,169	0,165	109	0,286777
17,763	536,0	549,6	97,22	99,74	0,169	0,165	110	0,2792902
17,611	536,0	549,6	98,34	100,68	0,170	0,165	111	0,2768065
17,632	536,0	549,7	98,20	100,82	0,170	0,165	112	0,2771185
17,470	536,0	549,5	99,12	101,86	0,170	0,166	113	0,274517
17,670	535,9	549,4	97,82	100,48	0,170	0,166	114	0,2776881
17,528	536,0	549,6	98,76	101,29	0,169	0,165	115	0,2753972
18,057	536,1	549,7	95,86	98,23	0,170	0,165	116	0,2837143

17,924	536,2	549,9	96,67	99,07	0,170	0,165	117	0,2815349
17,996	536,3	549,9	96,31	98,72	0,170	0,165	118	0,2826218
17,985	536,2	549,8	96,27	98,88	0,170	0,165	119	0,2824465
17,169	536,1	549,6	100,87	103,66	0,169	0,165	120	0,2696115
17,627	536,2	549,8	98,36	101,00	0,170	0,165	121	0,2767515
17,400	536,2	549,9	99,40	102,20	0,169	0,165	122	0,2732049
17,316	536,2	549,8	100,24	102,66	0,169	0,165	123	0,2718777
18,096	536,1	549,7	95,86	98,26	0,170	0,165	124	0,2840807
17,871	535,9	549,5	97,00	99,52	0,170	0,165	125	0,2806232
17,966	535,9	549,5	96,55	98,97	0,170	0,165	126	0,282023
18,455	535,8	549,5	94,09	96,35	0,170	0,165	127	0,289632
17,881	535,6	549,2	97,14	99,63	0,170	0,165	128	0,2806228
17,988	535,6	549,3	96,67	98,96	0,170	0,165	129	0,2823083
18,024	535,7	549,5	96,45	98,98	0,170	0,165	130	0,2828023
17,836	535,7	549,6	97,37	99,95	0,170	0,166	131	0,2798882
17,786	535,8	549,8	97,93	100,22	0,170	0,165	132	0,2789695
17,218	535,9	549,9	101,16	103,45	0,170	0,165	133	0,2699896
17,790	536,0	550,0	97,78	100,18	0,170	0,165	134	0,2788621
17,862	535,9	549,7	97,48	99,86	0,170	0,165	135	0,2799043
18,019	535,9	549,5	96,65	98,92	0,170	0,165	136	0,2824466
17,489	535,9	549,7	99,53	102,18	0,170	0,165	137	0,2741395
17,509	535,9	549,7	99,35	101,78	0,170	0,165	138	0,274517
17,949	535,9	549,8	96,88	99,31	0,170	0,165	139	0,2815305
17,328	535,9	549,9	100,39	102,87	0,170	0,165	140	0,2718852
17,665	535,9	549,7	98,41	100,88	0,170	0,165	141	0,2771232
17,563	535,8	549,6	99,07	101,56	0,170	0,165	142	0,2755549
17,613	535,8	549,6	98,56	101,23	0,170	0,166	143	0,2763797
17,634	535,8	549,6	98,50	101,22	0,170	0,166	144	0,2767516
17,630	535,8	549,6	98,41	100,81	0,170	0,165	145	0,2767519
17,314	535,7	549,6	100,25	103,00	0,170	0,165	146	0,2717593
17,937	535,6	549,5	96,83	99,24	0,170	0,166	147	0,2815589
17,964	535,7	549,6	96,45	99,06	0,170	0,165	148	0,2820811
17,372	535,8	549,8	99,73	102,10	0,170	0,165	149	0,2728277
17,156	536,0	550,1	101,11	103,79	0,170	0,165	150	0,2693729
17,505	536,0	550,0	99,09	101,50	0,170	0,165	151	0,2749031
17,194	536,1	549,8	100,76	103,23	0,170	0,165	152	0,269988
17,135	536,0	549,7	101,26	103,77	0,170	0,165	153	0,2690355
17,169	535,8	549,3	100,81	103,75	0,170	0,166	154	0,2696357
17,311	535,8	549,3	100,09	102,80	0,169	0,166	155	0,2718849
17,104	535,9	549,5	101,48	103,64	0,170	0,165	156	0,268655
17,695	535,8	549,3	97,76	100,25	0,170	0,165	157	0,2780471
16,502	535,8	549,1	104,68	107,54	0,169	0,165	158	0,2593423
17,181	535,8	549,3	100,77	103,61	0,169	0,165	159	0,2699885
17,609	535,9	549,4	98,24	100,76	0,170	0,165	160	0,2767488
17,671	536,0	549,6	97,82	100,62	0,169	0,165	161	0,2777246
17,125	536,0	549,7	101,22	103,67	0,170	0,165	162	0,2691123
17,758	536,1	549,8	97,62	99,97	0,170	0,165	163	0,278967
17,280	536,1	549,8	100,27	102,88	0,170	0,165	164	0,2714408
17,302	536,1	549,7	100,00	102,80	0,170	0,165	165	0,2718175
17,374	536,1	549,8	99,59	102,51	0,169	0,166	166	0,2729202
17,475	536,2	549,9	99,20	101,53	0,170	0,165	167	0,2745167
17,275	536,2	549,8	100,33	102,86	0,170	0,165	168	0,2713196
17,678	536,2	549,5	97,87	100,60	0,170	0,165	169	0,2776779
17,456	536,2	549,6	99,31	101,97	0,170	0,165	170	0,2741591
17,198	536,2	549,6	100,80	103,61	0,170	0,166	171	0,2701814
17,818	536,3	549,8	97,32	99,89	0,170	0,166	172	0,2798873
17,452	536,5	550,2	99,17	101,89	0,170	0,165	173	0,2741425
17,143	536,5	550,1	100,83	103,84	0,169	0,166	174	0,269356
17,562	536,3	549,9	98,54	101,31	0,169	0,166	175	0,2758239
17,759	536,3	549,8	97,45	100,07	0,169	0,165	176	0,2789711
17,452	536,4	549,9	99,01	101,87	0,169	0,165	177	0,274142

17,019	536,4	550,1	101,59	104,43	0,169	0,165	178	0,2673178
17,050	536,4	549,9	101,84	104,30	0,170	0,165	179	0,2676989
17,195	536,3	549,8	100,91	103,55	0,170	0,165	180	0,2699909
17,454	536,4	550,0	99,35	102,03	0,170	0,165	181	0,2740587
17,839	536,4	549,9	97,25	99,70	0,170	0,165	182	0,2800683
17,168	536,4	549,9	100,91	103,67	0,170	0,165	183	0,2696108
17,020	536,5	550,0	101,89	104,34	0,170	0,165	184	0,267316
17,704	536,5	549,9	97,75	100,41	0,170	0,165	185	0,2780506
17,107	536,5	550,0	101,32	103,95	0,170	0,165	186	0,2687044
17,708	536,6	550,0	97,75	100,30	0,170	0,165	187	0,2780516
17,397	536,5	550,0	99,71	102,25	0,170	0,165	188	0,2732053
17,458	536,6	550,2	99,20	101,88	0,170	0,165	189	0,2741974
17,617	536,5	549,9	98,30	100,95	0,170	0,165	190	0,2767545
17,500	536,5	550,0	98,92	101,66	0,170	0,165	191	0,2748941
17,783	536,5	550,0	97,38	100,28	0,170	0,166	192	0,2793404
17,865	536,4	550,0	97,02	99,66	0,170	0,166	193	0,2806196
17,039	536,3	549,9	101,74	104,52	0,170	0,166	194	0,2675869
17,257	536,4	550,0	100,58	103,07	0,170	0,165	195	0,2709409
17,459	536,4	550,1	99,30	101,96	0,170	0,165	196	0,274146
17,200	536,5	550,4	100,91	103,22	0,170	0,165	197	0,2700141
17,601	536,5	550,2	98,59	101,03	0,170	0,165	198	0,276368
16,770	536,6	550,4	103,41	105,92	0,170	0,165	199	0,2632551
17,541	536,6	550,4	98,80	101,35	0,170	0,165	200	0,2754881
17,647	536,5	550,1	98,23	100,79	0,170	0,165	201	0,2771358
17,764	536,5	550,3	97,61	99,93	0,170	0,165	202	0,2789747
17,282	536,5	550,3	100,29	103,10	0,170	0,165	203	0,2712726
17,774	536,3	549,9	97,67	100,28	0,170	0,166	204	0,2789745
17,776	536,2	549,9	97,58	100,04	0,170	0,165	205	0,2789749
17,828	536,3	550,2	97,45	99,78	0,170	0,165	206	0,2798933
17,826	536,3	550,5	97,24	99,83	0,170	0,165	207	0,2798932
17,709	536,4	550,4	97,97	100,35	0,170	0,165	208	0,2780916
17,861	536,6	550,6	96,79	99,24	0,170	0,165	209	0,2806262
17,366	536,6	550,3	99,67	102,39	0,169	0,165	210	0,2728332
17,074	536,6	550,1	101,61	104,20	0,170	0,166	211	0,2681942
17,701	536,5	549,9	97,72	100,50	0,170	0,166	212	0,2780535
17,893	536,4	549,9	96,78	99,32	0,170	0,165	213	0,281183
17,893	536,2	549,5	96,67	99,46	0,170	0,166	214	0,2811756
16,834	536,2	549,6	102,64	105,54	0,169	0,166	215	0,2646169
17,439	536,1	549,7	99,29	101,64	0,170	0,165	216	0,2742676
17,569	536,0	549,4	98,37	101,21	0,170	0,166	217	0,2763885
17,869	535,9	549,3	96,68	99,29	0,170	0,166	218	0,2811764
17,754	535,9	549,4	97,30	99,85	0,170	0,166	219	0,279401
17,132	535,8	549,3	100,85	103,30	0,170	0,165	220	0,2696076
16,922	535,8	549,4	102,08	104,60	0,170	0,165	221	0,2663579
17,236	535,8	549,6	100,30	102,65	0,170	0,165	222	0,2713233
17,735	535,8	549,5	97,43	99,85	0,170	0,165	223	0,2791416
17,790	535,7	549,4	97,20	99,85	0,170	0,166	224	0,2799083
17,280	535,5	549,0	100,15	102,71	0,170	0,166	225	0,2718939
17,333	535,4	548,8	99,79	102,31	0,170	0,166	226	0,2728321
16,982	535,4	549,2	101,89	104,55	0,170	0,166	227	0,2673339
17,212	535,4	549,4	100,52	102,99	0,170	0,166	228	0,2709143
17,746	535,3	549,4	97,31	99,90	0,170	0,166	229	0,2793387
17,047	535,2	549,1	101,48	104,07	0,170	0,166	230	0,2682783
17,640	535,1	548,9	98,11	100,64	0,170	0,166	231	0,2776039
17,192	535,1	548,8	100,63	103,34	0,170	0,166	232	0,2705639
17,586	535,1	548,9	98,45	100,85	0,170	0,166	233	0,276759
17,808	535,1	549,1	97,26	99,75	0,170	0,166	234	0,28026
17,016	535,1	549,1	101,61	104,42	0,170	0,166	235	0,2677021
17,647	535,2	549,3	97,95	100,68	0,170	0,166	236	0,2776848
17,018	535,2	549,2	101,72	104,19	0,170	0,166	237	0,2677025
17,424	534,9	548,7	99,53	102,05	0,170	0,166	238	0,274146

17,053	534,8	548,6	101,58	104,10	0,170	0,166	239	0,2683959
17,185	534,8	548,6	100,76	103,21	0,170	0,166	240	0,2705636
17,182	534,8	548,8	100,70	103,11	0,170	0,166	241	0,2705645
17,145	534,8	548,8	101,22	103,55	0,170	0,166	242	0,2698906
17,922	534,7	548,6	96,62	99,14	0,170	0,166	243	0,282084
17,778	534,8	548,9	97,26	99,76	0,170	0,166	244	0,2798908
17,587	534,8	548,8	98,50	101,07	0,170	0,166	245	0,2767559
17,450	534,8	548,7	99,28	101,69	0,170	0,166	246	0,2745212
17,074	534,8	548,6	101,45	104,21	0,170	0,166	247	0,268662
17,422	534,9	548,6	99,45	102,02	0,170	0,166	248	0,2741458
17,868	535,0	548,9	96,88	99,46	0,170	0,166	249	0,2811741
17,711	535,0	549,0	97,79	100,30	0,170	0,166	250	0,2786724
17,828	535,1	549,2	97,18	99,65	0,170	0,166	251	0,2805099
17,672	535,1	549,2	97,92	100,64	0,170	0,166	252	0,278072
17,610	535,0	549,0	98,17	100,59	0,170	0,166	253	0,2771282
17,199	534,9	549,3	100,66	103,16	0,170	0,165	254	0,2705625
17,655	534,8	549,0	98,03	100,61	0,170	0,166	255	0,2776819
17,369	534,7	548,8	99,66	102,23	0,170	0,166	256	0,2732079
17,674	534,7	548,8	98,05	100,35	0,170	0,166	257	0,2780511
17,077	534,7	548,6	101,30	103,98	0,170	0,166	258	0,2686863
17,211	534,7	548,7	100,66	103,13	0,170	0,166	259	0,2709452
17,497	534,8	549,1	99,02	101,07	0,170	0,165	260	0,2754507
17,715	534,9	549,3	97,71	99,86	0,170	0,165	261	0,2789736
17,462	535,1	549,4	98,85	101,53	0,170	0,166	262	0,2748994
17,188	535,0	548,8	100,67	103,34	0,170	0,166	263	0,2705641
17,560	534,9	548,7	98,50	101,06	0,170	0,166	264	0,2763819
17,331	534,8	548,1	99,89	102,66	0,170	0,166	265	0,2727544
17,609	534,8	548,1	98,36	100,80	0,170	0,166	266	0,2772009
17,064	534,9	548,5	101,41	104,01	0,170	0,166	267	0,2686591
17,109	534,8	548,6	101,17	103,95	0,170	0,166	268	0,2692766
17,237	534,8	548,7	100,48	103,11	0,170	0,166	269	0,2713218
17,465	534,8	548,3	99,15	101,64	0,170	0,166	270	0,2749034
17,355	534,7	548,1	99,67	102,44	0,170	0,166	271	0,273206
17,435	534,8	548,1	99,20	101,86	0,170	0,166	272	0,274519
17,719	534,8	548,5	97,58	100,14	0,170	0,166	273	0,2789734
17,115	534,7	548,1	101,13	103,87	0,170	0,166	274	0,2694548
17,735	534,7	548,3	97,51	100,23	0,170	0,166	275	0,2793419
17,551	534,6	548,1	98,47	101,18	0,170	0,166	276	0,2763832
17,002	534,6	548,0	101,68	104,59	0,170	0,166	277	0,2677372
17,787	534,6	548,3	97,21	99,90	0,170	0,166	278	0,2802569
17,481	534,6	548,2	98,86	101,37	0,170	0,166	279	0,2754516
17,401	534,6	548,4	99,26	101,88	0,170	0,166	280	0,2741438
17,677	534,4	548,2	97,66	100,27	0,170	0,166	281	0,2784256
17,084	534,3	547,8	101,40	103,99	0,170	0,166	282	0,2690542
17,084	534,3	548,0	101,42	103,90	0,170	0,166	283	0,2690392
17,177	534,2	547,9	100,78	103,36	0,170	0,166	284	0,2705634
17,002	534,2	547,7	101,80	104,78	0,170	0,166	285	0,2677007
17,720	534,3	548,1	97,53	99,91	0,170	0,166	286	0,2793689
17,479	534,6	548,6	98,84	101,29	0,170	0,166	287	0,2754492
17,141	534,7	548,6	101,07	103,33	0,170	0,166	288	0,2699913
17,045	534,5	548,2	101,46	104,06	0,170	0,166	289	0,2685312
17,765	534,5	548,3	97,22	99,68	0,170	0,166	290	0,2798893
17,535	534,4	548,2	98,39	100,93	0,170	0,166	291	0,2763823
17,376	534,2	547,9	99,32	102,16	0,170	0,166	292	0,2739135
16,705	534,2	548,0	103,42	105,94	0,170	0,166	293	0,2632512
17,138	534,2	547,9	100,93	103,52	0,170	0,166	294	0,269985
17,813	534,2	547,9	97,20	99,60	0,170	0,166	295	0,2806241
17,727	534,0	547,6	97,63	99,91	0,171	0,166	296	0,2793399
17,172	534,0	547,5	100,69	103,39	0,170	0,166	297	0,2705547
17,633	534,0	547,8	98,22	100,90	0,170	0,166	298	0,2777093
17,822	534,1	548,2	97,03	99,55	0,170	0,166	299	0,2806222

17,180	534,2	548,5	100,77	103,44	0,170	0,166	300	0,2703714
17,568	534,3	548,6	98,70	101,07	0,170	0,166	301	0,2763807
17,373	534,4	548,6	99,77	102,32	0,170	0,166	302	0,2732049
17,662	534,4	548,5	98,33	100,71	0,170	0,166	303	0,2776769
17,890	534,5	548,5	97,15	99,41	0,170	0,166	304	0,2811706
17,379	534,8	549,0	99,99	102,37	0,170	0,166	305	0,2730284
17,619	535,2	549,5	98,52	101,19	0,170	0,166	306	0,2767548
17,907	535,5	549,6	97,00	99,47	0,170	0,166	307	0,2811712
17,789	535,9	549,9	97,52	99,99	0,170	0,165	308	0,2793395
17,609	536,4	550,3	98,53	101,09	0,170	0,165	309	0,2763806
17,479	536,8	550,4	99,27	102,11	0,169	0,165	310	0,2742276
17,724	537,0	550,5	97,87	100,45	0,169	0,165	311	0,2780505
17,068	537,1	550,4	101,65	104,34	0,169	0,165	312	0,267701
17,119	537,2	550,2	101,28	103,90	0,169	0,165	313	0,2685372
17,704	537,2	550,1	98,03	100,96	0,169	0,165	314	0,2776795
16,898	537,2	550,1	102,68	105,62	0,169	0,166	315	0,2650037
17,194	537,4	550,2	100,93	103,69	0,169	0,165	316	0,2696128
17,403	537,5	550,2	99,60	102,44	0,169	0,165	317	0,2728342
17,595	537,6	550,4	98,67	101,21	0,169	0,165	318	0,2758282
17,311	537,7	550,4	100,22	103,23	0,169	0,165	319	0,2713242
17,492	537,7	550,4	99,27	102,18	0,169	0,166	320	0,2741486
17,133	537,7	550,3	101,19	104,25	0,169	0,165	321	0,2685119
17,575	537,8	550,3	98,89	101,72	0,169	0,165	322	0,275453
17,721	538,0	550,4	98,07	100,91	0,169	0,166	323	0,2776856
17,231	538,0	550,3	100,64	103,83	0,169	0,166	324	0,2699987
17,664	538,0	550,3	98,37	100,90	0,169	0,165	325	0,2767612
17,688	538,0	550,3	98,29	101,10	0,169	0,165	326	0,2771358
17,693	538,1	550,3	98,13	101,08	0,169	0,165	327	0,2771343
17,802	538,2	550,4	97,61	100,40	0,169	0,165	328	0,2788044
17,647	538,3	550,4	98,42	101,33	0,169	0,165	329	0,2763934
17,050	538,3	550,4	101,94	104,76	0,169	0,165	330	0,2669421
17,815	538,2	550,4	97,53	100,27	0,169	0,165	331	0,2789829
17,069	538,2	550,3	101,81	104,88	0,169	0,165	332	0,2673161
17,758	538,2	550,4	97,85	100,94	0,169	0,166	333	0,2780608
17,451	538,3	550,4	99,46	102,47	0,169	0,165	334	0,273216
17,675	538,4	550,4	98,20	101,51	0,169	0,166	335	0,2767672
18,288	538,4	550,5	95,17	97,96	0,169	0,166	336	0,2862444
17,988	538,4	550,4	96,77	99,62	0,169	0,166	337	0,281551
17,845	538,7	550,8	97,52	100,31	0,169	0,165	338	0,2793533
17,566	538,7	550,8	98,93	102,03	0,169	0,165	339	0,2749053
17,988	538,7	550,7	96,60	99,38	0,169	0,165	340	0,2815514
17,597	538,6	550,5	98,91	101,78	0,169	0,165	341	0,2754655
17,643	538,6	550,5	98,47	101,48	0,169	0,165	342	0,2762448
17,844	538,4	550,4	97,45	100,19	0,169	0,165	343	0,2793611
17,557	538,3	550,4	99,04	101,80	0,169	0,165	344	0,2749475
17,998	538,3	550,5	96,52	99,36	0,169	0,165	345	0,2818463
17,626	538,5	550,8	98,71	101,64	0,169	0,165	346	0,2760322
17,702	538,7	551,0	98,14	101,23	0,169	0,166	347	0,2771661
17,355	538,8	551,1	100,11	102,65	0,169	0,165	348	0,2719021
17,215	539,0	551,4	100,75	103,68	0,169	0,165	349	0,2696258
17,443	539,0	551,3	99,51	102,42	0,169	0,165	350	0,2732128
17,806	538,9	551,1	97,31	100,29	0,169	0,165	351	0,2789889
17,692	539,0	551,2	98,28	100,83	0,169	0,165	352	0,2771418
17,953	539,1	551,4	96,73	99,48	0,169	0,165	353	0,2811894
17,442	539,1	551,4	99,32	102,06	0,169	0,165	354	0,2732206
17,611	539,3	551,6	98,47	101,31	0,169	0,165	355	0,2758773
17,750	539,4	551,7	97,71	100,47	0,169	0,165	356	0,2780682
17,499	539,5	551,5	98,98	102,02	0,169	0,165	357	0,27416
17,727	539,5	551,5	97,86	100,66	0,169	0,165	358	0,2776992
17,665	539,4	551,3	98,14	100,97	0,169	0,165	359	0,2767703
17,725	539,3	551,1	97,97	100,72	0,169	0,165	360	0,2776969

17,727	539,4	551,4	97,74	100,48	0,169	0,165	361	0,2776974
17,863	539,5	551,5	97,07	99,57	0,169	0,165	362	0,2799082
16,884	539,5	551,5	102,60	105,48	0,169	0,165	363	0,2646288
17,660	539,4	551,4	98,09	101,12	0,169	0,165	364	0,2767709
17,733	539,4	551,5	97,69	100,63	0,169	0,165	365	0,2779488
17,488	539,4	551,3	99,04	102,12	0,169	0,165	366	0,2741552
17,715	539,3	551,4	97,83	100,69	0,169	0,165	367	0,2776954
17,827	539,1	551,0	97,26	100,01	0,169	0,165	368	0,2794698
17,940	539,0	550,8	96,65	99,45	0,169	0,165	369	0,2811976
17,791	539,3	551,1	97,32	100,09	0,169	0,165	370	0,2789874
17,306	539,4	551,2	100,15	103,01	0,169	0,165	371	0,2713368
17,837	539,5	551,4	96,82	99,91	0,169	0,165	372	0,2796816
17,189	539,4	551,1	100,63	103,39	0,169	0,165	373	0,2696247
17,982	539,0	550,8	96,26	99,12	0,169	0,165	374	0,2820987
17,476	538,9	550,7	99,09	102,13	0,169	0,166	375	0,2741586
17,463	539,0	550,8	99,02	101,85	0,169	0,165	376	0,2741129
17,514	539,1	550,8	98,80	101,55	0,169	0,165	377	0,2749141
17,238	539,2	550,9	100,25	103,22	0,169	0,165	378	0,2705743
17,573	539,1	550,8	98,55	101,29	0,169	0,165	379	0,2758369
18,075	539,6	551,1	95,57	98,91	0,169	0,166	380	0,2837022
17,285	540,1	551,5	99,96	102,86	0,169	0,166	381	0,2713315
17,200	540,6	551,8	100,25	103,36	0,169	0,165	382	0,2700034
17,838	540,9	552,0	96,62	99,29	0,168	0,165	383	0,2799684
16,865	541,3	552,2	102,26	105,32	0,168	0,165	384	0,2646298
17,183	541,5	552,2	100,19	103,29	0,168	0,165	385	0,2696216
17,806	541,6	552,3	96,72	99,77	0,168	0,165	386	0,2793482
17,557	541,8	552,4	98,24	101,29	0,168	0,165	387	0,2754641
17,417	541,9	552,6	98,95	102,17	0,168	0,165	388	0,2732167
17,395	542,1	552,7	99,21	102,15	0,168	0,165	389	0,2728411
17,519	542,2	552,9	98,38	101,44	0,168	0,165	390	0,2748148
17,418	542,3	553,0	98,80	101,98	0,168	0,165	391	0,2732179
18,088	542,4	553,1	95,21	98,16	0,168	0,165	392	0,2837311
17,420	542,5	553,2	98,70	101,79	0,168	0,165	393	0,2732801
17,891	542,5	553,2	96,12	99,26	0,168	0,165	394	0,280637
17,644	542,5	553,2	97,43	100,55	0,168	0,165	395	0,2767659
17,702	542,6	553,2	97,29	100,31	0,168	0,165	396	0,2776922
17,281	542,6	553,2	99,53	102,59	0,168	0,165	397	0,2710634
17,104	542,7	553,2	100,60	103,76	0,168	0,165	398	0,26829
17,643	542,7	553,2	97,51	100,60	0,168	0,165	399	0,2767675
17,727	542,7	553,2	96,99	100,11	0,168	0,165	400	0,2780781
17,702	542,8	553,2	97,11	100,06	0,168	0,164	401	0,2776845
17,805	542,8	553,3	96,45	99,82	0,168	0,165	402	0,2792943
17,559	542,9	553,4	97,85	101,14	0,168	0,165	403	0,2754654
17,333	542,9	553,4	99,07	102,41	0,168	0,165	404	0,2719003
17,406	543,0	553,4	98,70	101,82	0,168	0,165	405	0,273086
17,499	543,0	553,4	98,17	101,36	0,168	0,165	406	0,2745323
17,924	543,0	553,4	95,91	98,91	0,168	0,165	407	0,2811859
17,392	543,1	553,5	98,85	101,99	0,168	0,165	408	0,2728437
17,271	543,2	553,6	99,47	102,73	0,168	0,165	409	0,2709563
17,209	543,2	553,6	99,75	103,11	0,168	0,165	410	0,2700138
17,521	543,3	553,8	97,95	101,15	0,168	0,165	411	0,274906
17,555	543,3	553,8	97,96	101,16	0,168	0,165	412	0,275466
17,470	543,4	553,9	98,34	101,39	0,168	0,165	413	0,274117
17,148	543,4	554,0	100,15	103,43	0,168	0,165	414	0,2690535
17,918	543,4	554,0	95,79	98,92	0,168	0,165	415	0,2811664
17,380	543,4	554,0	98,78	101,90	0,168	0,164	416	0,2727014
17,206	543,5	554,1	99,68	103,05	0,168	0,164	417	0,2700232
17,401	543,5	554,2	98,55	101,82	0,168	0,165	418	0,2730794
17,578	543,5	554,2	97,60	100,71	0,168	0,164	419	0,2758443
17,554	543,6	554,2	97,80	100,93	0,168	0,164	420	0,2754788
17,409	543,6	554,2	98,58	101,77	0,168	0,165	421	0,2732194

17,659	543,6	554,2	97,10	100,29	0,168	0,164	422	0,2771374
17,287	543,6	554,2	99,25	102,38	0,168	0,164	423	0,2713358
17,445	543,6	554,3	98,32	101,34	0,168	0,164	424	0,2737999
17,856	543,6	554,3	95,97	99,04	0,168	0,164	425	0,2802735
17,692	543,7	554,4	96,97	99,88	0,168	0,164	426	0,277695
17,548	543,7	554,4	97,79	100,90	0,168	0,164	427	0,2754668
17,830	543,7	554,5	96,32	99,18	0,168	0,164	428	0,2798891
17,462	543,7	554,5	98,08	101,22	0,168	0,164	429	0,2741611
17,877	543,7	554,5	96,16	98,79	0,168	0,164	430	0,2806389
17,570	543,7	554,5	97,60	100,69	0,168	0,164	431	0,27584
17,852	543,8	554,6	95,94	99,19	0,168	0,164	432	0,2802735
17,136	543,8	554,6	100,11	103,19	0,168	0,164	433	0,2690532
17,603	543,8	554,7	97,32	100,37	0,168	0,164	434	0,2763962
17,649	543,8	554,8	96,93	99,91	0,167	0,164	435	0,2771401
17,566	543,8	554,8	97,56	100,51	0,168	0,164	436	0,275839
17,682	543,8	554,8	96,72	99,95	0,168	0,164	437	0,2776947
17,278	543,8	554,8	99,08	102,23	0,167	0,164	438	0,271334
17,263	543,8	554,8	99,20	102,52	0,168	0,164	439	0,2711104
17,927	543,9	554,8	95,45	98,61	0,168	0,164	440	0,2815524
17,926	543,9	554,8	95,33	98,50	0,167	0,164	441	0,2815525
17,785	543,9	554,8	96,31	99,25	0,167	0,164	442	0,2793545
17,787	543,9	554,8	96,22	99,17	0,168	0,164	443	0,2793773

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	98,57	103,07	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
16,818	535,8	536,8			0,168	0,167	0	0,2551205
16,947	535,9	537,2	104,71	111,40	0,168	0,167	1	0,2632386
17,209	536,0	537,7	102,58	109,40	0,168	0,167	2	0,2677502
16,852	536,2	538,2	104,82	111,71	0,168	0,167	3	0,2621963
17,020	536,4	538,7	103,96	110,70	0,168	0,167	4	0,264604
16,924	536,5	539,3	103,08	109,90	0,167	0,167	5	0,2646029
17,045	536,7	539,8	102,41	108,63	0,168	0,167	6	0,2668879
16,794	536,9	540,5	103,68	110,09	0,168	0,166	7	0,2632393
17,647	537,1	541,1	98,50	104,64	0,168	0,167	8	0,276741
17,031	537,1	541,6	102,06	108,06	0,168	0,166	9	0,2673033
16,952	537,2	542,1	102,44	108,53	0,168	0,166	10	0,2660068
16,730	537,4	542,6	103,72	109,77	0,168	0,166	11	0,2626546
16,967	537,5	543,1	102,25	108,18	0,168	0,166	12	0,2663419
17,003	537,5	543,5	102,04	107,77	0,168	0,166	13	0,2669365
17,108	537,5	543,9	101,40	107,09	0,168	0,166	14	0,2686436
17,762	537,6	544,3	97,56	102,92	0,168	0,166	15	0,2789592
17,471	537,8	544,7	99,03	104,54	0,168	0,165	16	0,2745062
17,812	538,2	545,2	97,00	102,49	0,167	0,165	17	0,279934
16,981	538,3	545,6	101,84	107,51	0,167	0,165	18	0,266921
17,093	538,3	545,9	101,26	106,38	0,168	0,165	19	0,2686436
16,922	538,4	546,3	102,08	107,83	0,168	0,165	20	0,2659744
17,264	538,4	546,6	100,03	105,39	0,167	0,165	21	0,2713345
17,087	538,6	546,9	101,03	106,51	0,167	0,165	22	0,2686453
16,681	538,8	547,2	103,48	109,01	0,167	0,165	23	0,2622643
17,202	539,0	547,5	100,22	105,48	0,167	0,165	24	0,2705484
16,996	539,0	547,7	101,69	106,73	0,167	0,165	25	0,2672961
17,371	539,2	548,0	99,24	104,28	0,167	0,164	26	0,2731929
16,700	539,3	548,2	103,20	108,53	0,167	0,164	27	0,2626541
16,973	539,3	548,4	101,64	106,65	0,167	0,164	28	0,2669277
17,019	539,3	548,5	101,24	106,43	0,167	0,164	29	0,2676872
17,101	539,4	548,7	100,72	105,85	0,167	0,164	30	0,2690274
17,221	539,3	548,9	100,03	105,06	0,167	0,164	31	0,2709381
17,283	539,3	549,1	99,63	104,55	0,167	0,164	32	0,271875
16,914	539,4	549,3	101,76	106,86	0,167	0,164	33	0,26606
16,968	539,4	549,5	101,62	106,39	0,167	0,164	34	0,2669203
16,889	539,5	549,6	101,96	106,80	0,167	0,164	35	0,2657016
16,929	539,6	549,8	101,71	106,62	0,167	0,164	36	0,2663418
16,605	539,6	549,9	103,66	108,68	0,167	0,164	37	0,2612822
16,991	539,6	550,0	101,39	106,40	0,167	0,164	38	0,2673037
17,220	539,7	550,1	99,82	104,80	0,167	0,164	39	0,2709306
17,007	539,7	550,3	101,07	106,00	0,167	0,164	40	0,2675752
16,988	539,7	550,4	101,20	106,10	0,167	0,164	41	0,2673037
16,631	539,7	550,5	103,47	108,70	0,167	0,164	42	0,2616744
17,160	539,8	550,6	100,52	105,26	0,167	0,164	43	0,2699844
16,901	539,9	550,7	101,94	106,74	0,167	0,164	44	0,2659568
16,925	539,9	550,8	101,47	106,48	0,167	0,164	45	0,2663427
17,016	539,9	550,9	101,00	105,90	0,167	0,164	46	0,2676891
16,847	539,9	550,9	102,29	107,00	0,167	0,164	47	0,2649905
16,906	539,9	551,1	101,86	106,50	0,167	0,164	48	0,2659569
16,819	539,9	551,1	102,43	107,07	0,167	0,163	49	0,2646026
17,140	540,0	551,2	100,46	105,08	0,167	0,163	50	0,2695963
17,169	540,1	551,3	100,06	104,96	0,167	0,164	51	0,2700816
16,986	540,2	551,3	101,39	105,97	0,167	0,163	52	0,2671864
17,426	540,1	551,4	98,66	103,41	0,167	0,163	53	0,2741325
16,911	540,2	551,4	101,90	106,42	0,167	0,163	54	0,2659569
16,849	540,2	551,5	102,25	106,89	0,167	0,163	55	0,2649904

17,040	540,2	551,5	101,00	105,72	0,167	0,163	56	0,2680114
17,741	540,2	551,6	97,10	101,61	0,167	0,163	57	0,2789604
16,638	540,2	551,6	103,51	108,36	0,167	0,164	58	0,2616781
16,683	540,2	551,5	103,40	107,92	0,167	0,163	59	0,2623234
17,596	540,6	551,8	97,93	102,42	0,167	0,163	60	0,2767203
17,111	540,6	551,8	100,52	105,29	0,167	0,163	61	0,2690281
17,624	540,6	551,9	97,62	102,21	0,167	0,163	62	0,2771138
16,939	540,5	551,9	101,81	106,32	0,167	0,163	63	0,2663364
17,002	540,5	551,9	101,24	106,24	0,167	0,164	64	0,267305
17,028	540,5	552,0	101,10	105,99	0,167	0,164	65	0,2676899
17,064	540,5	552,0	101,02	105,56	0,167	0,163	66	0,2682636
16,759	540,4	551,9	102,82	107,80	0,167	0,164	67	0,2635105
16,976	540,4	552,0	101,68	106,09	0,167	0,164	68	0,2669416
17,063	540,4	552,0	100,95	105,29	0,167	0,163	69	0,268263
17,371	540,5	552,0	99,16	103,89	0,167	0,163	70	0,2730586
17,066	540,4	552,1	101,04	105,58	0,167	0,163	71	0,2682655
16,918	540,5	552,1	101,84	106,53	0,167	0,163	72	0,265958
16,920	540,4	552,1	101,97	106,60	0,167	0,163	73	0,2659141
16,984	540,5	552,1	101,50	106,19	0,167	0,163	74	0,2669516
17,179	540,5	552,1	100,34	104,91	0,167	0,163	75	0,2699793
17,382	540,5	552,2	99,14	103,76	0,167	0,163	76	0,2731939
17,614	540,5	552,2	97,86	102,33	0,167	0,163	77	0,2767429
17,215	540,6	552,2	100,08	104,78	0,167	0,163	78	0,2705751
17,038	540,6	552,3	101,18	105,94	0,167	0,163	79	0,2676899
17,099	540,6	552,3	100,76	105,69	0,167	0,164	80	0,2686448
17,617	540,6	552,3	97,81	102,48	0,167	0,164	81	0,2767456
16,988	540,6	552,3	101,41	106,24	0,167	0,163	82	0,2668325
17,080	540,6	552,4	100,86	105,67	0,167	0,163	83	0,2682642
17,132	540,6	552,3	100,76	105,42	0,167	0,163	84	0,2690271
17,003	540,5	552,3	101,47	106,25	0,167	0,163	85	0,2669191
17,031	540,6	552,4	101,40	106,23	0,167	0,163	86	0,2673043
17,690	540,6	552,4	97,66	102,02	0,167	0,163	87	0,2776672
17,090	540,6	552,4	101,13	105,52	0,167	0,163	88	0,2682626
17,291	540,6	552,4	99,98	104,50	0,167	0,163	89	0,2713468
17,060	540,6	552,3	101,24	105,82	0,167	0,163	90	0,2676873
17,127	540,7	552,5	100,94	105,73	0,167	0,163	91	0,2686448
17,026	540,8	552,4	101,62	106,49	0,167	0,163	92	0,266919
17,082	540,8	552,4	101,15	106,06	0,167	0,163	93	0,2676895
18,005	540,8	552,3	96,32	100,53	0,167	0,163	94	0,2820717
17,974	540,9	552,3	96,32	101,04	0,167	0,163	95	0,2815155
17,152	540,9	552,2	101,24	105,70	0,167	0,163	96	0,2686383
17,147	540,8	552,1	100,99	105,92	0,167	0,163	97	0,268646
17,579	540,7	552,0	98,45	103,22	0,167	0,163	98	0,2754389
17,288	540,8	552,1	100,13	104,82	0,167	0,163	99	0,2709504
17,224	540,9	552,3	100,55	105,34	0,167	0,163	100	0,2699536
17,202	540,9	552,3	100,71	105,27	0,167	0,163	101	0,2696092
17,076	541,1	552,3	101,36	106,24	0,167	0,163	102	0,2676884
17,088	541,1	552,4	101,32	106,08	0,167	0,163	103	0,2678292
17,851	541,1	552,5	96,81	101,44	0,167	0,163	104	0,2798624
17,403	541,1	552,5	99,47	103,83	0,167	0,163	105	0,2728174
17,486	541,0	552,6	98,91	103,78	0,167	0,163	106	0,2741311
17,562	540,9	552,5	98,45	103,13	0,167	0,163	107	0,2753271
17,337	540,9	552,5	99,66	104,42	0,167	0,163	108	0,2718742
17,534	541,0	552,6	98,70	103,53	0,167	0,163	109	0,2748788
17,134	541,1	552,5	100,90	105,91	0,167	0,164	110	0,2686454
17,374	541,1	552,5	99,51	104,05	0,167	0,163	111	0,2724191
17,993	541,1	552,6	96,40	100,60	0,167	0,163	112	0,2820737
18,036	541,1	552,6	96,02	100,14	0,167	0,163	113	0,2828041
17,135	541,2	552,7	100,98	105,71	0,167	0,163	114	0,2686348
17,482	541,3	552,7	98,88	103,49	0,167	0,163	115	0,2741331
17,484	541,2	552,6	99,08	103,51	0,167	0,163	116	0,2741304

17,958	541,1	552,7	96,39	100,97	0,167	0,163	117	0,2815247
17,403	541,0	552,6	99,66	104,19	0,167	0,163	118	0,272817
18,186	541,0	552,7	95,24	99,54	0,167	0,163	119	0,2851251
17,509	540,9	552,7	98,95	103,36	0,167	0,163	120	0,2745213
17,732	540,9	552,8	97,53	102,18	0,167	0,163	121	0,278037
17,876	540,9	552,8	96,87	101,30	0,167	0,163	122	0,2802454
17,478	540,9	552,8	99,09	103,41	0,167	0,163	123	0,2740364
17,680	540,8	552,7	97,85	102,40	0,167	0,163	124	0,2771199
17,583	540,9	552,8	98,55	103,09	0,167	0,163	125	0,2754459
17,360	540,9	552,8	99,80	104,68	0,167	0,163	126	0,271876
17,640	540,9	552,8	98,15	102,65	0,167	0,163	127	0,2763706
17,266	541,0	552,9	100,31	104,92	0,167	0,163	128	0,2705745
17,437	541,0	552,8	99,47	103,98	0,167	0,163	129	0,2731842
17,381	540,9	552,8	99,70	104,25	0,167	0,163	130	0,2722364
17,172	540,9	552,8	100,84	105,59	0,167	0,163	131	0,2690681
17,518	540,9	552,9	98,95	103,54	0,167	0,163	132	0,2745059
17,735	540,9	552,9	97,51	101,99	0,167	0,163	133	0,2780385
17,407	540,9	552,9	99,43	104,02	0,167	0,163	134	0,2728177
17,738	540,9	552,9	97,56	101,90	0,167	0,163	135	0,2780387
17,738	541,2	553,1	97,51	102,09	0,167	0,163	136	0,2780585
17,487	541,1	553,1	99,02	103,41	0,167	0,163	137	0,2741271
17,634	541,0	553,2	98,13	102,46	0,167	0,163	138	0,2763715
17,492	541,0	553,2	99,12	103,34	0,167	0,163	139	0,27414
17,429	540,9	553,2	99,27	103,93	0,167	0,163	140	0,2731944
17,203	540,9	553,2	100,70	105,09	0,167	0,163	141	0,2695984
17,739	540,8	553,2	97,59	101,64	0,167	0,163	142	0,2780388
17,519	540,9	553,2	98,92	103,39	0,167	0,163	143	0,2745514
17,510	541,1	553,4	98,70	103,37	0,167	0,163	144	0,2745063
18,020	541,3	553,5	95,96	100,31	0,167	0,163	145	0,2824379
17,258	541,3	553,5	100,12	104,50	0,167	0,163	146	0,2705515
17,488	541,3	553,4	98,89	103,44	0,167	0,163	147	0,2741324
17,568	541,5	553,5	98,31	102,80	0,167	0,163	148	0,275444
18,044	541,4	553,5	95,76	100,30	0,167	0,163	149	0,282782
17,488	541,2	553,4	98,87	103,28	0,167	0,163	150	0,2741333
17,289	541,1	553,3	100,07	104,54	0,167	0,163	151	0,2710588
17,160	541,0	553,3	100,90	105,32	0,167	0,163	152	0,2689169
17,681	540,9	553,5	97,98	102,52	0,167	0,163	153	0,2771133
17,209	540,9	553,4	100,64	105,17	0,167	0,163	154	0,2697311
17,348	540,9	553,5	99,89	104,40	0,167	0,163	155	0,271877
17,491	540,9	553,5	99,04	103,37	0,167	0,163	156	0,2741311
17,905	540,9	553,6	96,76	101,23	0,167	0,163	157	0,2806124
17,434	540,9	553,6	99,49	103,89	0,167	0,163	158	0,2731952
17,349	540,9	553,6	99,98	104,20	0,167	0,163	159	0,2718762
17,965	540,9	553,7	96,74	100,91	0,167	0,163	160	0,2814869
17,600	540,9	553,8	98,52	102,81	0,167	0,163	161	0,275814
17,284	541,1	553,9	100,00	104,42	0,167	0,163	162	0,270933
17,487	541,4	554,0	98,98	103,44	0,167	0,163	163	0,2740507
17,539	541,3	553,9	98,78	103,17	0,167	0,163	164	0,2748821
17,537	541,4	553,9	98,62	103,00	0,167	0,163	165	0,2748858
17,401	541,5	554,0	99,33	103,65	0,167	0,163	166	0,2728194
17,735	541,5	554,0	97,53	102,02	0,167	0,163	167	0,2780403
17,607	541,5	553,9	98,42	102,67	0,167	0,163	168	0,276009
17,345	541,7	554,1	99,76	104,11	0,167	0,163	169	0,2718778
17,114	541,8	554,0	101,01	105,52	0,167	0,163	170	0,2682659
17,288	541,7	554,0	100,08	104,63	0,167	0,163	171	0,2709317
17,514	541,5	553,9	98,77	103,33	0,167	0,163	172	0,2745093
17,493	541,6	554,0	98,91	103,44	0,167	0,163	173	0,2741345
17,598	541,6	554,1	98,39	102,79	0,167	0,163	174	0,2758166
17,667	541,7	554,2	98,03	102,40	0,167	0,163	175	0,276746
17,665	541,8	554,3	97,95	102,45	0,167	0,163	176	0,276705
17,498	541,8	554,2	98,97	103,43	0,167	0,163	177	0,2741399

17,696	542,0	554,4	97,76	102,13	0,167	0,163	178	0,2771172
17,509	542,0	554,3	98,94	103,67	0,166	0,163	179	0,2741349
17,615	541,9	554,2	98,36	102,50	0,167	0,163	180	0,2758161
17,617	541,8	554,2	98,39	102,77	0,167	0,163	181	0,275817
17,598	542,2	554,5	98,60	102,94	0,167	0,163	182	0,2754434
18,085	542,4	554,5	95,66	99,91	0,167	0,163	183	0,2833478
17,729	542,4	554,6	97,70	102,17	0,167	0,163	184	0,277667
18,015	542,6	554,8	96,06	100,49	0,166	0,163	185	0,2820753
17,453	542,8	554,9	99,17	103,68	0,166	0,163	186	0,2731967
17,615	543,0	555,1	98,27	102,64	0,166	0,163	187	0,2757646
17,534	543,0	555,2	98,78	102,91	0,166	0,162	188	0,2745381
17,534	542,8	555,0	98,72	103,17	0,167	0,163	189	0,2745114
18,013	542,5	554,8	96,03	100,30	0,166	0,163	190	0,2821424
18,312	542,4	554,8	94,60	98,65	0,167	0,163	191	0,2867829
17,531	542,6	555,0	98,80	103,23	0,167	0,163	192	0,2745103
17,418	542,8	555,0	99,19	103,77	0,166	0,163	193	0,2728229
17,605	542,7	554,9	98,18	102,50	0,166	0,163	194	0,2758168
17,786	542,7	555,1	97,29	101,64	0,166	0,163	195	0,2785714
17,698	542,8	555,1	97,72	101,97	0,166	0,163	196	0,2771812
17,815	542,7	555,2	96,98	101,32	0,166	0,162	197	0,2789637
17,668	542,4	554,9	98,02	102,38	0,166	0,163	198	0,2767454
17,873	542,3	555,0	96,87	101,05	0,167	0,163	199	0,2798908
17,276	542,2	555,0	100,19	104,80	0,167	0,163	200	0,2705992
17,505	542,3	555,1	98,84	103,36	0,166	0,163	201	0,2741345
17,975	542,3	555,1	96,12	100,83	0,166	0,163	202	0,2815279
17,585	542,4	555,2	98,39	102,66	0,166	0,163	203	0,275444
17,850	542,3	555,1	96,84	101,21	0,167	0,163	204	0,279709
17,829	542,4	555,2	97,04	101,25	0,167	0,163	205	0,2793339
17,606	542,4	555,2	98,32	102,64	0,167	0,163	206	0,2758179
17,610	542,3	555,1	98,31	102,64	0,167	0,163	207	0,2758179
17,421	542,3	555,2	99,32	103,66	0,167	0,163	208	0,272967
18,225	542,3	555,2	94,88	99,17	0,167	0,163	209	0,2855175
17,607	542,2	555,2	98,32	102,78	0,167	0,163	210	0,2758166
17,713	542,1	555,1	97,77	102,19	0,167	0,163	211	0,2774901
17,431	542,1	555,1	99,32	103,59	0,167	0,163	212	0,2731217
18,027	542,1	555,1	96,09	100,20	0,167	0,163	213	0,2824426
17,687	542,1	555,1	97,95	102,03	0,167	0,163	214	0,2771171
17,727	542,0	555,1	97,84	102,02	0,167	0,163	215	0,2777482
17,182	542,0	555,3	100,75	105,13	0,167	0,163	216	0,2691826
18,007	542,0	555,3	96,21	100,24	0,167	0,163	217	0,2821269
17,409	541,9	555,1	99,45	103,50	0,167	0,162	218	0,2728229
17,499	541,8	555,0	98,90	103,38	0,167	0,163	219	0,2741819
17,491	541,8	555,0	98,87	103,04	0,167	0,163	220	0,2741377
17,938	541,8	555,0	96,40	100,44	0,167	0,162	221	0,2811861
17,716	541,8	554,9	97,70	102,08	0,167	0,163	222	0,2776739
17,418	542,0	555,2	99,49	103,54	0,167	0,163	223	0,2729604
17,286	542,4	555,4	99,89	104,25	0,167	0,162	224	0,2709928
17,795	542,5	555,4	97,14	101,11	0,167	0,162	225	0,2789642
17,426	542,5	555,4	99,04	103,43	0,167	0,162	226	0,2732082
17,712	542,6	555,5	97,57	101,80	0,166	0,163	227	0,2776722
17,946	542,6	555,5	96,17	100,41	0,167	0,163	228	0,2813622
17,428	542,5	555,5	99,16	103,30	0,166	0,162	229	0,2731991
17,509	542,6	555,5	98,67	102,90	0,167	0,162	230	0,2745125
17,655	542,7	555,6	97,85	102,23	0,167	0,163	231	0,2767482
17,218	542,8	555,6	100,25	104,90	0,166	0,163	232	0,2699083
17,853	542,8	555,7	96,84	100,98	0,167	0,163	233	0,2798847
17,676	542,8	555,7	97,63	101,78	0,167	0,162	234	0,27712
17,654	542,9	555,8	97,77	102,06	0,166	0,162	235	0,2767597
17,789	543,0	555,8	97,09	101,23	0,166	0,162	236	0,2789375
17,568	543,0	555,8	98,24	102,65	0,166	0,163	237	0,2754475
17,734	543,2	555,9	97,20	101,57	0,166	0,163	238	0,2780396

17,442	543,6	556,0	98,81	103,08	0,166	0,162	239	0,2734682
17,154	543,5	556,0	100,44	105,09	0,166	0,162	240	0,2690433
17,666	543,3	555,9	97,70	102,03	0,166	0,163	241	0,2771127
17,473	543,2	555,8	98,54	103,18	0,166	0,163	242	0,2740795
17,567	543,1	555,7	98,18	102,40	0,166	0,163	243	0,2754465
17,474	543,0	555,6	98,69	102,95	0,166	0,162	244	0,2741381
17,613	543,0	555,6	97,81	101,99	0,166	0,162	245	0,2763753
17,413	543,2	555,7	99,01	103,35	0,166	0,162	246	0,2732028
17,331	543,2	555,7	99,46	103,67	0,166	0,162	247	0,271846
17,154	543,3	555,7	100,39	105,00	0,166	0,162	248	0,2690337
17,723	543,5	555,7	97,05	101,54	0,166	0,163	249	0,2780438
18,163	543,5	555,7	94,77	99,31	0,166	0,163	250	0,2849758
18,310	543,4	555,5	94,10	98,28	0,166	0,163	251	0,2872925
17,526	543,3	555,5	98,41	102,67	0,166	0,163	252	0,2749882
17,611	543,0	555,4	97,70	102,25	0,166	0,163	253	0,276377
17,468	542,9	555,2	98,78	103,07	0,166	0,163	254	0,2741382
17,492	542,9	555,3	98,60	102,93	0,167	0,163	255	0,2745127
17,661	542,8	555,4	97,50	101,90	0,166	0,163	256	0,277111
17,521	542,9	555,5	98,38	102,78	0,166	0,163	257	0,2748854
17,920	542,8	555,6	96,22	100,43	0,166	0,163	258	0,2811654
18,347	542,9	555,7	93,80	98,05	0,166	0,163	259	0,2880243
17,006	543,2	555,7	101,26	105,78	0,166	0,163	260	0,2669264
17,322	543,5	555,7	99,42	103,70	0,166	0,162	261	0,2718922
17,610	543,4	555,7	97,73	102,19	0,166	0,162	262	0,2763756
17,801	543,2	555,8	96,65	100,86	0,166	0,162	263	0,2793321
17,836	543,0	555,8	96,67	100,95	0,166	0,162	264	0,2798818
17,801	543,0	555,9	96,68	101,15	0,166	0,163	265	0,2793352
17,408	543,0	555,9	98,98	103,28	0,166	0,163	266	0,2731996
17,835	543,0	555,8	96,63	100,82	0,166	0,162	267	0,2798844
17,915	543,0	555,8	96,27	100,42	0,167	0,163	268	0,2811505
18,055	543,1	555,8	95,43	99,24	0,167	0,162	269	0,2833552
17,490	542,9	555,5	98,51	103,06	0,166	0,162	270	0,2745125
17,610	543,1	555,5	97,79	102,16	0,166	0,163	271	0,2763687
17,778	543,2	555,6	96,97	101,07	0,166	0,162	272	0,2789413
17,495	543,6	555,8	98,42	102,90	0,166	0,162	273	0,2745052
17,555	543,8	555,9	98,08	102,59	0,166	0,163	274	0,2754446
18,003	543,6	555,8	95,68	99,83	0,166	0,163	275	0,282481
17,413	543,4	555,8	98,90	103,21	0,166	0,162	276	0,2731991
17,207	543,2	555,8	99,99	104,52	0,166	0,162	277	0,2699856
17,640	543,1	555,7	97,56	101,94	0,166	0,162	278	0,2767481
17,563	543,1	555,7	98,17	102,43	0,166	0,162	279	0,2756084
17,704	543,0	555,7	97,23	101,46	0,166	0,162	280	0,2777891
17,920	542,9	555,8	96,21	100,23	0,166	0,162	281	0,2811677
17,528	542,8	555,8	98,24	102,57	0,166	0,162	282	0,2749604
17,725	542,7	555,9	97,36	101,47	0,166	0,162	283	0,278044
17,461	542,6	555,8	98,62	103,09	0,166	0,162	284	0,2738932
17,641	542,5	555,6	97,89	102,17	0,166	0,163	285	0,2767478
17,618	542,7	555,6	97,84	102,29	0,167	0,163	286	0,276377
17,612	542,9	555,7	97,99	102,11	0,166	0,163	287	0,2763186
17,980	542,9	555,5	95,74	100,10	0,166	0,162	288	0,2820781
17,476	542,9	555,5	98,43	103,10	0,166	0,163	289	0,274139
17,697	543,2	555,6	97,31	101,82	0,166	0,163	290	0,2776739
17,554	543,2	555,5	98,17	102,79	0,166	0,163	291	0,2753775
17,181	543,1	555,5	100,35	104,55	0,166	0,163	292	0,2695894
17,516	543,2	555,6	98,25	102,83	0,166	0,162	293	0,2748912
17,784	543,2	555,6	97,02	101,37	0,166	0,163	294	0,2789657
17,817	543,1	555,6	96,72	101,34	0,166	0,163	295	0,2794929
17,562	542,9	555,6	98,15	102,66	0,166	0,163	296	0,2754711
17,703	542,8	555,6	97,42	101,64	0,166	0,163	297	0,2776766
17,924	542,7	555,6	96,11	100,42	0,166	0,162	298	0,2811667
17,558	542,8	555,6	98,16	102,50	0,166	0,162	299	0,2754356

17,643	543,2	555,8	97,74	102,03	0,166	0,162	300	0,2767491
17,411	543,4	556,0	98,77	103,31	0,166	0,162	301	0,2732017
17,524	543,3	555,8	98,26	102,99	0,166	0,163	302	0,2748872
17,869	543,2	555,9	96,60	100,77	0,166	0,163	303	0,2802555
17,702	543,8	556,2	97,29	101,54	0,166	0,162	304	0,2776757
17,290	543,8	556,1	99,60	103,96	0,166	0,162	305	0,2713175
17,715	543,5	555,9	96,95	101,41	0,166	0,162	306	0,2780443
17,534	543,4	555,8	98,25	102,54	0,166	0,162	307	0,2751542
18,192	543,6	556,0	94,58	98,74	0,166	0,162	308	0,2855285
17,799	544,2	556,3	96,61	100,80	0,166	0,162	309	0,2793364
18,231	544,3	556,5	94,31	98,54	0,166	0,162	310	0,2861977
17,459	543,8	556,0	98,36	102,85	0,166	0,163	311	0,2742836
18,179	543,3	555,9	94,69	98,70	0,166	0,163	312	0,2855268
17,677	543,3	556,0	97,16	101,57	0,166	0,162	313	0,2776744
17,602	543,1	555,9	97,80	102,07	0,166	0,163	314	0,2763777
18,060	543,2	556,0	95,32	99,33	0,166	0,162	315	0,2835395
17,487	543,3	556,1	98,41	102,62	0,166	0,162	316	0,2745392
17,608	543,4	556,2	97,64	101,95	0,166	0,162	317	0,2763769
17,470	543,5	556,2	98,42	102,79	0,166	0,162	318	0,2741388
17,620	543,4	556,2	97,54	101,79	0,166	0,162	319	0,2765676
17,998	543,3	556,1	95,65	100,00	0,166	0,162	320	0,2824343
17,612	543,1	556,0	97,76	101,92	0,166	0,162	321	0,2763769
17,363	543,0	556,0	99,13	103,26	0,166	0,162	322	0,2724929
18,016	542,9	555,9	95,50	99,88	0,166	0,162	323	0,2828068
17,907	543,0	555,9	96,19	100,54	0,166	0,163	324	0,2811645
17,513	543,2	556,0	98,30	102,50	0,166	0,163	325	0,2748874
17,970	543,2	556,0	95,71	99,99	0,166	0,162	326	0,2820783
17,711	543,0	555,9	97,11	101,42	0,166	0,162	327	0,2780428
17,659	543,0	555,7	97,59	102,02	0,166	0,163	328	0,2771563
17,830	543,0	555,9	96,41	100,83	0,166	0,163	329	0,2798862
17,281	542,9	556,0	99,63	104,00	0,166	0,162	330	0,2712254
17,097	542,9	556,1	100,70	104,95	0,166	0,162	331	0,2683031
17,259	542,8	556,0	99,81	104,06	0,166	0,162	332	0,270935
17,286	542,8	555,8	99,64	103,90	0,166	0,162	333	0,2713165
17,550	542,8	555,9	98,04	102,26	0,166	0,162	334	0,2754467
17,253	543,0	556,0	99,70	104,12	0,166	0,162	335	0,2708448
17,384	543,3	556,2	99,04	103,37	0,166	0,162	336	0,2728243
17,572	543,3	556,1	97,93	102,20	0,166	0,162	337	0,2758187
17,405	543,2	556,0	98,92	103,16	0,166	0,162	338	0,2732008
17,896	543,0	555,8	96,21	100,40	0,166	0,162	339	0,280931
17,534	542,7	555,7	98,08	102,36	0,166	0,162	340	0,2754433
17,647	542,9	555,9	97,55	101,82	0,166	0,162	341	0,2771203
17,460	542,9	556,0	98,60	102,76	0,166	0,162	342	0,2741386
17,499	542,8	556,1	98,46	102,58	0,167	0,162	343	0,2747229
17,572	542,8	556,1	97,89	102,27	0,166	0,162	344	0,2758193
17,547	542,8	556,1	98,16	102,59	0,166	0,163	345	0,2754461
17,321	542,8	556,1	99,56	103,67	0,167	0,163	346	0,2718823
17,935	542,7	556,1	95,98	100,29	0,167	0,162	347	0,2815336
17,466	542,7	556,0	98,52	102,86	0,166	0,162	348	0,2741396
17,237	542,7	556,0	100,10	104,39	0,167	0,162	349	0,2705568
17,513	542,7	556,0	98,44	102,63	0,167	0,163	350	0,2748884
17,320	542,8	555,9	99,38	103,97	0,166	0,163	351	0,2718816
17,379	542,8	555,9	99,04	103,24	0,166	0,163	352	0,2728262
18,210	542,8	555,8	94,57	98,46	0,166	0,162	353	0,2858781
17,605	542,8	555,8	97,81	102,14	0,166	0,162	354	0,2763788
17,289	542,8	555,7	99,58	103,97	0,166	0,163	355	0,2714225
17,874	542,9	555,7	96,41	100,64	0,167	0,163	356	0,2806179
17,652	542,9	555,7	97,53	101,86	0,167	0,163	357	0,2771208
17,622	542,9	555,6	97,69	101,95	0,166	0,163	358	0,2767203
17,462	542,9	555,6	98,52	102,97	0,166	0,163	359	0,2741397
18,014	542,9	555,6	95,54	99,78	0,166	0,163	360	0,2828067

17,789	542,9	555,5	96,77	101,07	0,166	0,163	361	0,2793354
17,632	542,9	555,6	97,63	101,89	0,166	0,163	362	0,2768645
18,046	542,9	555,5	95,44	99,66	0,167	0,163	363	0,2833483
17,539	542,9	555,5	98,06	102,31	0,166	0,163	364	0,2754445
17,566	542,8	555,5	98,13	102,09	0,167	0,162	365	0,2758145
17,456	542,8	555,5	98,53	103,07	0,167	0,162	366	0,2741395
17,987	542,8	555,5	95,77	99,85	0,166	0,163	367	0,2824511
17,692	542,9	555,5	97,20	101,30	0,166	0,162	368	0,2778603
17,536	542,9	555,5	98,20	102,52	0,166	0,162	369	0,2754141
17,623	542,9	555,5	97,52	102,23	0,166	0,163	370	0,27675
17,502	542,8	555,5	98,21	102,53	0,166	0,163	371	0,2748865
17,311	542,8	555,5	99,40	103,84	0,166	0,163	372	0,2718805
17,132	542,8	555,4	100,36	105,04	0,166	0,163	373	0,2690364
17,630	542,8	555,4	97,57	102,10	0,166	0,163	374	0,2769061
17,762	542,8	555,5	97,03	101,14	0,167	0,163	375	0,2789681
17,371	542,8	555,5	99,05	103,53	0,167	0,163	376	0,272854
17,452	542,8	555,4	98,60	102,98	0,167	0,163	377	0,2741396
17,528	542,8	555,4	98,25	102,69	0,167	0,163	378	0,2753114
17,815	542,8	555,4	96,40	100,81	0,166	0,163	379	0,2798859
17,452	542,8	555,4	98,62	103,01	0,166	0,163	380	0,2741374
17,497	542,8	555,4	98,37	102,81	0,167	0,163	381	0,2748877
17,841	542,8	555,4	96,43	100,70	0,167	0,163	382	0,2802538
17,472	542,8	555,4	98,42	102,78	0,167	0,163	383	0,2745155
17,497	542,8	555,4	98,11	102,69	0,166	0,163	384	0,2748902
17,496	542,8	555,4	98,31	102,57	0,166	0,163	385	0,2748877
18,434	542,8	555,4	93,35	97,49	0,167	0,163	386	0,2896286
17,674	542,8	555,4	97,25	101,52	0,167	0,163	387	0,277676
17,715	542,8	555,4	97,10	101,41	0,166	0,163	388	0,278325
17,363	542,8	555,4	98,89	103,35	0,166	0,163	389	0,272826
17,670	542,8	555,4	97,22	101,70	0,166	0,163	390	0,2776769
17,882	542,7	555,4	96,13	100,45	0,166	0,163	391	0,2809785
17,611	542,8	555,4	97,48	101,96	0,166	0,163	392	0,2767543
17,611	542,8	555,4	97,52	101,87	0,166	0,163	393	0,2767487
17,447	542,7	555,4	98,57	103,05	0,166	0,163	394	0,2741406
17,737	542,7	555,4	96,90	101,00	0,167	0,163	395	0,2787321
17,587	542,7	555,4	97,62	102,08	0,166	0,162	396	0,2763626
17,752	542,7	555,4	96,66	101,18	0,166	0,163	397	0,2789645
17,773	542,7	555,3	96,56	100,96	0,166	0,163	398	0,2793357
17,443	542,7	555,3	98,54	103,04	0,166	0,163	399	0,2741398
17,795	542,7	555,4	96,56	100,93	0,167	0,163	400	0,2796719
17,687	542,7	555,4	97,07	101,38	0,166	0,163	401	0,2779975
17,948	542,7	555,4	95,73	100,12	0,166	0,163	402	0,2820825
17,770	542,7	555,4	96,68	101,03	0,166	0,163	403	0,2793209
17,854	542,7	555,4	96,20	100,46	0,166	0,163	404	0,2806231
17,363	542,7	555,4	98,88	103,54	0,166	0,163	405	0,2728683
17,971	542,7	555,4	95,70	99,85	0,166	0,163	406	0,2824472
17,568	542,7	555,3	97,77	102,13	0,167	0,163	407	0,2760892
17,470	542,7	555,3	98,34	102,71	0,166	0,163	408	0,2745819
17,853	542,7	555,3	96,21	100,44	0,166	0,163	409	0,2805949
17,443	542,7	555,3	98,48	102,96	0,166	0,163	410	0,2741403
17,149	542,7	555,3	99,97	104,55	0,166	0,163	411	0,2696074
17,553	542,7	555,2	97,78	102,22	0,166	0,163	412	0,2759141
17,174	542,7	555,2	100,18	104,61	0,167	0,163	413	0,2699878
17,605	542,7	555,3	97,76	102,01	0,167	0,163	414	0,2767508
17,546	542,6	555,2	97,94	102,17	0,167	0,163	415	0,2758213
17,546	542,6	555,2	97,90	102,23	0,167	0,163	416	0,2758221
17,413	542,6	555,2	98,81	103,00	0,167	0,163	417	0,2737232
18,209	542,6	555,2	94,27	98,28	0,167	0,162	418	0,2862553
17,524	542,7	555,2	98,19	102,51	0,167	0,163	419	0,2754467
18,021	542,7	555,2	95,19	99,48	0,167	0,163	420	0,2833015
17,438	542,7	555,2	98,58	103,11	0,166	0,163	421	0,2741431

17,885	542,7	555,2	96,12	100,17	0,167	0,163	422	0,2811686
17,274	542,6	555,2	99,44	103,94	0,167	0,163	423	0,2715712
17,883	542,6	555,2	95,93	100,08	0,166	0,163	424	0,2811672
17,253	542,6	555,2	99,48	103,70	0,166	0,162	425	0,2712461
17,621	542,6	555,2	97,38	101,64	0,166	0,162	426	0,2770771
17,686	542,6	555,2	96,87	101,48	0,166	0,163	427	0,2780525
17,518	542,6	555,2	97,91	102,39	0,166	0,163	428	0,2754465
17,770	542,6	555,2	96,78	100,75	0,167	0,163	429	0,2793886
18,160	542,6	555,2	94,68	98,73	0,167	0,162	430	0,2855226
17,743	542,5	555,2	96,75	101,15	0,167	0,163	431	0,278962
17,460	542,6	555,2	98,39	102,62	0,166	0,163	432	0,2745136
17,233	542,6	555,2	99,64	104,19	0,167	0,163	433	0,2709364
17,202	542,6	555,2	99,70	104,25	0,166	0,163	434	0,2704987
17,660	542,6	555,2	97,11	101,51	0,166	0,163	435	0,2776745
17,541	542,6	555,2	97,80	102,12	0,166	0,163	436	0,2758208
17,255	542,6	555,2	99,49	104,07	0,166	0,163	437	0,2713174
17,516	542,5	555,2	98,06	102,29	0,167	0,163	438	0,2754152
17,535	542,5	555,2	97,92	102,38	0,167	0,163	439	0,2757475
17,374	542,6	555,2	98,81	103,12	0,167	0,163	440	0,2732005
17,659	542,6	555,2	97,20	101,56	0,166	0,163	441	0,2776755
17,517	542,6	555,2	97,86	102,47	0,166	0,163	442	0,2754451
17,518	542,6	555,2	98,01	102,44	0,166	0,163	443	0,2754471
17,740	542,6	555,1	96,73	101,13	0,166	0,163	444	0,2789672
17,461	542,6	555,1	98,30	102,66	0,166	0,163	445	0,2745821
17,655	542,5	555,2	97,18	101,71	0,166	0,163	446	0,2776447
17,372	542,5	555,2	98,78	103,27	0,166	0,163	447	0,2732008
17,433	542,6	555,2	98,29	102,84	0,166	0,163	448	0,2741402
17,432	542,6	555,2	98,38	103,05	0,166	0,163	449	0,2741398
17,348	542,6	555,1	98,95	103,33	0,166	0,163	450	0,272825
17,733	542,6	555,1	96,79	101,25	0,167	0,163	451	0,2788777
17,141	542,6	555,1	100,05	104,50	0,166	0,163	452	0,2696055
17,285	542,6	555,2	99,20	103,85	0,166	0,163	453	0,2718819
17,371	542,6	555,2	98,82	103,08	0,166	0,163	454	0,2732007
17,540	542,6	555,2	98,00	102,19	0,167	0,163	455	0,275826
17,345	542,6	555,2	98,81	103,03	0,167	0,162	456	0,2728236
18,199	542,5	555,2	94,47	98,57	0,167	0,163	457	0,2862375
17,819	542,5	555,2	96,47	100,61	0,167	0,163	458	0,2802538
17,652	542,5	555,2	97,18	101,49	0,167	0,163	459	0,2776802
17,656	542,5	555,2	97,34	101,64	0,167	0,163	460	0,2776758
17,454	542,5	555,2	98,22	102,71	0,167	0,163	461	0,2745138
17,676	542,5	555,2	97,08	101,28	0,166	0,163	462	0,2780459
17,786	542,5	555,1	96,48	100,90	0,167	0,163	463	0,2797984
17,162	542,4	555,1	100,06	104,35	0,167	0,163	464	0,2699935
17,760	542,4	555,1	96,78	100,97	0,167	0,163	465	0,2793345
17,533	542,5	555,1	97,82	102,19	0,167	0,163	466	0,2758261
17,594	542,5	555,1	97,46	101,77	0,166	0,163	467	0,2767311
17,758	542,5	555,1	96,48	101,01	0,166	0,163	468	0,2793344
18,033	542,5	555,1	95,11	99,36	0,166	0,163	469	0,2837145
17,342	542,5	555,1	98,87	103,38	0,166	0,163	470	0,2728249
17,261	542,5	555,1	99,45	103,74	0,167	0,163	471	0,2715535
18,148	542,4	555,1	94,61	98,69	0,167	0,163	472	0,2855198
17,591	542,4	555,1	97,60	101,78	0,167	0,163	473	0,2767497
17,649	542,4	555,1	97,11	101,60	0,167	0,163	474	0,2776867
17,673	542,4	555,1	97,00	101,31	0,166	0,163	475	0,2780463
17,221	542,4	555,1	99,56	104,00	0,166	0,163	476	0,2709363
17,729	542,4	555,1	96,72	101,08	0,167	0,163	477	0,2789666
17,589	542,4	555,1	97,33	101,91	0,166	0,163	478	0,2767492
17,565	542,4	555,1	97,55	101,96	0,166	0,163	479	0,2763778
17,566	542,4	555,1	97,49	101,98	0,166	0,163	480	0,2763776
17,365	542,4	555,1	98,60	103,18	0,166	0,163	481	0,2732276
17,577	542,4	555,0	97,50	101,98	0,166	0,163	482	0,2765789

17,818	542,4	555,0	96,25	100,36	0,167	0,163	483	0,2803824
17,527	542,4	555,0	97,66	102,00	0,166	0,162	484	0,2758199
17,810	542,4	555,0	96,27	100,64	0,166	0,163	485	0,2802531
17,531	542,4	555,0	97,79	102,18	0,166	0,163	486	0,2758367
17,421	542,3	555,0	98,47	102,71	0,167	0,163	487	0,2741392
17,642	542,3	555,0	97,25	101,41	0,167	0,163	488	0,2776751
17,751	542,3	555,0	96,44	100,94	0,166	0,163	489	0,2793349
17,211	542,3	554,9	99,62	103,96	0,166	0,163	490	0,2708829
17,344	542,3	554,9	98,86	103,18	0,167	0,163	491	0,2729409
17,336	542,3	554,9	98,90	103,31	0,167	0,163	492	0,2728252
17,502	542,3	554,9	97,94	102,14	0,167	0,163	493	0,2754465

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	98,13	101,16	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
18,181	535,8	536,3			0,169	0,169	0	0,2686426
17,848	535,9	536,6	97,99	103,19	0,169	0,169	1	0,271304
17,854	536,0	537,0	97,44	102,63	0,169	0,169	2	0,2718888
17,844	536,0	537,5	97,59	102,56	0,169	0,169	3	0,2718201
17,547	536,1	538,0	99,13	104,13	0,169	0,169	4	0,2673009
18,050	536,1	538,5	96,64	101,18	0,169	0,168	5	0,2748769
17,599	536,4	539,1	99,24	103,95	0,169	0,168	6	0,2676848
18,182	536,6	539,7	96,17	100,65	0,169	0,168	7	0,2765088
17,527	536,7	540,3	99,91	104,44	0,169	0,168	8	0,2663463
18,300	536,8	540,9	95,94	100,41	0,169	0,168	9	0,2776679
17,750	536,8	541,5	99,02	103,30	0,169	0,168	10	0,2689748
17,862	536,8	542,0	98,58	103,02	0,169	0,168	11	0,2705473
17,718	536,8	542,5	99,52	103,69	0,169	0,168	12	0,268261
17,886	536,8	543,0	98,82	102,93	0,169	0,167	13	0,2706299
18,130	536,9	543,5	97,55	101,53	0,170	0,167	14	0,2741293
18,082	537,0	544,0	97,89	102,04	0,169	0,167	15	0,2731855
17,397	537,5	544,7	101,91	105,84	0,169	0,167	16	0,2626525
17,455	537,6	545,1	101,85	105,83	0,169	0,167	17	0,2632383
17,490	537,6	545,5	101,47	105,59	0,169	0,167	18	0,2636284
17,796	537,7	545,8	99,70	103,63	0,169	0,167	19	0,2682522
18,358	537,7	546,2	96,78	100,46	0,169	0,167	20	0,2767403
18,043	537,8	546,7	98,56	102,17	0,169	0,166	21	0,2718688
18,338	538,1	547,2	96,93	100,22	0,169	0,166	22	0,2763296
17,794	538,1	547,4	99,86	103,31	0,169	0,166	23	0,2682625
17,221	538,2	547,7	103,07	106,96	0,169	0,166	24	0,2593994
17,445	538,2	547,9	102,08	105,45	0,169	0,166	25	0,2626714
17,668	538,3	548,0	100,65	104,33	0,169	0,166	26	0,2659523
17,697	538,4	548,3	100,48	104,11	0,169	0,166	27	0,2663397
17,578	538,4	548,6	101,25	104,69	0,169	0,166	28	0,2646008
17,300	538,6	549,2	102,74	106,31	0,169	0,166	29	0,260497
17,903	538,7	549,4	99,30	102,67	0,169	0,166	30	0,2695998
17,088	538,8	549,7	104,19	107,64	0,169	0,166	31	0,2571227
18,042	538,9	550,0	98,57	101,55	0,169	0,165	32	0,2714713
17,522	539,1	550,2	101,46	104,65	0,169	0,165	33	0,2636294
17,685	539,1	550,3	100,67	103,87	0,169	0,165	34	0,2659554
17,023	539,1	550,4	104,57	107,82	0,169	0,165	35	0,2561242
17,749	539,2	550,6	100,22	103,49	0,169	0,165	36	0,2671018
17,538	539,3	550,9	101,26	104,58	0,169	0,165	37	0,2640199
17,608	539,4	551,1	100,89	104,17	0,169	0,165	38	0,2649918
17,488	539,5	551,5	101,52	104,58	0,169	0,165	39	0,2632408
17,780	539,6	551,5	100,08	102,81	0,169	0,165	40	0,2676948
17,479	539,6	551,7	101,64	104,51	0,169	0,165	41	0,2632378
17,971	539,7	551,8	98,80	101,81	0,169	0,165	42	0,2705495
17,994	539,7	552,0	98,64	101,72	0,169	0,165	43	0,2709203
17,536	539,8	552,0	101,15	104,22	0,169	0,165	44	0,2641137
17,592	539,8	552,3	100,91	103,84	0,169	0,165	45	0,2649909
18,278	539,9	552,4	96,85	99,97	0,169	0,165	46	0,2754413
17,396	540,0	552,6	101,77	104,80	0,168	0,165	47	0,2621493
17,952	540,0	552,6	98,65	101,52	0,169	0,165	48	0,2705522
17,566	540,1	552,8	100,84	103,65	0,169	0,164	49	0,2646065
17,414	540,1	552,9	101,82	104,80	0,168	0,164	50	0,2622664
17,717	540,2	552,8	99,93	102,47	0,169	0,164	51	0,2670077
17,486	540,3	552,9	101,02	104,47	0,168	0,164	52	0,2636325
17,256	540,4	553,2	102,27	105,52	0,168	0,165	53	0,2602996
17,798	540,4	553,4	99,03	102,07	0,168	0,165	54	0,2686496
17,584	540,6	553,7	100,42	103,32	0,168	0,164	55	0,2653915

18,305	540,7	553,9	96,29	99,11	0,168	0,164	56	0,2763733
17,528	540,8	553,9	100,66	103,76	0,168	0,165	57	0,2646068
18,240	540,8	554,0	96,44	99,44	0,168	0,165	58	0,27555
17,548	540,9	554,1	100,41	103,23	0,168	0,164	59	0,2650234
17,478	541,0	554,2	100,67	103,60	0,168	0,164	60	0,2640227
17,694	541,1	554,4	99,47	102,37	0,168	0,164	61	0,2673084
18,288	541,1	554,4	96,23	98,93	0,168	0,164	62	0,276375
17,777	541,2	554,5	98,96	101,83	0,168	0,164	63	0,2686378
17,412	541,3	554,7	100,74	103,74	0,168	0,164	64	0,2632454
17,643	541,5	555,1	99,43	102,09	0,168	0,164	65	0,266925
18,226	541,8	555,3	95,79	98,60	0,168	0,164	66	0,2759799
17,729	541,9	555,3	98,74	101,48	0,168	0,164	67	0,2682703
17,354	542,0	555,6	100,85	103,88	0,168	0,164	68	0,2626595
17,904	542,0	555,5	97,81	100,56	0,168	0,164	69	0,2710479
17,714	542,0	555,6	98,70	101,51	0,168	0,164	70	0,2682683
17,500	542,1	555,7	99,86	102,73	0,168	0,164	71	0,2649948
17,493	542,1	555,8	99,91	102,84	0,168	0,164	72	0,2650121
17,905	542,2	555,9	97,37	100,26	0,168	0,164	73	0,2714362
17,462	542,2	555,9	99,96	102,99	0,168	0,164	74	0,2646082
17,804	542,3	556,0	97,88	100,70	0,168	0,164	75	0,269986
17,543	542,4	556,1	99,41	102,00	0,168	0,164	76	0,2660063
17,753	542,5	556,2	98,19	100,90	0,168	0,164	77	0,2693179
17,141	542,6	556,4	101,50	104,23	0,168	0,164	78	0,2600505
17,796	542,6	556,5	97,80	100,46	0,168	0,163	79	0,2699872
17,793	542,6	556,6	97,70	100,37	0,168	0,163	80	0,2699878
17,279	542,7	556,7	100,55	103,48	0,168	0,164	81	0,2622689
17,634	542,8	556,8	98,67	101,34	0,168	0,164	82	0,2676964
17,429	542,8	556,8	99,50	102,64	0,168	0,164	83	0,2646108
18,050	542,9	556,9	96,16	98,94	0,168	0,164	84	0,2741359
17,750	543,0	557,0	97,68	100,52	0,168	0,164	85	0,2695637
17,198	543,0	557,1	100,76	103,72	0,168	0,164	86	0,261295
17,534	543,1	557,1	98,83	101,51	0,168	0,164	87	0,2664242
17,424	543,1	557,2	99,63	102,38	0,168	0,163	88	0,2646648
17,223	543,2	557,3	100,69	103,52	0,168	0,164	89	0,2616837
17,285	543,3	557,4	100,29	102,95	0,168	0,163	90	0,2626636
17,389	543,4	557,5	99,79	102,19	0,168	0,163	91	0,2642201
17,502	543,4	557,6	99,05	101,79	0,168	0,163	92	0,2659696
17,498	543,5	557,7	98,93	101,72	0,168	0,163	93	0,2659654
17,608	543,6	557,7	98,32	100,98	0,168	0,163	94	0,267698
18,098	543,8	557,9	95,69	98,19	0,168	0,163	95	0,2751789
17,430	543,9	558,0	99,24	101,87	0,168	0,163	96	0,2649979
17,843	543,9	558,1	96,97	99,47	0,168	0,163	97	0,2713175
17,942	544,0	558,3	96,36	99,03	0,168	0,163	98	0,2728229
18,021	544,0	558,3	96,09	98,41	0,168	0,163	99	0,274142
18,072	544,0	558,2	95,52	98,22	0,168	0,163	100	0,274891
17,839	544,1	558,3	96,98	99,50	0,168	0,163	101	0,2713188
18,017	544,1	558,3	96,04	98,50	0,168	0,163	102	0,2741001
17,639	544,2	558,3	98,06	100,58	0,168	0,163	103	0,2682744
18,020	544,2	558,3	95,95	98,56	0,168	0,163	104	0,2741438
17,662	544,2	558,2	97,92	100,66	0,168	0,163	105	0,2686558
17,383	544,3	558,3	99,46	101,97	0,168	0,163	106	0,2644177
17,683	544,4	558,4	97,76	100,33	0,168	0,163	107	0,2690224
17,597	544,5	558,4	98,22	100,85	0,168	0,163	108	0,2677005
17,357	544,5	558,4	99,45	102,19	0,168	0,163	109	0,2640403
17,747	544,5	558,4	97,33	100,00	0,167	0,163	110	0,2699876
17,594	544,4	558,4	98,13	100,81	0,168	0,163	111	0,267701
17,679	544,4	558,4	97,67	100,13	0,168	0,163	112	0,2690454
17,594	544,4	558,4	98,11	100,75	0,168	0,163	113	0,267779
18,014	544,5	558,5	95,90	98,44	0,168	0,163	114	0,2741444
17,923	544,5	558,4	96,29	98,96	0,168	0,163	115	0,2728307
17,958	544,5	558,6	96,10	98,62	0,168	0,163	116	0,2733725

18,010	544,7	558,9	95,70	98,14	0,167	0,163	117	0,274148
17,791	544,8	558,9	96,83	99,58	0,167	0,163	118	0,2709426
18,525	544,7	558,9	92,88	95,75	0,167	0,163	119	0,2820845
17,581	544,7	558,8	97,80	100,93	0,167	0,164	120	0,2676958
17,619	544,7	558,7	97,78	100,52	0,167	0,163	121	0,2682743
17,251	545,0	559,0	99,72	102,40	0,167	0,163	122	0,2626823
18,017	545,2	559,1	95,56	98,18	0,167	0,163	123	0,2744238
18,168	545,3	559,2	94,77	97,34	0,167	0,163	124	0,2767533
17,372	545,3	559,2	99,11	101,75	0,167	0,163	125	0,2646149
17,998	545,3	559,2	95,57	98,30	0,167	0,163	126	0,2741446
17,515	545,2	559,1	98,07	100,70	0,167	0,163	127	0,2668778
18,022	545,2	559,1	95,37	97,95	0,167	0,163	128	0,2745165
17,483	545,7	559,3	98,18	101,06	0,167	0,163	129	0,2663562
17,619	545,9	559,4	97,43	100,27	0,167	0,163	130	0,26841
18,247	545,9	559,3	94,14	96,80	0,167	0,163	131	0,2780516
18,101	545,7	559,2	94,83	97,55	0,167	0,163	132	0,2758288
18,387	545,5	559,1	93,25	96,05	0,167	0,163	133	0,28026
17,774	545,2	558,9	96,60	99,47	0,167	0,163	134	0,2709176
17,595	545,0	558,7	97,61	100,66	0,167	0,164	135	0,2682761
17,712	544,9	558,6	97,08	99,85	0,167	0,164	136	0,2699937
18,242	544,8	558,5	94,30	96,97	0,167	0,163	137	0,2780522
17,692	544,9	558,6	97,17	99,86	0,167	0,163	138	0,2696135
17,808	545,3	558,8	96,67	99,21	0,167	0,163	139	0,2713275
17,513	545,6	558,9	98,25	100,81	0,167	0,163	140	0,2669314
18,302	545,4	558,7	93,85	96,39	0,167	0,163	141	0,2789639
17,601	545,3	558,6	97,69	100,50	0,167	0,163	142	0,2682754
17,774	545,2	558,6	96,64	99,40	0,167	0,163	143	0,2709419
17,790	545,0	558,4	96,64	99,39	0,167	0,163	144	0,2711511
18,426	544,9	558,2	93,34	95,92	0,167	0,163	145	0,2808792
18,125	544,8	558,2	94,71	97,57	0,167	0,163	146	0,2763841
17,650	544,8	558,2	97,39	100,15	0,167	0,163	147	0,2690411
17,649	544,8	558,2	97,45	100,18	0,167	0,163	148	0,2690413
17,980	545,0	558,3	95,49	98,05	0,167	0,163	149	0,2741757
17,532	545,3	558,5	97,95	100,77	0,167	0,163	150	0,2673155
18,142	545,8	558,7	94,55	97,42	0,167	0,163	151	0,2766341
17,975	545,8	558,7	95,34	98,38	0,167	0,163	152	0,2741451
17,619	546,1	558,8	97,19	100,30	0,167	0,163	153	0,2686598
17,314	545,9	558,6	99,18	101,85	0,167	0,163	154	0,2640321
18,339	545,8	558,7	93,52	96,54	0,167	0,163	155	0,2796557
18,224	545,7	558,5	93,98	96,91	0,167	0,164	156	0,2779792
17,531	545,7	558,6	97,98	100,75	0,167	0,163	157	0,2673178
17,982	545,6	558,6	95,30	98,27	0,167	0,163	158	0,274183
17,767	545,5	558,5	96,63	99,36	0,167	0,163	159	0,270934
18,447	545,3	558,3	93,19	95,76	0,167	0,163	160	0,2813777
18,491	545,1	558,2	92,80	95,43	0,168	0,163	161	0,2820854
17,503	545,0	558,1	98,07	100,96	0,167	0,163	162	0,2669332
17,466	544,9	558,0	98,18	101,28	0,167	0,163	163	0,2663491
17,741	544,9	558,0	96,81	99,54	0,167	0,163	164	0,2705634
17,756	544,8	557,9	96,63	99,54	0,167	0,163	165	0,2708165
17,248	544,7	557,9	99,63	102,29	0,167	0,163	166	0,2630999
17,371	544,8	558,0	98,90	101,72	0,168	0,163	167	0,2650041
17,760	544,9	558,0	96,74	99,53	0,168	0,163	168	0,2709433
17,786	544,8	557,9	96,61	99,23	0,168	0,163	169	0,2713205
17,611	544,7	557,8	97,34	100,38	0,167	0,163	170	0,26863
17,346	544,6	557,7	99,09	102,14	0,167	0,164	171	0,2646151
17,691	544,7	557,7	96,95	99,73	0,168	0,164	172	0,2699942
18,217	544,6	557,7	94,12	96,97	0,167	0,163	173	0,2779982
17,453	544,6	557,6	98,23	101,02	0,167	0,163	174	0,2663561
18,449	544,6	557,6	92,99	95,73	0,167	0,163	175	0,2815397
17,305	544,6	557,5	99,08	102,02	0,167	0,163	176	0,2640315
17,738	544,6	557,5	96,68	99,71	0,167	0,164	177	0,2706959

18,158	544,6	557,5	94,49	97,34	0,167	0,164	178	0,2771236
17,901	544,6	557,6	95,74	98,69	0,167	0,164	179	0,2732055

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	99,38	100,92	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
17,300	528,9	529,8			0,173	0,173	0	0,2632227
17,372	528,9	530,1	98,60	102,30	0,173	0,172	1	0,2712938
17,012	529,0	530,6	100,39	104,21	0,173	0,172	2	0,2659401
16,858	529,1	531,1	101,46	105,08	0,173	0,172	3	0,2635109
16,794	529,1	531,6	101,91	105,58	0,173	0,172	4	0,2625143
16,963	529,2	532,1	99,99	103,62	0,173	0,172	5	0,2663235
16,830	529,4	532,9	100,64	104,00	0,173	0,172	6	0,2645844
16,636	529,7	533,6	101,41	104,96	0,173	0,172	7	0,2616584
16,898	529,8	534,1	99,77	103,06	0,173	0,172	8	0,2660036
17,449	530,0	534,8	96,61	99,63	0,173	0,171	9	0,2748615
17,262	530,2	535,2	97,59	100,40	0,173	0,171	10	0,2718578
17,135	530,2	535,6	98,31	101,43	0,173	0,171	11	0,2699631
16,794	530,2	536,0	100,39	103,17	0,173	0,171	12	0,2645862
16,784	530,3	536,7	100,03	103,07	0,173	0,171	13	0,2645851
16,811	530,3	536,9	100,05	102,99	0,173	0,171	14	0,2649731
16,989	530,3	537,4	99,02	101,73	0,173	0,171	15	0,2678196
17,678	530,4	537,9	94,84	97,56	0,173	0,171	16	0,2789412
17,368	530,5	538,3	96,75	99,16	0,173	0,170	17	0,2739871
17,198	530,5	538,6	97,66	100,25	0,173	0,170	18	0,2712896
17,574	530,5	538,8	95,64	97,82	0,173	0,170	19	0,277357
16,679	530,5	539,0	100,48	102,95	0,173	0,170	20	0,2632235
17,528	530,5	539,4	95,56	97,89	0,173	0,170	21	0,2767263
16,720	530,6	539,8	100,08	102,61	0,173	0,170	22	0,2640039
17,001	530,6	540,1	98,36	100,80	0,173	0,170	23	0,2685985
17,651	530,6	540,5	94,68	96,73	0,173	0,170	24	0,2789425
17,531	530,7	540,9	95,46	97,39	0,173	0,169	25	0,2770905
17,146	530,8	541,2	97,53	99,60	0,173	0,169	26	0,2709148
16,725	530,8	541,4	100,22	102,22	0,173	0,169	27	0,2640005
17,001	530,9	541,7	98,54	100,63	0,173	0,169	28	0,2682465
17,053	531,1	542,0	98,38	100,49	0,173	0,169	29	0,2690101
17,176	531,1	542,2	97,70	99,49	0,173	0,169	30	0,2709067
16,780	531,1	542,2	100,00	102,00	0,173	0,169	31	0,2645864
16,897	531,0	542,4	99,28	101,35	0,173	0,169	32	0,266324
17,090	531,0	542,5	98,45	100,38	0,173	0,169	33	0,2692638
17,025	531,0	542,6	98,89	100,49	0,173	0,169	34	0,2682439
17,137	530,9	542,7	98,02	100,01	0,173	0,169	35	0,2699628
17,001	530,9	542,9	98,94	100,83	0,173	0,169	36	0,2677309
16,977	531,0	543,0	99,35	101,06	0,173	0,169	37	0,2671319
16,931	531,0	543,1	99,68	101,48	0,173	0,169	38	0,2663135
17,458	530,9	543,1	96,79	98,42	0,173	0,169	39	0,2744878
16,692	530,9	543,1	101,27	102,88	0,173	0,169	40	0,2622465
17,120	531,0	543,6	98,60	100,40	0,173	0,169	41	0,2690087
16,765	531,1	543,8	100,95	102,67	0,173	0,169	42	0,2631894
17,184	531,1	543,8	98,75	100,39	0,173	0,169	43	0,2695806
17,101	531,0	543,8	99,30	100,66	0,173	0,169	44	0,268244
16,998	531,0	543,9	99,98	101,56	0,173	0,168	45	0,266364
17,488	530,9	543,8	97,13	98,77	0,173	0,169	46	0,2741151
17,357	530,9	543,8	98,07	99,69	0,173	0,169	47	0,2718554
17,183	530,9	544,0	99,01	100,49	0,173	0,168	48	0,2690088
17,156	531,0	544,3	99,35	100,80	0,173	0,168	49	0,2684622
16,665	531,0	544,5	102,44	103,88	0,173	0,168	50	0,2607366
16,767	531,1	544,5	101,71	103,38	0,173	0,168	51	0,2622365
16,707	531,2	544,6	102,18	103,70	0,173	0,168	52	0,2612643
17,673	531,3	544,8	96,65	97,95	0,173	0,168	53	0,276314
16,930	531,4	545,0	100,84	102,48	0,173	0,168	54	0,2645825
16,720	531,5	545,2	101,99	103,51	0,172	0,168	55	0,2612667

16,804	531,6	545,3	101,51	103,10	0,172	0,168	56	0,2626353
16,807	531,6	545,4	101,73	103,00	0,173	0,168	57	0,2626338
17,034	531,6	545,3	100,24	101,76	0,173	0,168	58	0,2661328
17,022	531,6	545,3	101,10	102,02	0,173	0,168	59	0,2659727
17,397	531,7	545,4	98,08	99,45	0,173	0,168	60	0,2718559
17,136	531,8	545,5	99,52	100,98	0,172	0,168	61	0,2676707
17,194	531,9	545,7	99,31	100,56	0,172	0,168	62	0,2686316
17,036	531,9	545,6	100,40	101,56	0,173	0,168	63	0,2659393
16,669	531,8	545,6	102,34	104,20	0,172	0,168	64	0,2602863
16,941	531,7	545,5	100,96	102,67	0,172	0,168	65	0,2645862
16,782	531,7	545,5	101,79	103,48	0,173	0,168	66	0,2620296
16,602	531,7	545,5	103,22	104,61	0,173	0,168	67	0,2591596
16,947	531,7	545,5	100,92	102,53	0,173	0,168	68	0,2645921
17,235	531,8	545,6	99,36	100,74	0,173	0,168	69	0,2690105
17,033	531,7	545,6	100,44	101,88	0,173	0,168	70	0,2658393
16,475	531,7	545,5	103,94	105,49	0,173	0,168	71	0,2571094
17,123	531,6	545,4	99,92	101,44	0,173	0,168	72	0,2672866
16,946	531,7	545,5	100,86	102,17	0,173	0,168	73	0,2645848
17,038	531,7	545,6	100,36	101,95	0,172	0,168	74	0,2659424
17,102	531,8	545,7	99,75	101,25	0,172	0,168	75	0,2669825
17,696	531,9	545,9	96,63	98,25	0,172	0,168	76	0,2763533
16,646	531,9	546,0	102,66	104,14	0,173	0,168	77	0,259888
17,701	531,9	545,9	96,61	98,00	0,173	0,168	78	0,2763545
17,186	531,9	545,9	99,25	100,83	0,172	0,168	79	0,2683696
16,670	532,0	546,1	102,52	103,94	0,172	0,168	80	0,2602826
16,884	532,1	546,0	101,22	102,57	0,172	0,168	81	0,2636153
16,974	532,2	546,2	100,89	102,03	0,173	0,168	82	0,2649742
17,058	532,2	546,4	100,19	101,70	0,173	0,168	83	0,2663287
16,890	532,3	546,5	101,25	102,51	0,172	0,168	84	0,2636023
16,668	532,4	546,5	102,28	103,99	0,172	0,168	85	0,2602822
16,738	532,5	546,7	102,03	103,58	0,172	0,168	86	0,2612693
16,755	532,6	546,7	101,77	103,24	0,172	0,168	87	0,2616028
17,409	532,6	546,7	98,10	99,52	0,172	0,168	88	0,2718094
16,496	532,7	546,9	103,47	104,91	0,172	0,168	89	0,2575157
16,800	532,6	546,7	101,52	102,92	0,172	0,168	90	0,2623509
16,855	532,6	546,8	101,45	102,75	0,172	0,168	91	0,2632276
16,929	532,7	546,7	100,78	102,10	0,173	0,168	92	0,2645866
16,847	532,7	546,8	101,19	102,80	0,172	0,168	93	0,263227
17,105	532,8	547,0	99,61	101,09	0,172	0,168	94	0,2672899
16,630	532,9	547,1	102,56	104,12	0,172	0,168	95	0,2598915
16,862	533,0	547,3	101,10	102,44	0,172	0,168	96	0,2636169
16,628	533,0	547,5	102,38	103,63	0,172	0,168	97	0,2598926
17,156	533,0	547,3	99,28	100,65	0,172	0,168	98	0,2681877
17,670	532,8	547,0	96,38	97,95	0,172	0,168	99	0,2763573
16,731	532,7	546,8	101,70	103,28	0,172	0,168	100	0,2616647
16,581	532,6	546,8	102,66	104,00	0,172	0,168	101	0,2593002
16,589	532,6	546,8	102,65	103,91	0,172	0,168	102	0,2595235
17,142	532,6	546,8	99,44	100,48	0,173	0,168	103	0,2682302
16,635	532,5	546,7	102,32	103,77	0,173	0,168	104	0,2602892
17,307	532,6	546,8	98,40	99,53	0,173	0,168	105	0,270916
16,905	532,7	547,1	100,60	101,98	0,173	0,168	106	0,2645859
17,534	532,8	547,3	96,95	98,48	0,173	0,168	107	0,2745635
17,178	532,8	547,2	98,76	100,16	0,172	0,168	108	0,2690164
17,364	532,9	547,4	97,79	99,16	0,172	0,168	109	0,2718638
16,980	533,1	547,7	99,98	101,25	0,172	0,168	110	0,2659453
17,676	533,2	547,8	95,98	97,13	0,172	0,168	111	0,2769728
17,654	533,3	547,7	95,87	97,19	0,172	0,168	112	0,2767287
17,139	533,4	547,9	98,76	100,20	0,172	0,168	113	0,2686351
17,223	533,4	548,0	98,38	99,42	0,172	0,167	114	0,2699694
16,722	533,4	548,0	101,17	102,56	0,172	0,167	115	0,2622678
16,633	533,3	547,7	101,85	103,14	0,172	0,168	116	0,2608776

17,326	533,2	547,7	97,45	98,92	0,172	0,168	117	0,2718625
17,141	533,1	547,6	98,41	100,01	0,172	0,168	118	0,2690176
16,997	533,1	547,6	99,29	100,55	0,172	0,168	119	0,2669033
16,956	533,2	547,9	99,48	100,87	0,172	0,168	120	0,2663301
16,780	533,3	548,3	100,50	101,72	0,172	0,168	121	0,2636191
17,357	533,4	548,5	96,99	98,26	0,172	0,167	122	0,2728071
16,481	533,6	548,6	102,09	103,16	0,172	0,167	123	0,2589846
16,538	533,6	548,7	101,80	103,22	0,172	0,167	124	0,2598937
17,176	533,6	548,6	97,92	99,32	0,172	0,168	125	0,2700092
16,999	533,7	548,6	98,84	100,19	0,172	0,167	126	0,267322
17,539	533,6	548,6	95,95	97,34	0,172	0,168	127	0,2757267
17,176	533,6	548,5	97,95	99,20	0,172	0,168	128	0,2699932
17,230	533,7	548,6	97,54	98,96	0,172	0,167	129	0,2709183
17,088	533,8	548,7	98,34	99,79	0,172	0,168	130	0,2686751
16,783	533,8	548,6	100,11	101,32	0,172	0,167	131	0,2640077
17,507	533,7	548,5	95,81	97,45	0,172	0,168	132	0,2754298
16,725	533,7	548,6	100,36	101,76	0,172	0,168	133	0,2632306
16,878	533,8	548,7	99,51	100,95	0,172	0,168	134	0,2656615
16,813	533,7	548,6	99,97	101,14	0,172	0,168	135	0,2645721
16,779	533,7	548,6	100,19	101,32	0,172	0,167	136	0,2640046
17,434	533,7	548,5	96,27	97,67	0,172	0,167	137	0,2742985
17,053	533,6	548,4	98,55	99,91	0,172	0,168	138	0,2682549
17,837	533,6	548,2	94,12	95,33	0,172	0,167	139	0,2805975
17,218	533,5	548,1	97,61	98,85	0,172	0,167	140	0,2709165
16,901	533,6	548,3	99,36	100,69	0,172	0,167	141	0,2659469
17,524	533,7	548,5	95,94	97,27	0,172	0,168	142	0,275696
17,161	533,6	548,6	97,96	99,35	0,172	0,168	143	0,269956
16,666	533,6	548,6	100,70	102,00	0,172	0,168	144	0,2622524
16,892	533,7	548,7	99,45	100,85	0,172	0,167	145	0,2657456
17,442	533,6	548,5	96,40	97,72	0,172	0,168	146	0,2744085
16,609	533,6	548,4	101,24	102,57	0,172	0,168	147	0,2612728
16,995	533,7	548,4	99,07	100,45	0,172	0,168	148	0,2672949
16,851	533,8	548,5	99,80	101,30	0,172	0,168	149	0,2649785
16,739	533,9	548,6	100,30	101,72	0,172	0,168	150	0,2633078
17,431	533,9	548,6	96,46	97,98	0,172	0,168	151	0,2741157
17,261	533,9	548,6	97,61	98,78	0,172	0,168	152	0,2713847
16,862	533,9	548,5	99,79	101,29	0,172	0,168	153	0,26505
16,643	533,9	548,4	100,90	102,47	0,172	0,168	154	0,2616256
16,053	534,0	548,5	104,90	106,56	0,172	0,168	155	0,2522817
17,119	534,0	548,4	98,34	99,49	0,172	0,168	156	0,2690174
17,355	534,0	548,4	96,91	98,42	0,172	0,167	157	0,2728077
16,942	534,1	548,5	99,51	100,86	0,172	0,168	158	0,2661637
17,036	534,1	548,6	98,74	100,37	0,172	0,168	159	0,2676779
16,627	534,1	548,6	101,28	102,68	0,172	0,168	160	0,2612724
17,094	534,0	548,5	98,54	99,96	0,172	0,168	161	0,2686365
17,034	534,1	548,6	98,87	100,28	0,172	0,168	162	0,2676646
16,864	534,1	548,6	100,05	101,23	0,172	0,168	163	0,2649802
16,990	534,1	548,7	99,25	100,55	0,172	0,168	164	0,2669104
16,655	534,1	548,8	101,10	102,39	0,172	0,167	165	0,2616669
16,955	534,1	548,8	99,35	100,77	0,172	0,167	166	0,2663309
16,697	534,1	548,7	100,94	102,63	0,172	0,168	167	0,2622558
17,105	534,0	548,5	98,46	99,73	0,172	0,168	168	0,26869
17,370	534,1	548,8	97,02	98,19	0,172	0,167	169	0,2728719
16,992	534,3	549,0	99,09	100,30	0,172	0,167	170	0,2669062
16,957	534,3	549,1	99,31	100,48	0,172	0,167	171	0,2663276
16,857	534,3	549,1	99,82	101,24	0,172	0,167	172	0,2647386
17,166	534,2	548,8	98,06	99,48	0,172	0,167	173	0,2695781
17,048	534,2	548,7	98,69	100,01	0,172	0,167	174	0,267679
16,959	534,4	549,1	99,31	100,75	0,172	0,167	175	0,2663274
16,938	534,5	549,0	99,29	100,48	0,172	0,167	176	0,2659509
17,197	534,5	548,9	97,94	98,99	0,172	0,167	177	0,2699944

17,652	534,6	549,1	95,41	96,61	0,172	0,167	178	0,2771035
17,087	534,6	549,1	98,56	99,98	0,172	0,167	179	0,2682558
16,760	534,7	549,1	100,55	101,95	0,172	0,167	180	0,2630559
17,280	534,7	549,1	97,56	98,83	0,172	0,167	181	0,2712119
17,007	534,7	549,1	99,19	100,35	0,172	0,167	182	0,2669136
17,095	534,7	549,3	98,53	99,87	0,172	0,167	183	0,2682543
16,650	534,8	549,2	101,01	102,59	0,172	0,167	184	0,2613177
17,240	534,8	549,2	97,78	99,33	0,172	0,167	185	0,2705393
16,469	534,8	549,2	102,36	103,80	0,172	0,168	186	0,2585115
17,492	534,8	549,2	96,19	97,55	0,172	0,167	187	0,274499
17,896	534,7	549,1	94,21	95,38	0,172	0,167	188	0,2808538
16,827	534,7	549,3	100,17	101,62	0,172	0,167	189	0,2640118
16,976	534,8	549,3	99,32	100,73	0,172	0,167	190	0,2663367
17,144	534,8	549,4	98,32	99,61	0,172	0,167	191	0,2690188
16,915	534,8	549,3	99,77	101,26	0,172	0,167	192	0,2654023
17,037	534,8	549,4	99,05	100,29	0,172	0,167	193	0,2672963
16,975	534,8	549,4	99,39	100,85	0,172	0,167	194	0,266336
17,613	534,9	549,5	95,74	97,08	0,172	0,167	195	0,276362
16,715	534,9	549,6	101,00	102,07	0,172	0,167	196	0,2622568
16,864	534,9	549,7	100,05	101,12	0,172	0,167	197	0,2645958
17,036	534,9	549,7	98,99	100,17	0,172	0,167	198	0,2672974
16,913	534,8	549,6	99,61	101,17	0,172	0,167	199	0,2653716
17,147	534,7	549,5	98,44	99,62	0,172	0,167	200	0,2690207
16,954	534,5	549,3	99,58	100,95	0,172	0,167	201	0,2659502
17,476	534,5	549,4	96,59	97,99	0,172	0,167	202	0,2741248
17,553	534,5	549,5	96,35	97,47	0,172	0,167	203	0,2753747
17,184	534,5	549,5	98,29	99,52	0,172	0,167	204	0,2695923
16,630	534,6	549,5	101,60	102,72	0,172	0,167	205	0,2608833
17,148	534,6	549,4	98,16	99,78	0,172	0,167	206	0,269021
17,211	534,6	549,4	98,12	99,50	0,172	0,167	207	0,2699751
17,328	534,6	549,3	97,53	98,68	0,172	0,167	208	0,2718655
16,721	534,6	549,4	101,18	102,42	0,172	0,167	209	0,2623034
16,984	534,6	549,3	99,31	100,56	0,172	0,167	210	0,2664629
17,060	534,6	549,3	98,71	100,30	0,172	0,167	211	0,2676813
17,037	534,6	549,2	99,04	100,45	0,172	0,167	212	0,2672984
17,389	534,6	549,4	97,13	98,25	0,172	0,167	213	0,2728112
17,103	534,6	549,4	98,72	100,09	0,172	0,167	214	0,2682567
17,293	534,5	549,4	97,62	98,85	0,172	0,167	215	0,2712876
16,830	534,5	549,4	100,26	101,59	0,172	0,167	216	0,2640127
16,668	534,4	549,3	101,13	102,70	0,172	0,167	217	0,2613784
16,654	534,4	549,3	101,56	102,78	0,172	0,167	218	0,2611876
17,561	534,3	549,3	96,29	97,56	0,172	0,167	219	0,2754313
16,963	534,3	549,3	99,77	100,94	0,172	0,167	220	0,2659503
17,234	534,1	549,0	98,08	99,39	0,172	0,167	221	0,2702048
17,282	534,2	549,0	97,83	99,29	0,172	0,167	222	0,270927
17,076	534,2	549,0	98,99	100,39	0,172	0,168	223	0,2676814
17,220	534,2	548,9	98,20	99,47	0,172	0,167	224	0,2699736
16,986	534,2	549,0	99,57	100,92	0,172	0,167	225	0,266213
17,141	534,2	549,1	98,67	99,98	0,172	0,167	226	0,2685955
17,053	534,2	549,1	99,33	100,56	0,172	0,167	227	0,2672986
17,117	534,2	549,1	98,87	100,09	0,172	0,167	228	0,2682567
17,653	534,2	549,1	95,74	97,03	0,172	0,167	229	0,276701
16,795	534,4	549,4	100,73	101,83	0,172	0,167	230	0,2632337
16,877	534,3	549,4	100,00	101,60	0,172	0,167	231	0,2645957
17,114	534,3	549,2	98,74	100,20	0,172	0,168	232	0,2682711
17,216	534,2	549,1	98,19	99,48	0,172	0,167	233	0,2698535
16,799	534,3	549,2	100,66	101,79	0,172	0,167	234	0,26323
17,172	534,3	549,1	98,30	99,78	0,172	0,167	235	0,2691455
16,885	534,3	549,2	100,27	101,19	0,172	0,167	236	0,264596
17,142	534,2	549,0	98,71	100,16	0,172	0,167	237	0,2686299
17,146	534,2	549,0	98,72	100,14	0,172	0,168	238	0,26864

17,333	534,3	549,1	97,74	98,96	0,172	0,167	239	0,2715624
17,211	534,3	549,0	98,22	99,69	0,172	0,167	240	0,269705
17,121	534,2	549,0	98,94	100,12	0,172	0,167	241	0,2682569
17,289	534,3	549,1	97,79	99,25	0,172	0,167	242	0,2709232
16,886	534,3	549,2	100,14	101,43	0,172	0,167	243	0,2646061
16,973	534,3	549,1	99,71	101,01	0,172	0,167	244	0,2659582
16,373	534,1	549,0	103,34	104,65	0,172	0,167	245	0,2565204
16,614	534,1	549,0	102,02	103,23	0,172	0,167	246	0,2602928
16,594	534,1	548,9	102,04	103,38	0,172	0,167	247	0,2599654
16,827	534,0	548,8	100,69	102,06	0,172	0,167	248	0,263625
17,414	533,9	548,6	97,25	98,56	0,172	0,168	249	0,2728096
16,770	534,0	548,7	100,87	102,38	0,172	0,167	250	0,2627336
17,233	534,1	548,9	98,18	99,60	0,172	0,167	251	0,2699759
16,998	534,1	548,9	99,48	100,84	0,172	0,167	252	0,2663362
16,615	534,2	549,0	101,83	103,20	0,172	0,167	253	0,2602952
16,911	534,3	549,2	100,17	101,34	0,172	0,167	254	0,2649785
17,085	534,2	548,9	99,09	100,44	0,172	0,167	255	0,267647
17,152	534,1	548,6	98,84	100,33	0,172	0,168	256	0,2686389
17,129	534,0	548,5	99,06	100,42	0,172	0,168	257	0,2682572
17,238	534,0	548,6	98,47	99,55	0,172	0,167	258	0,2699731
17,181	534,0	548,6	98,41	100,00	0,172	0,167	259	0,2690461
17,072	534,0	548,6	99,34	100,77	0,172	0,168	260	0,2672987
16,925	534,0	548,6	100,09	101,68	0,172	0,168	261	0,2649837
16,857	534,0	548,6	100,62	102,02	0,172	0,168	262	0,2638994
16,925	534,1	548,7	100,05	101,77	0,172	0,168	263	0,2649841
16,751	534,2	548,9	101,32	102,72	0,172	0,168	264	0,2622593
17,158	534,3	548,9	98,57	100,11	0,172	0,168	265	0,2686396
16,782	534,3	548,9	101,00	102,25	0,172	0,167	266	0,2627025
17,049	534,4	549,1	99,42	100,71	0,172	0,167	267	0,2669133
16,605	534,5	549,1	102,10	103,30	0,172	0,167	268	0,2598981
17,368	534,4	548,8	97,55	98,88	0,172	0,167	269	0,2718528
17,106	534,4	548,9	99,11	100,47	0,172	0,167	270	0,2677371
16,925	534,5	549,0	100,14	101,69	0,172	0,168	271	0,2649858
17,052	534,5	549,1	99,16	100,74	0,172	0,167	272	0,2669151
16,992	534,4	548,9	99,76	101,10	0,172	0,167	273	0,2659505
16,363	534,4	549,0	103,59	104,68	0,172	0,167	274	0,2561193
16,683	534,4	549,1	101,61	102,87	0,172	0,167	275	0,2611648
16,515	534,4	549,1	102,64	104,08	0,172	0,167	276	0,2585126
17,130	534,2	548,8	98,91	100,26	0,172	0,167	277	0,2681939
16,988	534,2	548,9	99,64	101,06	0,172	0,167	278	0,2659518
17,155	534,2	548,8	99,00	100,12	0,172	0,167	279	0,2686408

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	98,40	100,70	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
17,889	534,6	535,8			0,171	0,170	0	0,2703599
17,897	534,7	536,2	97,43	101,32	0,171	0,170	1	0,2776614
16,871	534,7	536,6	102,73	107,11	0,171	0,170	2	0,2622854
17,496	534,9	537,1	99,17	103,36	0,171	0,170	3	0,2720971
17,213	535,1	537,7	100,79	104,71	0,171	0,170	4	0,2676979
17,786	535,3	538,3	96,69	100,62	0,171	0,170	5	0,2776608
17,578	535,4	538,9	97,38	101,18	0,171	0,170	6	0,2748743
17,530	535,4	539,4	97,93	101,69	0,171	0,170	7	0,2741254
17,730	535,5	539,8	96,54	100,03	0,171	0,170	8	0,2774551
17,561	535,5	540,3	97,52	101,17	0,171	0,170	9	0,2747931
17,553	535,9	540,9	97,38	100,79	0,171	0,169	10	0,274871
17,222	536,3	541,6	99,31	102,77	0,171	0,169	11	0,2695937
17,161	536,5	542,2	99,50	103,10	0,171	0,169	12	0,2685919
16,902	536,5	542,5	100,92	104,55	0,171	0,169	13	0,2645967
16,895	536,4	542,9	101,08	104,37	0,171	0,169	14	0,2645964
17,744	536,4	543,2	96,24	99,40	0,171	0,169	15	0,2779017
17,723	536,4	543,5	96,35	99,35	0,171	0,169	16	0,2775925
17,436	536,4	543,8	97,77	100,85	0,171	0,168	17	0,2731847
17,289	536,4	544,2	98,76	101,67	0,171	0,168	18	0,2709231
17,494	536,5	544,4	97,39	100,40	0,171	0,168	19	0,2741254
17,059	536,6	544,7	99,92	103,07	0,171	0,168	20	0,2672976
17,228	536,8	545,1	99,06	102,15	0,171	0,169	21	0,2699733
17,498	536,9	545,4	97,47	100,27	0,171	0,168	22	0,2741263
17,498	536,9	545,6	97,30	100,30	0,171	0,168	23	0,274188
17,144	536,9	545,8	99,27	102,32	0,171	0,168	24	0,2686968
17,409	536,8	546,1	97,77	100,73	0,171	0,168	25	0,2728152
16,731	536,9	546,3	101,87	104,52	0,171	0,168	26	0,2622594
17,535	536,9	546,5	97,28	99,74	0,171	0,168	27	0,2748732
17,681	537,0	546,8	96,39	98,96	0,171	0,168	28	0,2772527
17,629	537,1	547,0	96,58	98,97	0,171	0,168	29	0,276329
16,988	537,1	547,2	100,18	102,91	0,171	0,167	30	0,2663347
16,837	537,2	547,4	100,93	103,61	0,171	0,168	31	0,264012
17,648	537,4	547,6	96,39	99,06	0,171	0,168	32	0,2767359
17,646	537,4	547,7	96,39	98,83	0,171	0,168	33	0,2767361
17,216	537,5	547,9	98,93	101,38	0,171	0,167	34	0,2699737
17,305	537,5	548,1	98,23	100,86	0,171	0,167	35	0,2713941
17,020	537,6	548,2	99,89	102,60	0,171	0,168	36	0,2669137
17,583	537,7	548,3	96,80	99,08	0,171	0,167	37	0,2758051
17,501	537,8	548,3	97,13	99,54	0,171	0,167	38	0,2745006
17,503	537,8	548,4	96,98	99,60	0,171	0,167	39	0,2745011
17,627	537,9	548,6	96,40	98,82	0,171	0,167	40	0,2765299
17,150	538,0	548,9	98,90	101,45	0,171	0,167	41	0,2690242
17,332	538,0	548,9	98,14	100,59	0,171	0,167	42	0,2718697
17,134	538,1	549,0	99,12	101,63	0,171	0,167	43	0,2686456
17,511	538,1	549,1	97,06	99,27	0,171	0,167	44	0,2747056
17,865	538,0	549,0	95,04	97,61	0,171	0,167	45	0,2802384
16,954	538,1	549,2	100,28	102,67	0,171	0,167	46	0,2659507
17,110	538,4	549,5	99,26	101,55	0,171	0,167	47	0,2684154
17,814	538,6	549,6	95,28	97,82	0,171	0,167	48	0,2793215
17,479	538,7	549,6	97,00	99,77	0,170	0,167	49	0,2741218
17,929	538,7	549,6	94,78	97,07	0,170	0,167	50	0,2811529
17,483	538,8	549,7	97,18	99,64	0,171	0,167	51	0,274126
17,479	538,9	549,8	97,09	99,74	0,170	0,167	52	0,2741236
16,867	539,1	550,0	100,26	103,11	0,170	0,167	53	0,2645955
17,126	539,1	549,9	99,07	101,77	0,170	0,167	54	0,2686365
17,632	539,0	549,9	96,26	98,74	0,170	0,167	55	0,2765539

17,528	538,9	549,9	96,81	99,34	0,170	0,167	56	0,2749159
17,667	538,9	549,9	95,87	98,17	0,170	0,167	57	0,2771079
17,296	538,9	550,0	98,12	100,28	0,170	0,167	58	0,2713001
17,761	538,9	549,8	95,53	97,65	0,170	0,167	59	0,2785874
17,000	538,9	549,8	99,76	102,52	0,170	0,167	60	0,2666791
17,665	538,9	550,0	96,00	98,38	0,170	0,167	61	0,2770867
17,980	538,9	550,1	94,39	96,79	0,170	0,167	62	0,2820642
17,419	539,0	550,2	97,38	99,75	0,170	0,167	63	0,2731862
17,112	539,0	550,1	99,04	101,53	0,170	0,167	64	0,2683849
17,866	539,2	550,2	94,89	97,17	0,170	0,167	65	0,2802384
17,275	539,3	550,3	98,11	100,72	0,170	0,167	66	0,2709201
16,896	539,3	550,4	100,30	102,77	0,170	0,167	67	0,2649832
17,203	539,4	550,6	98,63	100,77	0,170	0,167	68	0,2697887
17,152	539,5	550,6	98,66	101,37	0,170	0,167	69	0,2690211
17,131	539,5	550,7	99,04	101,23	0,170	0,167	70	0,2687022
17,279	539,4	550,7	97,94	100,47	0,170	0,167	71	0,2710135
17,155	539,4	550,8	98,86	101,27	0,170	0,167	72	0,2690159
17,298	539,5	550,8	98,05	100,23	0,170	0,167	73	0,2713375
17,105	539,5	550,8	99,07	101,48	0,170	0,167	74	0,2682559
16,959	539,4	550,8	99,90	102,69	0,170	0,167	75	0,2659498
17,217	539,4	550,8	98,35	100,96	0,170	0,167	76	0,2699794
17,869	539,4	550,8	94,79	97,13	0,170	0,167	77	0,2802395
17,277	539,4	550,9	98,21	100,67	0,170	0,167	78	0,2709231
17,154	539,5	551,1	98,85	101,15	0,170	0,167	79	0,2690196
16,809	539,6	551,2	100,83	103,35	0,170	0,167	80	0,2636232
17,190	539,5	551,2	98,71	101,21	0,170	0,167	81	0,2695921
17,156	539,5	551,2	98,84	101,05	0,170	0,167	82	0,2690206
17,210	539,5	551,1	98,66	100,90	0,170	0,167	83	0,2699735
17,247	539,5	551,1	98,32	100,69	0,170	0,167	84	0,2705331
16,805	539,6	551,2	100,80	103,13	0,170	0,167	85	0,2635269
17,337	539,9	551,3	97,62	100,14	0,170	0,166	86	0,2718674
16,887	540,3	551,5	100,14	102,59	0,170	0,166	87	0,2648503
16,965	540,3	551,5	99,84	102,28	0,170	0,166	88	0,2659503
17,420	540,1	551,4	97,07	99,56	0,170	0,166	89	0,2731873
17,479	539,9	551,3	97,24	99,20	0,170	0,166	90	0,2741239
17,336	539,7	551,2	97,79	100,21	0,170	0,167	91	0,2718678
17,129	539,6	551,2	98,98	101,53	0,170	0,167	92	0,2686337
16,899	539,5	551,1	100,50	103,05	0,170	0,167	93	0,2649848
17,811	539,5	551,1	95,02	97,53	0,170	0,167	94	0,2792623
17,120	539,7	551,3	99,01	101,45	0,170	0,167	95	0,2684454
17,568	539,9	551,4	96,50	98,82	0,170	0,167	96	0,2754301
17,199	539,9	551,5	98,69	100,79	0,170	0,166	97	0,2695913
17,402	539,9	551,5	97,42	99,64	0,170	0,166	98	0,2728098
17,878	539,8	551,4	94,97	97,09	0,170	0,166	99	0,2802218
17,054	539,7	551,4	99,45	102,04	0,170	0,167	100	0,2672968
17,033	539,9	551,6	99,61	101,96	0,170	0,167	101	0,2669127
17,001	540,2	551,7	99,80	102,25	0,170	0,166	102	0,2663347
17,301	540,2	551,6	98,02	100,35	0,170	0,166	103	0,2711376
17,803	540,0	551,4	95,25	97,55	0,170	0,166	104	0,2789479
17,236	540,0	551,4	98,53	100,90	0,170	0,166	105	0,269972
16,796	540,1	551,5	101,09	103,47	0,170	0,166	106	0,262988
17,415	540,3	551,6	97,57	99,64	0,170	0,166	107	0,272736
17,647	540,3	551,6	96,06	98,48	0,170	0,166	108	0,2763641
17,098	540,1	551,4	99,37	101,86	0,170	0,166	109	0,2676811
17,011	540,0	551,3	99,82	102,16	0,170	0,166	110	0,2663357
17,454	540,0	551,4	97,28	99,77	0,170	0,166	111	0,2731982
17,678	540,1	551,4	96,16	98,45	0,170	0,166	112	0,2767352
17,710	540,2	551,4	95,97	98,17	0,170	0,166	113	0,2771051
17,626	540,2	551,5	96,58	98,83	0,170	0,166	114	0,2758051
16,884	540,1	551,4	100,89	103,45	0,170	0,167	115	0,2641333
17,441	540,0	551,3	97,57	99,91	0,170	0,167	116	0,2728102

17,006	540,1	551,3	100,05	102,61	0,170	0,166	117	0,2659491
17,061	540,0	551,3	99,83	102,27	0,170	0,167	118	0,266811
17,309	540,1	551,4	98,52	100,96	0,170	0,167	119	0,2705428
17,729	540,0	551,3	96,22	98,51	0,170	0,167	120	0,277105
16,869	539,9	551,3	101,18	103,51	0,170	0,166	121	0,2636229
17,533	539,8	551,4	97,33	99,75	0,170	0,167	122	0,2740086
17,106	540,2	551,6	99,78	101,92	0,170	0,166	123	0,2672894
17,541	540,3	551,7	97,18	99,63	0,170	0,166	124	0,2741246
16,962	540,2	551,6	100,65	102,98	0,170	0,166	125	0,2649828
17,552	540,0	551,6	97,31	99,84	0,170	0,167	126	0,2741242
16,945	540,0	551,7	100,78	103,18	0,170	0,167	127	0,2645946
16,979	539,8	551,5	100,75	103,09	0,170	0,166	128	0,2649819
16,864	539,7	551,4	101,44	104,03	0,170	0,167	129	0,2632325
17,265	539,3	550,9	99,05	101,36	0,170	0,167	130	0,2697133
16,802	539,2	551,0	102,07	104,35	0,171	0,167	131	0,262257
17,189	539,0	550,9	99,59	102,06	0,170	0,167	132	0,2682547
17,218	538,7	550,9	99,63	101,88	0,170	0,167	133	0,2686359
17,508	538,6	551,1	98,03	100,15	0,171	0,167	134	0,2731857
17,677	538,8	551,3	96,92	99,06	0,170	0,166	135	0,2758055
17,890	538,9	551,5	95,98	98,14	0,170	0,166	136	0,2789511
16,796	539,1	551,6	102,33	104,64	0,170	0,166	137	0,2616642
17,415	539,3	551,7	98,79	100,80	0,170	0,166	138	0,2712163
17,373	539,4	551,9	98,96	101,38	0,170	0,166	139	0,2705412
17,204	539,7	552,1	99,95	102,05	0,170	0,166	140	0,2679117
17,288	539,8	552,2	99,56	101,59	0,170	0,166	141	0,2690918
17,696	540,2	552,3	97,04	99,35	0,170	0,166	142	0,2754307
17,339	540,1	552,1	99,07	101,43	0,170	0,166	143	0,2699713
17,658	539,9	551,9	97,44	99,53	0,170	0,166	144	0,2747686
16,944	539,8	551,8	101,67	103,83	0,170	0,166	145	0,2636225
17,612	539,7	551,8	97,70	99,93	0,170	0,166	146	0,2741244
17,745	539,9	551,8	97,24	99,37	0,170	0,166	147	0,275805
17,616	539,9	551,8	97,71	100,07	0,170	0,166	148	0,2741233
16,826	539,9	551,8	102,09	104,58	0,170	0,166	149	0,261897
17,714	540,0	551,8	97,10	99,28	0,170	0,166	150	0,2757897
17,353	540,1	551,8	99,23	101,39	0,170	0,166	151	0,2699752
17,039	539,9	551,7	101,08	103,33	0,170	0,166	152	0,2651595
17,147	539,9	551,8	100,41	102,65	0,170	0,166	153	0,2668679
17,151	539,8	551,8	100,47	102,61	0,170	0,166	154	0,2669129
17,406	539,7	551,7	98,95	101,16	0,170	0,166	155	0,2709217
17,237	539,6	551,6	99,66	102,08	0,170	0,166	156	0,2682561
17,163	539,6	551,6	100,09	102,50	0,170	0,166	157	0,2672906
17,255	539,8	551,8	99,62	101,77	0,170	0,166	158	0,2686391
17,721	539,8	551,6	97,35	99,31	0,170	0,166	159	0,2758065
17,797	539,7	551,6	96,59	98,69	0,170	0,166	160	0,2771056
17,546	539,7	551,6	97,99	99,97	0,170	0,166	161	0,273244
17,007	539,8	551,7	100,96	103,27	0,170	0,166	162	0,2649821
17,737	539,9	551,9	96,65	98,91	0,170	0,166	163	0,276365
17,677	540,0	551,9	97,20	99,42	0,170	0,166	164	0,2753662
17,158	540,0	551,8	99,94	102,27	0,170	0,166	165	0,2672942
17,131	539,9	551,8	100,21	102,50	0,170	0,166	166	0,2669144
17,530	539,9	551,8	97,80	100,16	0,170	0,166	167	0,2731869
17,609	539,9	551,9	97,45	99,52	0,170	0,166	168	0,2744527
17,292	539,8	551,9	99,17	101,25	0,170	0,166	169	0,2695855
17,141	539,7	551,9	99,92	102,19	0,170	0,166	170	0,2672971
17,164	539,7	551,9	99,79	102,25	0,170	0,166	171	0,2676826
16,928	539,7	551,9	101,27	103,56	0,170	0,166	172	0,2640123
17,684	539,8	551,9	96,82	99,07	0,170	0,166	173	0,2758203
17,312	539,8	551,9	98,95	101,43	0,170	0,166	174	0,2699747
16,966	539,7	551,9	100,97	103,38	0,170	0,167	175	0,2645978
17,080	539,7	551,8	100,37	102,70	0,170	0,166	176	0,2663395
17,767	539,7	551,8	96,57	98,68	0,170	0,166	177	0,2771078

17,477	539,7	551,8	97,79	100,06	0,170	0,166	178	0,2728126
17,224	539,8	551,9	99,47	101,85	0,170	0,166	179	0,2686832
17,369	539,9	551,9	98,48	101,08	0,170	0,167	180	0,2709676
16,829	539,9	551,7	101,52	103,80	0,170	0,166	181	0,2626517
17,199	539,9	551,8	99,73	102,15	0,170	0,166	182	0,2682579
17,167	540,1	552,0	99,62	101,92	0,170	0,166	183	0,26787
17,556	540,0	552,0	97,55	99,78	0,170	0,166	184	0,2738097
17,570	539,9	551,9	97,45	99,74	0,170	0,166	185	0,2741111
17,034	539,8	551,8	100,51	102,91	0,170	0,167	186	0,2658222
16,864	539,8	551,8	101,42	103,67	0,170	0,166	187	0,2632365
17,742	539,8	551,9	96,41	98,88	0,170	0,166	188	0,276787
17,215	539,8	551,9	99,42	101,52	0,170	0,166	189	0,2686456
17,214	540,0	552,0	99,40	101,91	0,170	0,166	190	0,268697
17,310	540,0	552,0	98,88	101,05	0,170	0,166	191	0,2700899
16,870	539,9	552,0	101,40	103,94	0,170	0,166	192	0,2632247
17,187	539,9	552,1	99,40	101,80	0,170	0,166	193	0,2682578
17,211	540,5	552,5	99,22	101,70	0,170	0,166	194	0,2686402
17,182	540,5	552,5	99,31	101,68	0,170	0,166	195	0,268228
17,265	540,5	552,5	98,70	100,95	0,170	0,166	196	0,2695969
17,236	540,8	552,6	99,04	101,46	0,170	0,166	197	0,2690246
17,229	540,8	552,6	99,10	101,11	0,170	0,166	198	0,2690229
17,745	540,7	552,5	96,02	98,41	0,170	0,166	199	0,2771104
16,855	540,4	552,4	101,17	103,67	0,170	0,166	200	0,2632391
17,662	540,3	552,3	96,97	99,00	0,170	0,166	201	0,2758085
17,720	540,2	552,2	96,44	98,54	0,170	0,166	202	0,2767319
17,908	540,0	552,2	95,54	97,80	0,170	0,166	203	0,2795245
17,701	540,0	552,2	96,69	98,69	0,170	0,166	204	0,2763673
17,981	540,1	552,4	95,06	97,21	0,170	0,166	205	0,2806071
17,103	540,2	552,4	99,95	102,31	0,170	0,166	206	0,2669078
17,522	540,5	552,6	97,72	99,91	0,170	0,166	207	0,2731764
17,518	540,5	552,5	97,70	99,98	0,170	0,166	208	0,2731901
17,163	540,3	552,4	99,61	102,06	0,170	0,166	209	0,2676858
17,196	540,2	552,4	99,65	101,64	0,170	0,166	210	0,2680841
17,167	540,0	552,3	99,82	102,06	0,170	0,166	211	0,267684
17,295	540,0	552,4	99,07	101,48	0,170	0,166	212	0,2695956
18,038	540,0	552,4	95,02	97,24	0,170	0,166	213	0,281157
17,346	539,9	552,4	99,02	100,97	0,170	0,166	214	0,2703803
17,087	539,9	552,3	100,25	102,51	0,170	0,166	215	0,2663392
17,522	540,0	552,4	97,76	99,86	0,170	0,166	216	0,2731911
17,606	540,2	552,6	97,30	99,50	0,170	0,166	217	0,2745028
17,594	540,6	552,9	97,34	99,57	0,170	0,166	218	0,2741286
17,507	540,7	552,9	97,87	100,06	0,170	0,166	219	0,2728178
17,086	540,6	552,8	100,31	102,68	0,170	0,166	220	0,2663388
17,199	540,6	552,8	99,67	102,06	0,170	0,166	221	0,2680668
16,978	540,5	552,8	100,69	103,20	0,170	0,166	222	0,2647418
17,161	540,4	552,8	99,76	101,82	0,170	0,166	223	0,2676863
17,109	540,4	552,7	100,01	102,15	0,170	0,166	224	0,2669178
17,336	540,4	552,7	98,54	100,90	0,170	0,166	225	0,2705469
17,645	540,3	552,6	96,91	99,03	0,170	0,166	226	0,2754376
16,955	540,2	552,7	100,84	102,97	0,170	0,166	227	0,2646002
17,620	540,2	552,7	97,04	99,12	0,170	0,166	228	0,2750864
17,239	540,1	552,6	99,16	101,22	0,170	0,166	229	0,2690756
16,701	540,1	552,6	102,22	104,56	0,170	0,166	230	0,2608892
17,703	540,2	552,6	96,76	98,69	0,170	0,166	231	0,276369
17,146	540,3	552,8	99,66	101,88	0,170	0,166	232	0,2676861
16,730	540,4	552,9	102,09	104,23	0,170	0,166	233	0,2612865
17,632	540,3	552,9	96,76	99,19	0,170	0,166	234	0,2754379
17,406	540,3	552,8	97,99	100,22	0,170	0,166	235	0,2718724
16,894	540,4	552,9	100,96	103,29	0,170	0,166	236	0,264017
17,174	540,4	552,9	99,52	101,53	0,170	0,166	237	0,2682486
17,055	540,3	552,8	100,12	102,36	0,170	0,166	238	0,2663387

17,775	540,3	552,8	96,00	98,28	0,170	0,166	239	0,2776734
17,735	540,4	552,9	96,08	98,32	0,170	0,166	240	0,2771468
17,082	540,4	552,9	99,78	101,97	0,170	0,166	241	0,2669684
17,129	540,4	552,9	99,71	101,95	0,170	0,166	242	0,2676859
17,584	540,3	552,8	96,95	99,06	0,170	0,166	243	0,2748786
17,150	540,2	552,7	99,31	101,94	0,170	0,166	244	0,2681105
17,046	540,2	552,8	100,20	102,45	0,170	0,167	245	0,2663381
17,560	540,2	552,8	96,99	99,23	0,170	0,166	246	0,2745056
17,151	540,4	552,9	99,51	101,56	0,170	0,166	247	0,2681099
17,707	540,3	552,8	96,35	98,48	0,170	0,166	248	0,2767759
17,947	540,2	552,7	95,00	97,07	0,170	0,166	249	0,280607
16,942	540,3	553,0	100,61	102,71	0,170	0,166	250	0,2649878
17,646	540,3	552,9	96,83	98,68	0,170	0,166	251	0,2758113
17,687	540,3	552,8	96,30	98,35	0,170	0,166	252	0,2767246
17,176	540,2	552,8	99,19	101,36	0,170	0,166	253	0,2686439
17,434	540,2	552,9	97,71	99,73	0,170	0,166	254	0,2728171
18,037	540,3	552,9	94,50	96,65	0,170	0,166	255	0,2820696
17,317	540,2	552,9	98,59	100,29	0,170	0,166	256	0,2708888
17,301	540,1	552,9	98,47	100,73	0,170	0,166	257	0,2705499
17,527	540,1	552,8	97,37	99,30	0,170	0,166	258	0,2741303
17,153	540,0	552,8	99,25	101,48	0,170	0,166	259	0,2683073
17,750	540,3	553,1	95,91	97,71	0,170	0,166	260	0,2776485
17,606	540,5	553,2	96,71	98,90	0,170	0,166	261	0,2754377
17,687	541,0	553,4	96,06	98,24	0,170	0,166	262	0,2767405
17,653	541,3	553,5	96,32	98,53	0,170	0,166	263	0,2761526
17,718	541,2	553,5	95,86	98,15	0,170	0,166	264	0,2771791
17,193	541,0	553,4	98,87	101,23	0,170	0,166	265	0,2690256
17,667	540,8	553,3	96,23	98,60	0,170	0,166	266	0,2763694
17,437	540,8	553,3	97,39	99,81	0,170	0,166	267	0,2728316
17,711	541,1	553,5	95,90	98,28	0,170	0,166	268	0,2771129
17,630	541,0	553,3	96,62	98,58	0,170	0,166	269	0,2758116
17,282	540,9	553,3	98,23	100,44	0,170	0,166	270	0,2705488
17,627	540,9	553,3	96,40	98,42	0,170	0,166	271	0,2760503
17,254	540,9	553,4	98,65	100,83	0,170	0,166	272	0,2699732
17,852	540,9	553,3	95,20	97,39	0,170	0,166	273	0,279326
17,291	541,1	553,4	98,31	100,46	0,170	0,166	274	0,2705492
17,369	541,5	553,6	97,84	100,08	0,170	0,166	275	0,2718727
17,604	541,5	553,5	96,53	98,64	0,170	0,166	276	0,2754375
17,690	541,3	553,4	96,14	98,46	0,170	0,166	277	0,2767383
17,105	541,0	553,2	99,54	101,75	0,170	0,166	278	0,267687
17,518	540,8	553,1	97,14	99,19	0,170	0,166	279	0,2741271
17,330	540,5	552,9	98,14	100,55	0,170	0,166	280	0,2713015
16,832	540,1	552,4	101,01	103,17	0,170	0,167	281	0,2636297
16,909	539,7	552,3	100,67	102,71	0,170	0,166	282	0,2647884
17,182	539,6	552,4	99,01	101,19	0,170	0,166	283	0,26904
16,857	539,5	552,7	100,99	102,97	0,170	0,166	284	0,2640167
17,240	539,6	552,8	98,87	100,87	0,171	0,166	285	0,269977
17,241	539,6	552,8	98,79	100,58	0,171	0,166	286	0,2699851
17,324	539,7	552,8	98,33	100,26	0,171	0,166	287	0,271305
17,362	539,7	552,9	97,92	100,17	0,170	0,166	288	0,2718734
17,303	539,8	552,9	98,44	100,31	0,170	0,166	289	0,270897
17,088	539,8	552,9	99,59	101,56	0,170	0,166	290	0,2676064
17,589	539,8	552,9	96,78	98,81	0,170	0,166	291	0,2754389
17,702	539,9	552,9	96,25	98,14	0,170	0,166	292	0,2771098
17,161	539,9	552,9	99,19	101,40	0,170	0,166	293	0,2686515
17,305	539,8	552,8	98,45	100,34	0,170	0,166	294	0,2709287
17,676	539,8	552,8	96,30	98,35	0,170	0,166	295	0,276741
17,931	539,8	552,8	95,17	97,19	0,171	0,166	296	0,2806095
17,157	539,8	552,8	99,20	101,40	0,170	0,166	297	0,268482
17,460	539,8	552,8	97,61	99,52	0,170	0,166	298	0,2732739
17,225	539,9	552,8	98,91	101,09	0,170	0,166	299	0,2695907

16,923	539,9	552,8	100,87	102,78	0,171	0,166	300	0,2648546
17,763	539,9	552,8	95,92	98,06	0,171	0,166	301	0,2780331
17,367	539,9	552,7	98,05	100,28	0,170	0,167	302	0,2718722
16,908	539,9	552,7	100,66	102,98	0,170	0,166	303	0,2646006
17,679	539,9	552,7	96,34	98,27	0,170	0,166	304	0,2767401
17,335	539,9	552,7	98,26	100,36	0,170	0,166	305	0,2713049
17,140	539,9	552,7	99,25	101,55	0,170	0,166	306	0,2682611
17,707	539,9	552,7	96,11	98,20	0,170	0,166	307	0,2771109
17,517	539,9	552,7	97,30	99,20	0,170	0,166	308	0,2741289
17,703	539,9	552,7	96,16	98,30	0,170	0,166	309	0,2771107
17,225	539,9	552,7	98,98	100,95	0,170	0,166	310	0,269589
17,452	539,9	552,7	97,46	99,54	0,170	0,166	311	0,2731916
17,072	539,9	552,7	99,64	101,74	0,170	0,166	312	0,2672373
16,771	539,9	552,7	101,58	103,59	0,170	0,166	313	0,2624572
17,451	539,9	552,7	97,64	99,38	0,170	0,166	314	0,2731913
17,053	539,9	552,7	99,98	101,87	0,171	0,166	315	0,2669179
17,270	539,9	552,7	98,73	100,67	0,171	0,166	316	0,270325
17,904	539,9	552,6	95,12	96,91	0,170	0,166	317	0,2802422
17,015	539,9	552,7	99,97	102,15	0,170	0,166	318	0,2663394
17,655	539,9	552,7	96,35	98,67	0,170	0,166	319	0,276368
17,359	539,9	552,7	98,16	99,92	0,170	0,166	320	0,2717323
17,603	539,9	552,7	96,53	98,87	0,170	0,166	321	0,2755267
17,073	539,9	552,7	99,74	102,03	0,170	0,167	322	0,2673036
17,613	539,9	552,7	96,56	98,74	0,170	0,166	323	0,2757382
17,425	539,9	552,7	97,63	100,00	0,170	0,167	324	0,2728165
17,134	539,9	552,6	99,26	101,48	0,170	0,167	325	0,268261
17,365	539,9	552,7	98,00	100,21	0,170	0,166	326	0,2718792
17,069	539,9	552,7	99,52	101,94	0,170	0,166	327	0,2673023
17,531	539,9	552,7	97,10	98,92	0,170	0,166	328	0,2745119
16,989	539,9	552,7	100,33	102,45	0,171	0,166	329	0,2659584
17,156	539,9	552,7	99,21	101,25	0,170	0,166	330	0,268643
17,415	539,9	552,7	97,76	99,68	0,170	0,166	331	0,2727151
17,715	539,9	552,7	95,99	98,26	0,170	0,166	332	0,2773966
17,130	539,9	552,7	99,25	101,74	0,170	0,167	333	0,2682226
17,327	539,9	552,7	98,18	100,31	0,170	0,167	334	0,2713073
17,073	539,9	552,7	99,51	101,83	0,170	0,166	335	0,2673569
16,751	539,9	552,6	101,42	103,85	0,170	0,166	336	0,2622637
16,983	539,9	552,6	100,03	102,35	0,170	0,166	337	0,2659557
17,327	539,9	552,6	98,13	100,15	0,170	0,166	338	0,2713069
17,507	539,9	552,6	97,14	99,43	0,170	0,166	339	0,2741133
17,093	539,9	552,6	99,43	101,69	0,170	0,166	340	0,2676872
16,897	539,9	552,6	100,64	102,78	0,170	0,166	341	0,2646011
17,693	539,9	552,6	96,26	98,14	0,170	0,166	342	0,2771108
17,605	539,8	552,6	96,56	98,58	0,170	0,166	343	0,2757895
16,662	539,8	552,6	102,37	104,41	0,171	0,166	344	0,2609602
16,915	539,8	552,5	100,52	102,42	0,171	0,166	345	0,2649883
17,467	539,8	552,6	97,27	99,45	0,170	0,166	346	0,2735982
16,520	539,8	552,5	103,08	105,05	0,170	0,166	347	0,2587209
17,177	539,8	552,6	98,98	101,04	0,170	0,166	348	0,269027
17,840	539,8	552,6	95,35	97,38	0,170	0,166	349	0,2793915
17,416	539,8	552,6	97,74	99,72	0,170	0,166	350	0,2727633
17,419	539,8	552,5	97,58	99,97	0,170	0,166	351	0,2728161
17,501	539,8	552,5	97,09	99,06	0,170	0,166	352	0,2741298
17,175	539,8	552,5	98,88	101,08	0,170	0,166	353	0,26901
17,002	539,8	552,6	100,01	102,05	0,170	0,166	354	0,2663316
17,667	539,8	552,6	96,13	98,19	0,170	0,166	355	0,276738
17,503	539,8	552,6	97,20	99,20	0,170	0,166	356	0,2741314
16,840	539,8	552,6	100,96	103,01	0,170	0,166	357	0,2637972
17,272	539,8	552,6	98,42	100,59	0,170	0,166	358	0,2705783
16,678	539,8	552,5	101,93	104,09	0,170	0,166	359	0,2612837
17,501	539,8	552,5	97,08	99,27	0,170	0,166	360	0,2741309

17,441	539,8	552,5	97,39	99,57	0,170	0,166	361	0,2732203
17,203	539,8	552,5	98,81	100,82	0,170	0,166	362	0,269524
17,317	539,8	552,5	98,08	100,24	0,170	0,166	363	0,2713074
17,688	539,8	552,5	96,09	98,14	0,170	0,166	364	0,2771116
17,048	539,8	552,5	99,55	101,66	0,170	0,166	365	0,2671092
17,414	539,8	552,5	97,49	99,87	0,170	0,166	366	0,2728119
16,803	539,8	552,5	101,15	103,37	0,170	0,166	367	0,2632375
16,980	539,7	552,5	100,09	102,30	0,170	0,166	368	0,266007
17,656	539,8	552,5	96,33	98,35	0,170	0,166	369	0,2766438
17,315	539,7	552,5	98,14	100,38	0,170	0,166	370	0,271302
18,002	539,8	552,5	94,31	96,17	0,170	0,166	371	0,2820706
17,230	539,8	552,5	98,57	100,60	0,170	0,166	372	0,2699781
17,033	539,7	552,5	99,73	101,89	0,170	0,166	373	0,2668542
17,718	539,7	552,5	95,76	97,94	0,170	0,166	374	0,2776659
16,820	539,7	552,4	100,94	103,08	0,170	0,166	375	0,2636294
17,714	539,7	552,4	96,04	97,91	0,170	0,166	376	0,277666
17,429	539,7	552,4	97,37	99,70	0,170	0,166	377	0,2731919
17,138	539,7	552,3	99,09	101,22	0,170	0,166	378	0,2686418
17,409	539,6	552,4	97,85	99,59	0,171	0,166	379	0,2728148
17,516	539,6	552,3	96,86	99,24	0,170	0,166	380	0,2745029
16,822	539,6	552,3	101,08	103,30	0,170	0,167	381	0,2636308
16,821	539,6	552,3	100,89	103,34	0,170	0,167	382	0,2636283
16,970	539,6	552,4	100,17	102,34	0,170	0,167	383	0,2659228
17,310	539,6	552,3	98,08	100,49	0,170	0,167	384	0,2713202
17,493	539,6	552,3	97,16	99,23	0,170	0,167	385	0,2741289
16,990	539,6	552,3	99,98	102,04	0,170	0,166	386	0,2663736
17,725	539,6	552,4	95,95	97,77	0,171	0,166	387	0,2777976
17,736	539,6	552,4	95,77	97,84	0,171	0,166	388	0,2780353
16,877	539,6	552,4	100,60	102,63	0,170	0,166	389	0,264569
17,204	539,6	552,4	98,78	100,93	0,170	0,166	390	0,2695958
17,486	539,6	552,4	97,07	99,36	0,170	0,167	391	0,2741295
17,425	539,5	552,3	97,61	99,51	0,171	0,166	392	0,2731913
17,344	539,5	552,3	98,03	99,84	0,171	0,166	393	0,2718783
17,515	539,5	552,3	96,98	99,10	0,171	0,166	394	0,2745346
17,202	539,5	552,3	98,73	100,92	0,170	0,166	395	0,2695953
17,115	539,6	552,3	99,13	101,42	0,170	0,166	396	0,2682919
16,843	539,6	552,4	100,88	102,93	0,170	0,166	397	0,264017
17,227	539,6	552,4	98,55	100,69	0,170	0,166	398	0,2699776
16,971	539,6	552,4	100,11	102,05	0,170	0,166	399	0,2660167
17,132	539,6	552,4	99,22	101,16	0,171	0,166	400	0,2685802
17,630	539,5	552,3	96,41	98,60	0,171	0,166	401	0,2763679
16,792	539,5	552,3	101,04	103,13	0,170	0,166	402	0,2632381
17,084	539,5	552,3	99,30	101,55	0,170	0,166	403	0,267739
17,402	539,5	552,4	97,53	99,61	0,170	0,166	404	0,2728136
17,815	539,5	552,3	95,31	97,08	0,170	0,166	405	0,2793248
17,402	539,5	552,3	97,53	99,40	0,170	0,166	406	0,2728159
17,816	539,5	552,3	95,40	97,46	0,170	0,166	407	0,279324
16,878	539,5	552,3	100,51	102,99	0,170	0,167	408	0,2645993
17,031	539,5	552,3	99,70	101,86	0,170	0,166	409	0,2669175
17,191	539,5	552,3	98,77	101,01	0,170	0,166	410	0,2695218
16,822	539,5	552,3	100,83	103,35	0,170	0,167	411	0,2637249
17,509	539,5	552,3	96,89	99,11	0,170	0,167	412	0,2745034
16,988	539,5	552,3	100,01	101,93	0,170	0,166	413	0,2663385
17,483	539,5	552,3	97,23	99,10	0,171	0,166	414	0,2741173
17,401	539,5	552,3	97,36	99,83	0,170	0,166	415	0,2728538
16,963	539,5	552,3	100,28	102,27	0,170	0,167	416	0,2659529
17,338	539,5	552,3	97,79	100,12	0,170	0,166	417	0,2718726
16,983	539,4	552,3	100,05	102,07	0,170	0,166	418	0,2662259
17,219	539,4	552,3	98,76	100,76	0,171	0,166	419	0,2699757
17,627	539,4	552,3	96,30	98,36	0,171	0,166	420	0,2763668
17,074	539,4	552,3	99,36	101,53	0,170	0,166	421	0,2676847

17,069	539,5	552,3	99,48	101,53	0,170	0,166	422	0,267685
17,021	539,4	552,4	99,62	101,79	0,170	0,166	423	0,2669081
17,191	539,4	552,4	98,69	101,05	0,170	0,166	424	0,2695974
17,134	539,4	552,4	99,09	101,14	0,170	0,166	425	0,2686422
17,215	539,4	552,4	98,53	100,73	0,170	0,166	426	0,2699841
16,874	539,4	552,3	100,57	102,74	0,170	0,166	427	0,2645999
17,077	539,4	552,3	99,48	101,53	0,170	0,166	428	0,2677104
17,647	539,4	552,3	96,26	98,39	0,171	0,166	429	0,2767321
17,931	539,4	552,3	94,59	96,49	0,170	0,166	430	0,2811593
16,984	539,4	552,3	99,82	102,00	0,170	0,166	431	0,2663392
17,482	539,4	552,3	97,18	99,22	0,170	0,166	432	0,2741273
17,019	539,4	552,3	99,68	101,96	0,170	0,166	433	0,2669163

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	98,89	101,14	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
17,715	531,0	532,1			0,172	0,171	0	0,2677353
17,512	531,1	532,5	99,65	103,90	0,172	0,171	1	0,2718532
17,676	531,1	532,9	98,49	102,83	0,172	0,171	2	0,2748545
17,982	531,3	533,4	96,95	100,87	0,172	0,171	3	0,2795712
17,737	531,4	534,0	98,56	102,41	0,172	0,171	4	0,2754745
17,530	531,6	534,6	98,27	101,99	0,172	0,171	5	0,2741093
17,743	531,8	535,2	97,01	100,72	0,172	0,170	6	0,2776451
17,591	532,0	535,7	97,62	101,24	0,172	0,170	7	0,2754151
17,809	532,0	536,3	96,43	99,82	0,172	0,170	8	0,2789535
17,996	532,1	536,8	95,28	98,51	0,172	0,170	9	0,2820493
17,714	532,3	537,4	96,70	99,89	0,172	0,170	10	0,277639
17,817	532,4	537,9	96,09	99,43	0,172	0,170	11	0,2793033
17,066	532,5	538,3	100,38	103,81	0,172	0,170	12	0,2675537
17,912	532,7	538,9	95,47	98,65	0,172	0,169	13	0,2807776
17,252	532,9	539,4	99,23	102,21	0,171	0,169	14	0,2705263
18,203	533,2	539,9	93,88	96,88	0,172	0,169	15	0,2854841
17,228	533,3	540,3	99,08	102,35	0,171	0,169	16	0,2701294
17,303	533,3	540,6	98,88	101,77	0,171	0,169	17	0,2712409
17,393	533,1	540,9	98,20	101,29	0,171	0,169	18	0,2727923
17,206	533,2	541,2	99,41	102,20	0,172	0,169	19	0,2699566
17,616	533,7	541,8	96,92	100,02	0,171	0,169	20	0,2762675
17,120	533,8	542,1	99,76	102,74	0,171	0,169	21	0,2684431
18,020	533,8	542,3	94,46	97,28	0,171	0,168	22	0,2827746
17,861	534,0	542,6	95,54	98,11	0,171	0,168	23	0,280218
17,839	534,2	542,8	95,71	98,58	0,171	0,168	24	0,2798419
16,859	534,2	542,9	101,34	104,12	0,171	0,169	25	0,2643998
17,556	534,1	543,0	97,17	99,90	0,171	0,168	26	0,2754177
16,776	534,1	543,2	101,67	104,48	0,171	0,168	27	0,2632205
17,154	534,4	543,6	99,51	102,43	0,171	0,168	28	0,2690052
17,539	534,4	543,8	97,43	100,06	0,171	0,168	29	0,2750876
17,880	534,3	544,0	95,37	98,24	0,171	0,168	30	0,2805877
17,315	534,6	544,3	98,38	100,86	0,171	0,168	31	0,271854
16,771	535,1	544,6	101,47	104,30	0,171	0,168	32	0,2632187
17,625	535,5	544,8	96,49	99,13	0,171	0,168	33	0,2767178
17,306	535,6	544,9	98,23	100,78	0,171	0,168	34	0,2715827
17,779	535,5	544,9	95,96	98,28	0,171	0,168	35	0,2789185
17,640	535,3	545,1	96,51	99,25	0,171	0,168	36	0,2766955
17,562	535,1	545,2	97,12	99,67	0,171	0,168	37	0,2754219
17,388	535,0	545,4	98,04	100,35	0,171	0,168	38	0,272795
17,520	535,0	545,5	97,24	99,62	0,171	0,167	39	0,2748585
17,503	535,0	545,7	97,49	99,83	0,171	0,168	40	0,2744754
18,066	535,1	545,8	94,49	96,57	0,171	0,167	41	0,2833192
16,906	535,4	545,8	100,67	103,41	0,171	0,168	42	0,2652201
17,527	535,5	545,8	97,17	99,65	0,171	0,168	43	0,2748567
17,428	535,8	546,0	97,86	100,49	0,171	0,168	44	0,27317
17,675	535,9	546,1	96,40	98,95	0,171	0,168	45	0,277088
17,863	536,2	546,3	95,09	97,63	0,171	0,167	46	0,2801971
17,939	536,3	546,3	95,00	97,19	0,171	0,167	47	0,2811371
17,720	536,2	546,3	96,10	98,67	0,171	0,167	48	0,2776425
17,917	536,1	546,2	95,18	97,66	0,171	0,167	49	0,2805888
17,747	536,0	546,2	96,07	98,61	0,171	0,167	50	0,2780153
16,915	535,8	546,3	100,97	103,60	0,171	0,168	51	0,264963
17,335	535,7	546,4	98,26	100,57	0,171	0,167	52	0,2716299
17,266	535,7	546,5	98,61	100,97	0,171	0,167	53	0,2705265
17,234	535,6	546,7	99,07	101,41	0,171	0,167	54	0,269958
17,892	535,6	546,7	95,36	97,85	0,171	0,167	55	0,2802232

17,124	535,6	546,7	99,90	102,16	0,171	0,167	56	0,2682292
17,363	535,5	546,7	98,17	100,29	0,171	0,167	57	0,2720856
17,806	535,9	546,9	95,74	98,29	0,171	0,167	58	0,2789375
17,508	536,1	546,9	97,52	99,97	0,171	0,167	59	0,2741084
17,626	536,2	546,9	97,01	99,31	0,171	0,167	60	0,275808
17,681	536,1	546,9	96,64	98,79	0,171	0,167	61	0,276733
17,366	536,0	546,8	98,41	100,73	0,171	0,167	62	0,2718527
17,226	535,9	546,9	99,25	101,41	0,171	0,167	63	0,2695772
17,886	535,8	547,0	95,57	97,72	0,171	0,167	64	0,279955
17,163	535,8	547,1	99,66	102,00	0,171	0,167	65	0,2686216
17,105	535,8	547,2	100,05	102,24	0,171	0,167	66	0,2676688
17,154	535,8	547,2	99,85	102,05	0,171	0,167	67	0,2682392
17,031	536,0	547,2	100,42	102,77	0,171	0,167	68	0,2663208
17,619	536,2	547,2	97,16	99,40	0,171	0,167	69	0,2754147
17,622	536,3	547,1	97,20	99,77	0,171	0,167	70	0,275419
17,770	536,3	547,1	96,36	98,69	0,171	0,167	71	0,2776455
17,336	536,3	547,1	98,87	101,30	0,171	0,167	72	0,2708201
17,794	536,2	547,1	96,30	98,79	0,171	0,167	73	0,2779738
17,402	536,1	547,2	98,59	100,71	0,171	0,167	74	0,2718506
17,336	536,1	547,2	98,94	101,44	0,171	0,167	75	0,2707395
17,738	536,1	547,3	96,52	99,25	0,170	0,167	76	0,2769206
17,864	536,0	547,3	96,05	98,05	0,170	0,167	77	0,2789377
17,208	536,0	547,3	99,75	102,02	0,171	0,167	78	0,2686243
17,327	536,0	547,4	99,05	101,51	0,171	0,167	79	0,2705277
17,444	536,1	547,4	98,56	100,84	0,171	0,167	80	0,2722965
17,419	536,1	547,4	98,79	101,04	0,171	0,167	81	0,271834
17,674	536,1	547,5	97,35	99,58	0,171	0,167	82	0,2757901
17,291	536,0	547,5	99,47	101,82	0,171	0,167	83	0,2698736
17,639	536,0	547,5	97,53	99,57	0,171	0,167	84	0,2753576
17,651	536,0	547,5	97,33	99,57	0,171	0,167	85	0,2754948
17,268	536,0	547,5	99,36	101,79	0,171	0,167	86	0,2695779
17,498	536,1	547,5	98,24	100,47	0,171	0,167	87	0,2730914
17,375	536,1	547,5	98,77	101,08	0,171	0,167	88	0,2712917
17,049	536,0	547,6	100,79	103,02	0,171	0,167	89	0,2662463
17,120	536,0	547,6	100,31	102,63	0,171	0,167	90	0,2672885
17,899	536,1	547,7	96,15	98,05	0,171	0,167	91	0,2793776
17,552	536,0	547,5	97,64	100,12	0,171	0,167	92	0,2742642
17,633	536,2	547,5	97,42	99,43	0,171	0,167	93	0,2754184
17,950	536,2	547,6	95,82	98,18	0,171	0,167	94	0,2802248
17,411	536,2	547,6	98,66	100,91	0,171	0,167	95	0,2718548
17,498	536,0	547,5	98,13	100,43	0,171	0,167	96	0,2731273
17,321	535,9	547,5	99,35	101,71	0,171	0,167	97	0,2702036
17,650	535,9	547,5	97,44	99,75	0,171	0,167	98	0,2754189
17,826	535,8	547,6	96,64	98,75	0,171	0,167	99	0,2780161
17,343	535,8	547,6	99,24	101,49	0,171	0,167	100	0,2705285
17,646	535,8	547,6	97,40	99,49	0,171	0,167	101	0,2754209
17,755	535,8	547,6	96,81	98,87	0,171	0,167	102	0,277095
17,486	536,1	547,8	98,21	100,72	0,171	0,167	103	0,2727949
16,978	536,2	547,8	101,30	103,20	0,171	0,167	104	0,2649671
17,369	536,3	547,8	98,72	101,03	0,171	0,167	105	0,271267
17,327	536,3	547,8	99,01	101,49	0,171	0,167	106	0,2705494
17,270	536,3	547,7	99,47	101,72	0,171	0,167	107	0,2695771
16,857	536,4	547,9	101,77	104,17	0,171	0,167	108	0,2632189
17,631	536,3	547,8	97,21	99,56	0,171	0,167	109	0,2754182
16,918	536,3	547,9	101,54	103,82	0,171	0,167	110	0,2639971
16,971	536,2	547,8	101,17	103,35	0,171	0,167	111	0,2649685
17,150	536,1	547,7	100,21	102,53	0,171	0,167	112	0,2676678
17,329	536,0	547,7	99,08	101,27	0,171	0,167	113	0,2705294
16,737	535,8	547,7	102,51	105,12	0,171	0,167	114	0,2612963
17,382	535,8	547,7	98,92	101,18	0,171	0,167	115	0,2712848
17,661	535,8	547,8	97,29	99,43	0,171	0,167	116	0,275792

17,092	535,8	547,8	100,40	102,54	0,171	0,167	117	0,2668991
16,913	535,7	547,7	101,47	103,82	0,171	0,167	118	0,2639984
17,181	535,6	547,7	100,10	102,15	0,171	0,167	119	0,2682421
17,437	535,6	547,8	98,69	100,72	0,171	0,167	120	0,2722909
17,189	535,6	547,8	100,02	102,33	0,171	0,167	121	0,2682431
16,829	535,5	547,9	102,17	104,38	0,171	0,167	122	0,2626374
17,237	535,6	548,0	99,95	101,87	0,171	0,167	123	0,2690076
16,953	535,6	548,1	101,52	103,62	0,171	0,167	124	0,2645823
17,552	535,6	548,1	97,99	100,14	0,171	0,167	125	0,2738596
16,979	535,6	548,1	101,41	103,49	0,171	0,167	126	0,2649801
17,608	535,6	548,1	97,54	99,67	0,171	0,167	127	0,2748878
16,765	535,6	548,1	102,64	104,83	0,171	0,167	128	0,2616551
17,354	535,7	548,1	99,05	101,19	0,171	0,167	129	0,2709086
16,976	535,9	548,3	101,17	103,34	0,171	0,167	130	0,2649695
17,105	536,0	548,3	100,49	102,67	0,171	0,167	131	0,2668992
17,450	535,9	548,3	98,66	100,72	0,171	0,167	132	0,2723223
17,590	535,9	548,4	97,86	99,82	0,171	0,167	133	0,2744803
17,485	535,9	548,4	98,43	100,49	0,171	0,167	134	0,2727816
16,911	535,9	548,4	101,55	103,91	0,171	0,167	135	0,264004
16,797	535,9	548,3	102,31	104,40	0,171	0,167	136	0,2622452
17,775	535,9	548,3	96,71	98,65	0,171	0,167	137	0,2776143
16,564	536,0	548,3	103,79	106,01	0,171	0,167	138	0,2585039
17,272	536,2	548,5	99,46	101,42	0,171	0,167	139	0,2695819
16,769	536,4	548,7	102,42	104,92	0,171	0,167	140	0,2616574
16,833	536,4	548,7	101,99	104,27	0,171	0,167	141	0,2626383
17,727	536,4	548,7	96,95	99,09	0,171	0,167	142	0,2767221
17,388	536,4	548,7	98,85	101,24	0,171	0,167	143	0,2712895
17,158	536,4	548,6	99,93	102,17	0,171	0,167	144	0,2678727
17,633	536,3	548,6	97,21	99,48	0,170	0,167	145	0,275383
16,804	536,2	548,5	102,21	104,38	0,171	0,167	146	0,2622408
16,824	536,2	548,6	102,07	104,26	0,171	0,167	147	0,2626376
17,233	536,2	548,7	99,77	101,90	0,171	0,167	148	0,2690141
17,418	536,2	548,7	98,50	100,82	0,171	0,167	149	0,2718547
17,137	536,2	548,6	100,40	102,47	0,171	0,167	150	0,2672855
17,235	536,2	548,7	99,67	101,63	0,171	0,167	151	0,2690099
17,123	536,1	548,7	100,35	102,41	0,171	0,167	152	0,2672863
17,067	536,1	548,7	100,81	102,89	0,171	0,167	153	0,2663234
17,242	536,1	548,7	99,73	101,94	0,171	0,167	154	0,2690096
16,807	536,1	548,7	102,41	104,59	0,171	0,167	155	0,2622078
17,570	536,1	548,7	97,89	99,98	0,171	0,167	156	0,2742112
16,868	536,0	548,7	101,93	103,96	0,171	0,167	157	0,2632294
17,239	536,0	548,7	99,60	101,96	0,171	0,167	158	0,2690117
17,347	536,1	548,8	99,27	101,34	0,171	0,167	159	0,27058
17,116	536,1	548,8	100,47	102,53	0,171	0,167	160	0,2671452
17,065	536,1	548,8	100,72	103,06	0,171	0,167	161	0,2663256
17,197	536,0	548,7	99,94	101,84	0,171	0,167	162	0,2686285
17,205	536,1	548,8	99,85	101,95	0,171	0,167	163	0,2685926
17,631	536,1	548,8	97,28	99,23	0,171	0,167	164	0,275399
16,812	536,1	548,8	102,07	104,06	0,171	0,167	165	0,2626479
16,945	536,2	549,0	101,14	103,39	0,171	0,167	166	0,2645861
17,562	536,2	548,9	97,97	99,96	0,171	0,167	167	0,2741141
17,285	536,2	548,9	99,40	101,69	0,171	0,167	168	0,2697707
17,409	536,2	548,9	98,72	100,72	0,171	0,167	169	0,2718586
17,698	536,2	548,9	97,16	99,11	0,171	0,167	170	0,2763534
17,142	536,1	548,9	100,23	102,22	0,171	0,167	171	0,2676045
17,022	536,3	549,2	100,77	102,97	0,171	0,167	172	0,2657385
17,232	536,4	549,1	99,61	101,93	0,171	0,167	173	0,2690084
17,228	536,3	549,1	99,70	101,76	0,171	0,167	174	0,2690105
17,166	536,2	549,1	99,92	102,01	0,171	0,167	175	0,268145
17,531	536,1	549,0	97,86	99,54	0,171	0,166	176	0,2740848
17,043	536,2	549,1	100,52	102,59	0,171	0,166	177	0,2663227

17,254	536,3	549,1	99,28	101,35	0,171	0,166	178	0,2695816
17,312	536,2	549,1	99,11	101,17	0,171	0,167	179	0,2705335
17,479	536,2	549,1	98,20	100,25	0,171	0,167	180	0,2731768
17,673	536,2	549,1	96,89	98,82	0,171	0,167	181	0,2763498
17,850	536,2	549,1	96,11	97,92	0,171	0,167	182	0,2789427
16,928	536,1	549,1	101,09	103,22	0,171	0,166	183	0,2645853
17,359	536,1	549,1	98,85	100,82	0,171	0,167	184	0,2712901
16,953	536,1	549,1	101,03	103,32	0,171	0,167	185	0,2649777
17,490	536,1	549,1	97,91	100,01	0,171	0,167	186	0,2733653
17,437	536,1	549,1	98,35	100,25	0,171	0,167	187	0,2725948
17,641	536,1	549,1	97,20	99,08	0,171	0,167	188	0,2757925
17,343	536,1	549,0	98,71	100,66	0,171	0,167	189	0,2712923
16,916	536,2	549,2	101,07	103,07	0,171	0,166	190	0,2645928
16,999	536,3	549,3	100,91	102,83	0,171	0,166	191	0,2656668
16,833	536,3	549,3	101,78	103,83	0,171	0,167	192	0,2632351
17,469	536,3	549,3	98,06	100,02	0,171	0,167	193	0,2731789
17,308	536,2	549,1	98,84	100,89	0,171	0,167	194	0,2708087
16,777	536,2	549,1	101,80	103,76	0,171	0,167	195	0,2626384
16,933	536,3	549,2	100,96	103,21	0,171	0,167	196	0,2649699
17,433	536,4	549,3	98,01	100,11	0,171	0,167	197	0,2728006
17,530	536,4	549,3	97,50	99,76	0,171	0,167	198	0,2742471
17,422	536,5	549,4	98,09	100,24	0,170	0,167	199	0,2723997
17,006	536,5	549,4	100,66	102,66	0,171	0,166	200	0,2659356
17,176	536,5	549,4	99,53	101,64	0,171	0,167	201	0,2686305
17,122	536,4	549,3	99,96	101,86	0,171	0,166	202	0,2676738
17,541	536,4	549,4	97,40	99,50	0,171	0,166	203	0,2744712
17,074	536,4	549,4	100,31	102,54	0,171	0,167	204	0,2669577
17,090	536,4	549,4	99,95	102,06	0,171	0,167	205	0,2672866
17,350	536,5	549,6	98,64	100,63	0,171	0,166	206	0,271296
17,114	536,6	549,6	99,89	101,85	0,171	0,166	207	0,2676727
17,345	536,6	549,5	98,57	100,61	0,171	0,166	208	0,2712937
17,604	536,5	549,4	97,18	99,15	0,171	0,167	209	0,275373
17,306	536,5	549,4	98,67	100,68	0,171	0,166	210	0,270797
17,340	536,4	549,4	98,59	100,34	0,171	0,166	211	0,2712937
17,338	536,5	549,5	98,66	100,52	0,171	0,166	212	0,2712936
17,047	536,6	549,5	100,30	102,09	0,171	0,166	213	0,2669046
17,166	536,5	549,3	99,57	101,73	0,171	0,167	214	0,2686327
17,106	536,5	549,3	99,93	102,09	0,171	0,167	215	0,267673
17,109	536,5	549,3	99,89	101,97	0,171	0,167	216	0,2677646
16,941	536,4	549,4	101,20	103,13	0,171	0,167	217	0,2649843
16,694	536,4	549,4	102,33	104,41	0,171	0,167	218	0,261311
17,849	536,4	549,5	95,65	97,72	0,171	0,167	219	0,2793071
17,631	536,4	549,5	96,91	99,01	0,171	0,167	220	0,2757965
17,061	536,4	549,6	100,24	102,27	0,171	0,167	221	0,266905
16,789	536,5	549,6	102,07	103,94	0,171	0,167	222	0,2626523
16,572	536,5	549,6	103,14	105,48	0,171	0,167	223	0,2593053
16,906	536,4	549,5	101,24	103,27	0,171	0,167	224	0,2645869
17,252	536,5	549,6	99,01	101,02	0,171	0,167	225	0,269965
17,597	536,5	549,6	97,20	99,16	0,171	0,167	226	0,2753377
17,283	536,5	549,6	98,79	101,01	0,171	0,167	227	0,2705112
17,342	536,7	549,8	98,58	100,63	0,171	0,167	228	0,2712889
17,246	536,9	549,9	98,95	101,01	0,171	0,166	229	0,2699654
17,315	536,9	549,8	98,71	100,77	0,171	0,167	230	0,2708954
17,311	536,9	549,8	98,77	100,57	0,171	0,166	231	0,2709143
17,167	536,8	549,7	99,60	101,59	0,171	0,166	232	0,2686294
16,919	536,8	549,7	101,06	103,02	0,171	0,166	233	0,2647254
17,347	536,8	549,7	98,52	100,54	0,171	0,166	234	0,2714473
17,049	536,8	549,7	100,07	102,20	0,171	0,167	235	0,2669076
17,283	536,7	549,6	98,98	100,52	0,171	0,166	236	0,270535
17,781	536,8	549,7	96,21	97,96	0,171	0,166	237	0,2782702
17,315	536,9	549,9	98,63	100,85	0,171	0,167	238	0,2709031

16,939	537,0	549,9	100,79	103,12	0,170	0,167	239	0,2649735
16,900	537,0	549,9	101,08	103,13	0,171	0,167	240	0,2645905
16,822	537,1	549,9	101,44	103,51	0,171	0,167	241	0,2634419
17,517	537,0	549,8	97,59	99,53	0,171	0,167	242	0,2741144
17,515	537,1	549,9	97,58	99,54	0,171	0,167	243	0,2741136
17,337	537,1	549,9	98,48	100,52	0,171	0,166	244	0,2712924
17,192	537,0	549,9	99,38	101,38	0,171	0,166	245	0,2690325
17,246	537,0	549,9	99,05	101,01	0,171	0,166	246	0,2699635
17,342	537,0	549,9	98,56	100,51	0,171	0,166	247	0,2712933
16,935	537,2	550,0	100,84	103,11	0,171	0,167	248	0,2649755
17,273	537,3	550,0	98,86	100,96	0,170	0,167	249	0,2701535
17,246	537,3	549,9	98,80	101,11	0,170	0,166	250	0,2699264
17,544	537,3	549,9	97,16	99,50	0,170	0,167	251	0,2744899
17,527	537,3	549,9	97,47	99,56	0,170	0,167	252	0,2741462
17,105	537,5	550,0	99,95	101,44	0,171	0,166	253	0,2761079
17,262	537,6	550,0	98,99	100,95	0,171	0,166	254	0,269965
17,083	537,5	549,9	99,86	102,17	0,170	0,166	255	0,2672925
17,888	537,4	549,7	95,33	97,46	0,170	0,167	256	0,2798632
17,281	537,3	549,7	98,70	100,74	0,170	0,166	257	0,2705366
16,918	537,6	549,9	100,70	102,92	0,170	0,166	258	0,2649808
17,721	537,8	550,1	95,94	98,01	0,170	0,166	259	0,2776528
17,623	538,1	550,3	96,77	98,70	0,170	0,166	260	0,2757979
17,607	538,3	550,5	96,75	99,13	0,170	0,166	261	0,2754244
16,872	538,2	550,4	101,01	103,25	0,170	0,166	262	0,2640053
17,146	538,0	550,2	99,48	101,68	0,170	0,166	263	0,2682485
16,920	537,7	550,1	100,69	103,18	0,170	0,167	264	0,2647208
17,140	537,6	550,1	99,53	101,70	0,170	0,167	265	0,268249
17,849	537,6	550,1	95,51	97,50	0,170	0,166	266	0,279311
17,935	537,5	550,0	95,18	96,90	0,170	0,166	267	0,2805973
17,519	537,5	549,9	97,53	99,54	0,171	0,166	268	0,2741187
17,418	537,5	549,9	98,02	100,08	0,171	0,166	269	0,2725165
16,847	537,5	549,9	101,30	103,56	0,170	0,167	270	0,2636184
17,080	537,4	549,8	99,91	102,13	0,170	0,167	271	0,2672912
17,557	537,3	549,8	97,00	99,29	0,170	0,167	272	0,2748666
17,458	537,3	549,7	97,52	99,62	0,170	0,166	273	0,2733719
17,301	537,2	549,6	98,66	100,87	0,170	0,167	274	0,2709317
17,188	537,2	549,7	99,35	101,42	0,171	0,167	275	0,2690146
17,242	537,4	549,9	98,91	101,21	0,170	0,167	276	0,2697182
17,053	537,8	550,1	99,91	102,06	0,170	0,166	277	0,2669
17,599	537,8	550,0	96,91	99,02	0,170	0,166	278	0,275423
17,664	537,8	550,0	96,63	98,75	0,170	0,167	279	0,2764556
16,742	537,6	549,6	101,76	104,04	0,171	0,167	280	0,2622749
17,514	537,2	549,4	97,47	99,63	0,171	0,167	281	0,2741141
17,725	537,3	549,8	95,99	98,17	0,170	0,167	282	0,2776522
17,817	537,3	549,9	95,59	97,62	0,170	0,166	283	0,2789448
17,514	537,1	549,7	97,39	99,57	0,170	0,167	284	0,2742148
16,235	536,9	549,7	105,10	107,39	0,171	0,167	285	0,254102
16,286	536,8	549,7	104,67	106,80	0,171	0,166	286	0,2551072
17,229	536,8	549,7	99,15	101,27	0,171	0,167	287	0,2696676
17,292	536,8	549,6	98,76	100,97	0,171	0,167	288	0,2705358
17,053	536,7	549,6	100,25	102,23	0,171	0,167	289	0,2669049
17,249	536,7	549,6	98,84	101,02	0,171	0,166	290	0,269966
17,167	536,7	549,7	99,62	101,70	0,171	0,167	291	0,2686092
17,367	536,8	549,7	98,18	100,17	0,171	0,166	292	0,2718592
16,992	536,8	549,7	100,50	102,51	0,171	0,166	293	0,2659429
17,565	536,9	549,7	97,21	99,14	0,171	0,166	294	0,2748646
16,817	536,9	549,6	101,49	103,55	0,171	0,166	295	0,263226
17,441	536,9	549,5	97,92	99,81	0,171	0,166	296	0,2731655
17,070	536,9	549,6	99,86	101,98	0,171	0,166	297	0,2672842
17,242	537,1	549,9	98,93	101,11	0,170	0,167	298	0,2699651
17,224	537,3	550,0	99,12	101,32	0,171	0,167	299	0,2695978

17,204	537,2	549,9	99,10	101,15	0,170	0,166	300	0,2692421
17,511	537,2	549,8	97,39	99,52	0,170	0,166	301	0,2741109
17,004	537,1	549,8	100,28	102,48	0,170	0,167	302	0,2661497
16,594	537,1	549,8	102,87	104,99	0,170	0,166	303	0,2597187
16,861	537,1	549,8	101,10	103,16	0,170	0,166	304	0,2639385
17,421	537,1	549,8	97,89	99,96	0,170	0,166	305	0,2728034
16,898	537,1	549,8	100,78	103,20	0,170	0,167	306	0,2645871
17,050	537,1	549,8	100,04	102,20	0,170	0,167	307	0,2669056
17,837	537,1	549,8	95,50	97,42	0,170	0,166	308	0,2793109
17,000	537,1	549,7	99,92	102,29	0,170	0,166	309	0,2663271
17,053	537,2	549,8	99,90	101,91	0,170	0,166	310	0,2670953
16,766	537,3	549,9	101,62	103,65	0,170	0,166	311	0,2626522
16,682	537,5	550,0	102,09	104,43	0,170	0,166	312	0,2612706
16,897	537,6	550,1	100,88	102,96	0,170	0,166	313	0,2645878
17,943	537,6	550,1	94,79	96,93	0,170	0,166	314	0,280983
17,014	537,6	550,1	100,01	102,05	0,170	0,166	315	0,2665055
17,230	537,8	550,1	98,78	100,95	0,170	0,166	316	0,2699652
17,640	538,0	550,3	96,33	98,61	0,170	0,166	317	0,2763544
17,675	538,3	550,5	96,24	98,40	0,170	0,166	318	0,2767256
17,505	538,2	550,4	97,29	99,21	0,170	0,166	319	0,2740751
16,774	538,0	550,2	101,58	103,67	0,170	0,166	320	0,262638
17,327	537,9	550,2	98,33	100,54	0,170	0,166	321	0,2712976
16,992	537,8	550,1	100,21	102,37	0,170	0,166	322	0,2661116
17,089	537,7	550,1	99,55	101,74	0,170	0,166	323	0,2675369
17,245	537,7	550,0	98,66	100,91	0,170	0,166	324	0,2699629
17,321	537,6	549,9	98,30	100,48	0,170	0,166	325	0,2712919
17,415	537,5	549,8	97,67	100,15	0,170	0,167	326	0,2728023
16,969	537,4	549,7	100,33	102,47	0,170	0,167	327	0,265783
16,975	537,4	549,8	100,24	102,50	0,170	0,166	328	0,2659352
17,275	537,4	549,8	98,56	101,04	0,170	0,167	329	0,2705335
17,871	537,4	549,9	95,28	97,46	0,170	0,167	330	0,2798622
17,729	537,4	549,9	96,00	98,32	0,170	0,167	331	0,277655
17,355	537,6	549,9	98,01	100,18	0,170	0,167	332	0,2718611
17,550	537,7	550,0	96,82	98,96	0,170	0,166	333	0,2748666
16,914	537,6	549,8	100,56	102,88	0,170	0,166	334	0,2649731
17,073	537,9	550,0	99,59	101,94	0,170	0,167	335	0,2674544
17,322	538,0	550,0	98,18	100,55	0,170	0,167	336	0,2712933
17,245	538,0	550,0	98,78	101,05	0,170	0,167	337	0,270103
17,360	537,9	550,0	98,10	100,11	0,170	0,166	338	0,2717818
17,212	537,9	549,9	98,80	101,16	0,170	0,166	339	0,2695847
17,730	538,0	550,0	95,83	97,94	0,170	0,166	340	0,277653
17,505	538,1	550,1	97,08	99,30	0,170	0,166	341	0,2741172
17,457	538,1	550,0	97,47	99,87	0,170	0,166	342	0,2732669
16,974	538,0	550,0	100,14	102,41	0,170	0,166	343	0,2658428
17,285	538,0	550,1	98,57	100,91	0,170	0,166	344	0,2705366
16,476	537,9	550,1	103,37	105,54	0,170	0,166	345	0,257907
16,837	537,8	550,2	101,11	103,39	0,170	0,166	346	0,2636028
16,858	537,8	550,2	101,05	103,30	0,170	0,166	347	0,2640008
17,045	537,8	550,3	99,77	101,94	0,170	0,166	348	0,2669047
17,420	537,8	550,3	97,78	99,96	0,170	0,166	349	0,272804
17,329	537,9	550,4	98,23	100,20	0,170	0,166	350	0,2712891
17,131	537,9	550,4	99,36	101,56	0,170	0,166	351	0,26825
17,669	537,9	550,4	96,35	98,12	0,170	0,166	352	0,2767266
16,983	537,8	550,4	100,33	102,23	0,170	0,166	353	0,2659435
17,504	537,8	550,4	97,13	99,26	0,170	0,166	354	0,2741169
17,179	537,9	550,4	99,19	101,04	0,170	0,166	355	0,2690134
17,418	537,9	550,4	97,70	99,69	0,170	0,166	356	0,2728037
17,064	537,9	550,5	99,68	101,75	0,170	0,166	357	0,267198
17,422	537,9	550,5	97,77	99,94	0,170	0,166	358	0,2728029
17,043	537,9	550,5	100,03	102,15	0,170	0,167	359	0,2669059
17,673	537,9	550,5	96,48	98,39	0,171	0,166	360	0,2767255

17,077	537,9	550,4	99,70	101,80	0,170	0,166	361	0,2674269
16,746	537,9	550,5	101,60	103,86	0,170	0,166	362	0,2622358
17,421	537,9	550,5	97,84	99,85	0,170	0,166	363	0,2728032
17,045	537,9	550,5	99,95	101,91	0,170	0,166	364	0,2669049
17,073	538,0	550,5	99,70	101,93	0,170	0,166	365	0,2673569
17,402	538,0	550,5	97,83	99,69	0,170	0,166	366	0,2725858
16,887	538,0	550,5	100,94	103,04	0,170	0,166	367	0,2644991
16,477	538,0	550,6	103,48	105,49	0,171	0,166	368	0,2580085
17,680	538,1	550,5	96,23	98,38	0,170	0,166	369	0,2769526
16,508	538,1	550,5	102,97	105,44	0,170	0,166	370	0,2585033
17,697	538,1	550,5	96,17	98,49	0,170	0,167	371	0,2770973
17,551	538,1	550,5	96,93	99,03	0,170	0,166	372	0,2748652
16,768	538,2	550,5	101,13	103,81	0,170	0,166	373	0,2626073
17,212	538,2	550,4	98,88	101,22	0,170	0,167	374	0,2695835
17,212	538,2	550,4	98,85	101,19	0,170	0,167	375	0,2695841
17,002	538,2	550,4	100,02	102,35	0,170	0,167	376	0,2663272
17,266	538,2	550,4	98,49	100,72	0,170	0,166	377	0,2704942
16,688	538,2	550,4	101,95	104,34	0,170	0,167	378	0,2613639
17,108	538,3	550,4	99,31	101,79	0,170	0,167	379	0,2679778
17,610	538,3	550,4	96,49	98,76	0,170	0,166	380	0,2757986
17,360	538,3	550,4	97,98	100,24	0,170	0,166	381	0,2718607
16,590	538,3	550,4	102,48	104,93	0,170	0,167	382	0,2598915
17,175	538,3	550,4	98,97	101,33	0,170	0,167	383	0,2690144
17,559	538,3	550,4	96,92	99,16	0,170	0,167	384	0,2750769
17,060	538,3	550,4	99,87	101,83	0,170	0,166	385	0,2671832
17,067	538,3	550,4	99,78	102,03	0,170	0,166	386	0,2672879
17,349	538,3	550,4	98,00	100,37	0,170	0,167	387	0,2718597
16,890	538,4	550,4	100,80	102,92	0,170	0,167	388	0,2645879
17,638	538,4	550,4	96,36	98,63	0,170	0,166	389	0,2763545
17,061	538,4	550,4	99,45	101,80	0,170	0,166	390	0,2672878
17,037	538,4	550,4	99,71	101,93	0,170	0,166	391	0,266913
17,082	538,4	550,3	99,36	101,90	0,170	0,166	392	0,2676126
17,579	538,4	550,3	96,62	98,85	0,170	0,166	393	0,2754259
16,853	538,4	550,3	100,99	103,11	0,170	0,166	394	0,2640053
16,702	538,4	550,3	101,75	104,29	0,170	0,167	395	0,2616656
17,089	538,4	550,4	99,62	101,93	0,170	0,167	396	0,2676739
16,911	538,4	550,4	100,57	102,68	0,170	0,166	397	0,2649496
17,085	538,4	550,3	99,52	101,63	0,170	0,166	398	0,2676741
17,311	538,4	550,3	98,20	100,55	0,170	0,166	399	0,2711148
17,598	538,4	550,3	96,70	98,73	0,170	0,166	400	0,2757582
17,493	538,4	550,3	97,10	99,10	0,170	0,166	401	0,2741169

APPENDIX 3: Calibration data

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 #1788.01

ISO 17025 Accredited
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:	Ohaus	Instrument Type:	Weighing Instrument
Model:	AR2140	Asset Number:	EM-051
Serial No.:	M3658329010091	Terminal Model:	N/A
Building:	N/A	Terminal Serial No.:	N/A
Floor:	N/A	Terminal Asset No.:	N/A
Room:	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 472
 In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	Temperature	
As Found	Start: 26.0 °C	End: 26.0 °C
As Left	Start: 26.0 °C	End: 26.0 °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: 27-01-2021
 As Left Calibration Date: 27-01-2021
 Issue Date: 27-01-2021
 Requested Next Calibration Date: 31-01-2022

Authorized A2LA Signatory:

Kamel Mohand Kaci

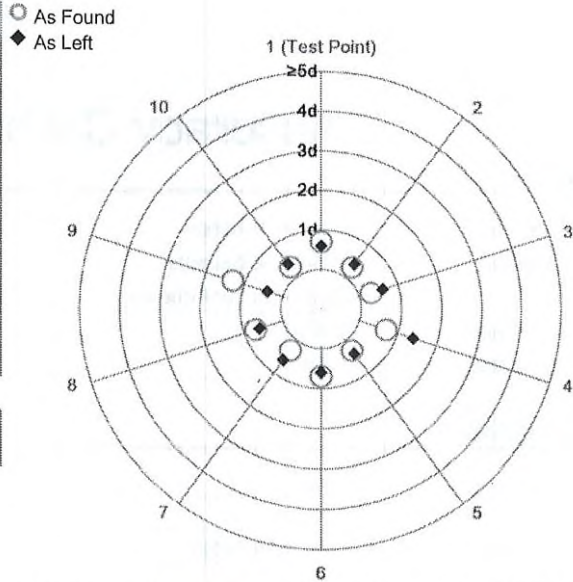
Measurement Results

Repeatability

Test Load: 100 g

	As Found	As Left
1	100.0008 g	100.0003 g
2	100.0007 g	100.0004 g
3	100.0007 g	100.0003 g
4	100.0008 g	100.0005 g
5	100.0007 g	100.0004 g
6	100.0008 g	100.0003 g
7	100.0007 g	100.0003 g
8	100.0008 g	100.0003 g
9	100.0006 g	100.0004 g
10	100.0007 g	100.0004 g

Standard Deviation	0.00007 g	0.00007 g
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The "d" in the graph represents the readability of the range/interval in which the test was performed.

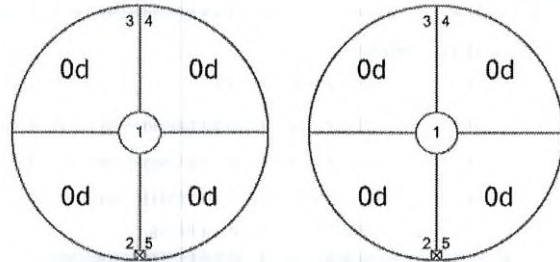
The results of this graph are based upon the absolute values of the differences from the mean value.

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

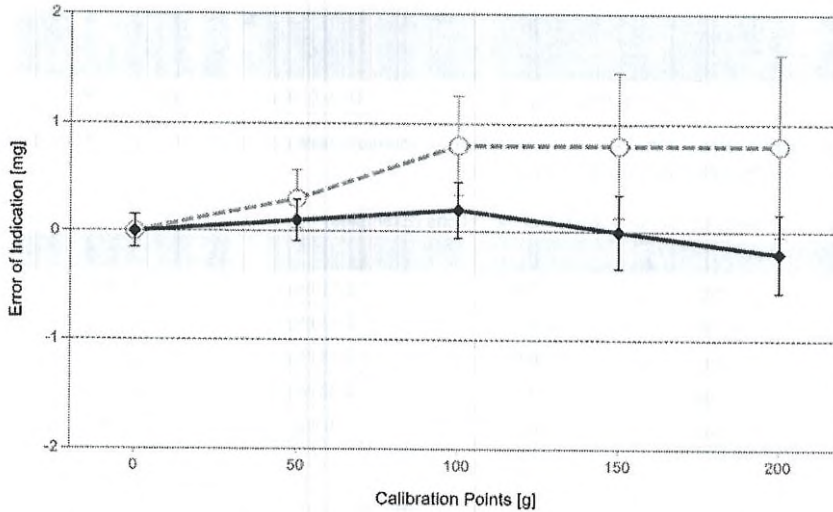
Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.15 mg	2
2	50.0000 g	50.0003 g	0.0003 g	0.27 mg	2
3	100.0000 g	100.0008 g	0.0008 g	0.46 mg	2
4	150.0000 g	150.0008 g	0.0008 g	0.67 mg	2
5	200.0001 g	200.0009 g	0.0008 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	0.15 mg	2
2	50.0000 g	50.0001 g	0.0001 g	0.19 mg	2
3	100.0000 g	100.0002 g	0.0002 g	0.26 mg	2
4	150.0000 g	150.0000 g	0.0000 g	0.34 mg	2
5	200.0001 g	199.9999 g	-0.0002 g	0.36 mg	2



○ As Found

◆ As Left

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.

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 E2

Weight Set No.:	472	Date of Issue:	28-02-2020
Certificate Number:	01127534-1	Calibration Due Date:	28-02-2021

Remarks

calibration faite selon tolerances du fabricant METTLER TOLEDO pour un model comparable: AB204

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: $3.0 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: 4 K

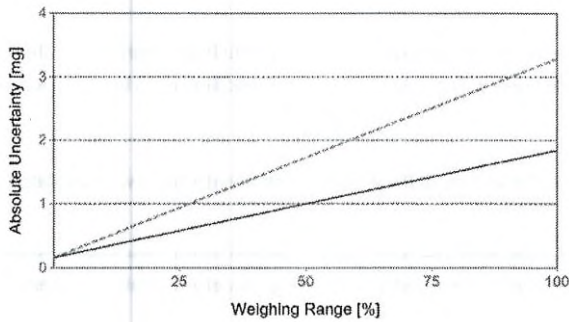
Linearization of Uncertainty Equation

	Range		As Found	As Left
	d	Max		
1	0.0001 g	210 g	$U_1 = 0.16 \text{ mg} + 0.0149 \text{ mg/g} \cdot R$	$U_1 = 0.16 \text{ mg} + 0.00798 \text{ mg/g} \cdot R$

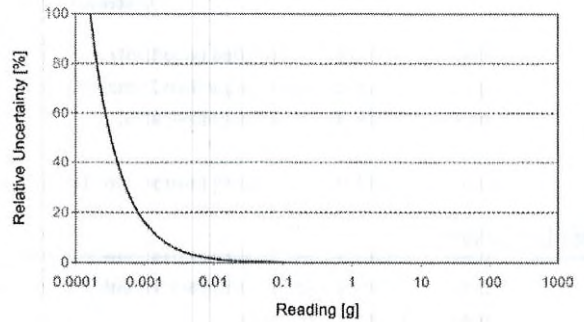
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

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

Net Indication	As Found		As Left	
	Value	Percentage	Value	Percentage
0.0210 g	0.16 mg	0.76%	0.16 mg	0.76%
0.2100 g	0.16 mg	0.078%	0.16 mg	0.077%
2.1000 g	0.19 mg	0.0091%	0.18 mg	0.0084%
21.0000 g	0.47 mg	0.0023%	0.33 mg	0.0016%
210.0000 g	3.3 mg	0.0016%	1.8 mg	0.00087%



As Found



As Left

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	100.0008 g	100.0003 g
2	100.0007 g	100.0004 g
3	100.0007 g	100.0003 g
4	100.0008 g	100.0005 g
5	100.0007 g	100.0004 g
6	100.0008 g	100.0003 g
7	100.0007 g	100.0003 g
8	100.0008 g	100.0003 g
9	100.0006 g	100.0004 g
10	100.0007 g	100.0004 g

Standard Deviation	0.00007 g	0.00007 g
Tolerance	0.00010 g ✔	0.00010 g ✔

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	0.0001 g	✓
2	50.0000 g	50.0003 g	0.0003 g	0.0003 g	✓
3	100.0000 g	100.0008 g	0.0008 g	0.0006 g	✗
4	150.0000 g	150.0008 g	0.0008 g	0.0009 g	✓
5	200.0001 g	200.0009 g	0.0008 g	0.0012 g	✓

As Left

	Reference Value	Indication	Error of Indication	Tolerance	
1	0.0000 g	0.0000 g	0.0000 g	0.0001 g	✓
2	50.0000 g	50.0001 g	0.0001 g	0.0003 g	✓
3	100.0000 g	100.0002 g	0.0002 g	0.0006 g	✓
4	150.0000 g	150.0000 g	0.0000 g	0.0009 g	✓
5	200.0001 g	199.9999 g	-0.0002 g	0.0012 g	✓

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

Certificat de Calibration de Précision Accuracy Calibration Certificate

Client

Compagnie: Services Polytests
Adresse: 695-B Rue Gaudette
Ville: Saint-Jean-Sur-Richelieu Contact: Danick Power
Zip/Code Postal: J3B 7S7
État/Province: Quebec

Weighing Device

Manufacturier: RICE LAKE Type d'Instrument: Weighing Instrument
Modèle: 4X4HP-10K # Outil: EM-114 EM-137
No. Série: C18395 Modèle Indicateur: IQ+355
Building: N/D Terminal Serial No.: 164851
Floor: N/D Terminal Asset No.: N/D
Room: N/D

Plage	Capacité Max	Lisibilité (d)
1	400 kg	0.05 kg

Procedure

Instruction de Calibration: EURAMET cg-18 v. 4.0 (11/2015)
Instruction de travail METTLER TOLEDO: 30260953

Ce certificat de calibration contient des mesures pour la calibration Tel que Trouvé. Aucune calibration Tel que Laissé n'a été effectuée puisque l'appareil n'a pas été modifié suite à la calibration Tel que Trouvé. Par conséquent, les résultats Tel que Laissé correspondent aux résultats Tel que Trouvé.

The calibration was agreed with the user below the maximum capacity of the balance.

	Temperature		
Tel que Trouvé	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.

Date calibration Tel que Trouvé: 21-12-2020
Date calibration Tel que Laissé: N/D
Date d'Émission: 21-12-2020
Requested Next Calibration Date: 31-12-2021

Authorized A2LA Signatory:

Stephane Poisson

Stephane Poisson
22 déc. 2020

Résultats de Mesure

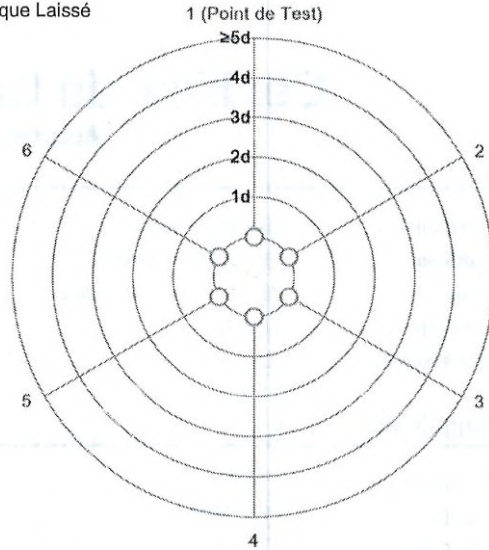
Répétabilité

Charge de Test: 70 kg

	Tel que Trouvé	Tel que Laissé
1	70.00 kg	N/D
2	70.00 kg	N/D
3	70.00 kg	N/D
4	70.00 kg	N/D
5	70.00 kg	N/D
6	70.00 kg	N/D

Écart Type	0.000 kg	N/D
------------	----------	-----

○ Tel que Trouvé
◆ Tel que Laissé



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

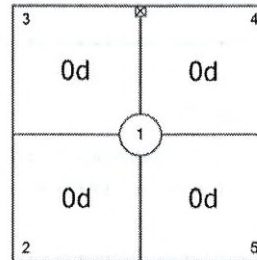
The results of this graph are based upon the absolute values of the differences from the mean value.

Excentricité

Charge de Test: 50 kg

Position	Tel que Trouvé	Tel que Laissé
1	50.00 kg	N/D
2	50.00 kg	N/D
3	50.00 kg	N/D
4	50.00 kg	N/D
5	50.00 kg	N/D

Déviatoin Maximale	0.00 kg	N/A
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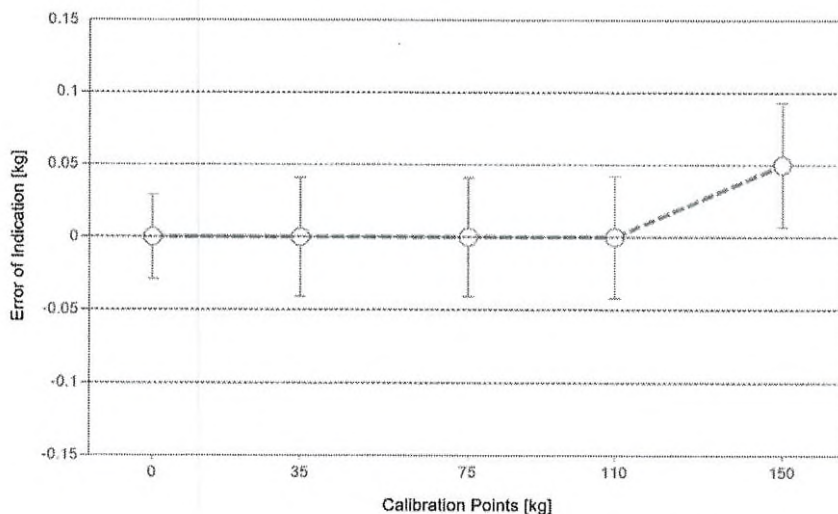
Tel que Trouvé

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

Erreur d'indication

Tel que Trouvé

	Reference Value	Indication	Erreur d'indication	Incertitude Élargie	k
1	0 kg	0.00 kg	0.00 kg	0.029 kg	2
2	35 kg	35.00 kg	0.00 kg	0.041 kg	2
3	75 kg	75.00 kg	0.00 kg	0.041 kg	2
4	110 kg	110.00 kg	0.00 kg	0.042 kg	2
5	150 kg	150.05 kg	0.05 kg	0.043 kg	2
6	110 kg	110.00 kg	0.00 kg	0.042 kg	2
7	75 kg	75.00 kg	0.00 kg	0.041 kg	2
8	35 kg	35.00 kg	0.00 kg	0.041 kg	2
9	0 kg	0.00 kg	0.00 kg	0.029 kg	2



○ Tel que Trouvé

◆ Tel que Laissé

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.

Test Equipment

Tous les poids utilisés pour le contrôle métrologique sont retraçables aux étalons Nationaux et Internationaux. Les poids ont été calibrés et certifiés par un laboratoire de calibration accrédité.

Jeu de Poids 1: OIML M1

Weight Set Number:	67094	Date d'Émission:	11-09-2020
# Certificat:	M20-0351	Date de Calibration Due:	11-09-2021

Jeu de Poids 2: OIML M1

Weight Set Number:	S	Date d'Émission:	28-05-2020
# Certificat:	1412741	Date de Calibration Due:	28-05-2021

Remarques

N/D

End of Accredited Section

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

Incertitude de Mesure du dispositif de pesage en opération

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.

Coefficient de température pour l'évaluation de l'incertitude de mesure en opération: $10.0 \cdot 10^{-6} / K$

Plage d'opération sur le site pour l'évaluation de l'incertitude de mesure en opération: 20 K

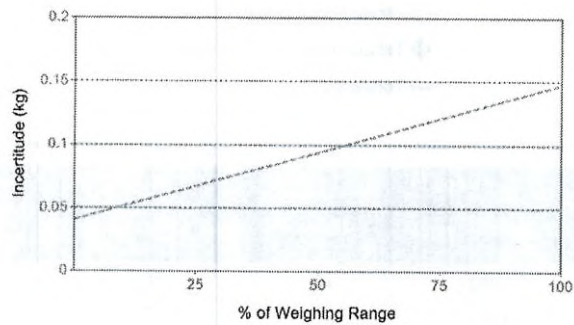
Linéarisation de l'Équation d'Incertitude

	Plage		Tel que Trouvé	Tel que Laissé
	d	Max		
1	0.05 kg	150 kg	$U_1 = 41 \text{ g} + 0.711 \text{ g/kg} \cdot R$	N/A

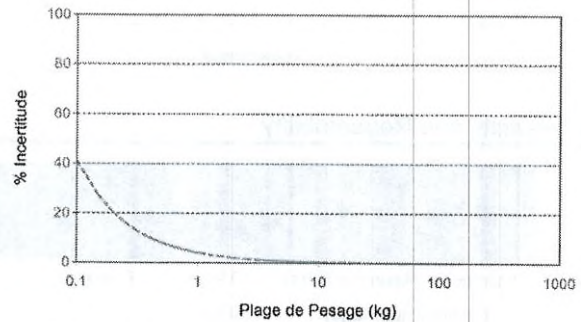
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

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

Indication Net	Tel que Trouvé		Tel que Laissé	
1.50 kg	0.042 kg	2.8%	N/A	N/A
15.00 kg	0.052 kg	0.34%	N/A	N/A
30.00 kg	0.062 kg	0.21%	N/A	N/A
75.00 kg	0.094 kg	0.13%	N/A	N/A
150.00 kg	0.15 kg	0.098%	N/A	N/A



Tel que Trouvé



Tel que Laissé

Handbook 44 Tolerance Assessment(Entretien)

Assessment done without considering measurement uncertainty.

Les mesures du certificat de calibration joint ont été évaluées selon les tolérances définies par NIST HB44.

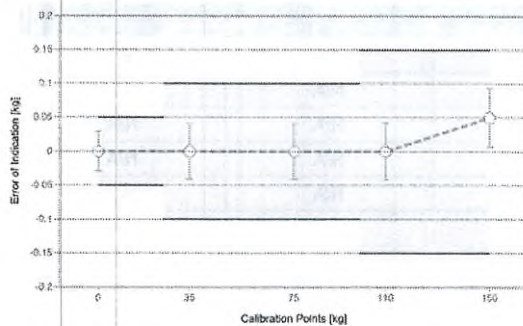
Tel que Trouvé
Tel que Laissé

Global ✓
N/D ✗

✓ = 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		Tolérance
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

○ Tel que Trouvé
 ◆ Tel que Laissé
 — Tolérance

Eccentricity and Repeatability

Test	Test Load	Tolérance	As Found		As Left	
			Max. Error / Range	Result	Max. Error / Range	Result
Excentricité (Maximum Error)	50 kg	0.10 kg	0.00 kg	✓	N/D	N/D
Excentricité (Plage)	50 kg	0.1 kg	0.00 kg	✓	N/D	N/D
Répétabilité (Maximum Error)	70 kg	0.1 kg	0.00 kg	✓	N/D	N/D
Répétabilité (Plage)	70 kg	0.10 kg	0.00 kg	✓	N/D	N/D

Max. Error: Maximum of the absolute values of the individual errors.

Range: Difference between largest and smallest measurement value.

Error of Indication

	Reference Value	Tolérance	As Found		As Left	
			Error of Indication	Result	Error of Indication	Result
1	0 kg	0.05 kg	0.00 kg	✓	N/D	N/D
2	35 kg	0.10 kg	0.00 kg	✓	N/D	N/D
3	75 kg	0.10 kg	0.00 kg	✓	N/D	N/D
4	110 kg	0.15 kg	0.00 kg	✓	N/D	N/D
5	150 kg	0.15 kg	0.05 kg	✓	N/D	N/D
6	110 kg	0.15 kg	0.00 kg	✓	N/D	N/D
7	75 kg	0.10 kg	0.00 kg	✓	N/D	N/D
8	35 kg	0.10 kg	0.00 kg	✓	N/D	N/D
9	0 kg	0.05 kg	0.00 kg	✓	N/D	N/D

CALIBRATION CERTIFICATE #

Calibration date : 1899-12-30
Certificate issued : 2021-03-18

Company name
Company address
City, Province, Canada

Calibration of
Volumetric flow meter American Meter Company DTM-200A S/N : ABCD7

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 $\pm 0.2\%$ of reading for a flow range between 5 SCCM to 10 SLPM, $\pm 0.3\%$ of reading for a flow range between 10 SLPM to 30 SLPM, $\pm 0.2\%$ of reading for a flow range between 30 SLPM to 3000 SLPM, $\pm 0.3\%$ of reading for a flow range above 3000 SLPM to 6000 SLPM and $\pm 0.5\%$ 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
Results	
Remarks	Calibration frequency every 12 months

 Metrologist

 Laboratory Manager

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 3650, Matte blvd. (Unit A-1), Brossard (Quebec), Canada, J4Y 2Z2
 Tel: (450) 444-3600 Fax: (450) 444-1088 www.polycontrols.com

Calibration certificate

Serial Number:	ABCD7	Test stand:	1
Calibration Date:		Procedure:	POS-CAL-005
Instrument ID:		Decision rule:	Method #3

Standard equipment used for final calibration

Description	Model	Serial #	Traceability	Due date
Fluke molbloc_100 slpm	2E2-S	380	1500289416	2021-08-07
Fluke molbloc_250 slpm	5E2-S	349	1500289417	2021-08-07
Fluke molbox1	Molbox1	881	1500289834	2021-08-13
RTD Mist	M22	2208101	2020003042	2021-04-23
Module 44.5 PSI avec Baro 163671	Module 30	160659	2020003156	2021-04-28

Final specifications of the device under test

Calibration conditions

Gas	Air	Gas	Air
Operation temperature		Ambient temperature	20.5 °C
Inlet pressure		Ambient pressure	1026.22 mbar
Outlet pressure		Orientation	
Reference temperature		Seals	
Reference pressure		Valve	
Range	0-325 ACFH		
Input/Output Signals	-		
Supply			
Accuracy	±2 %O.R.		

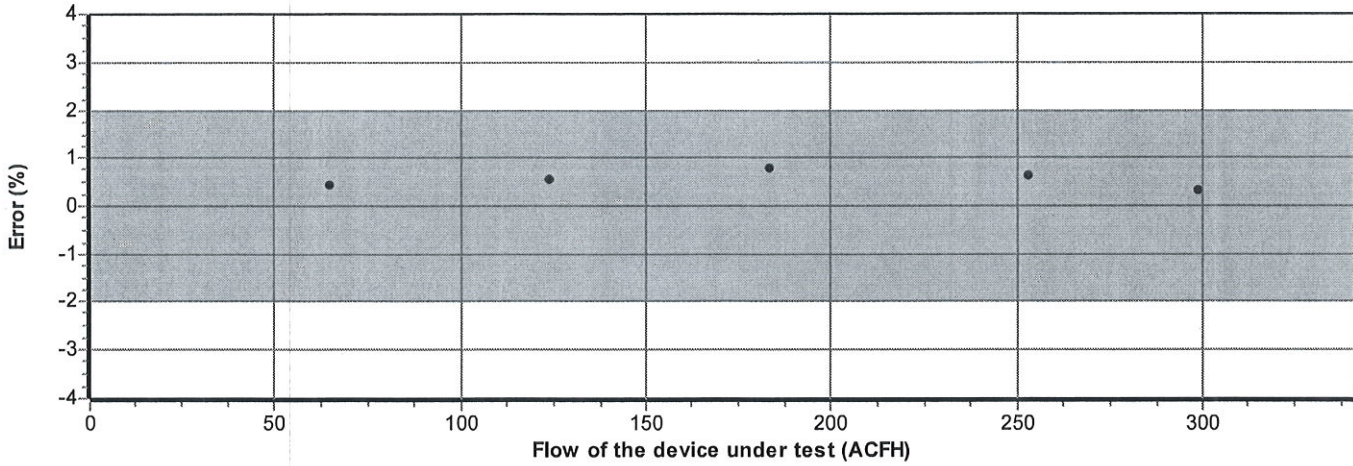
Final readings

Test Flow ACFH	Device under test ft³	Measured values			Calculated Reference ft³	Calculated Error ft³	Acceptable Error ft³	Uncertainty k = 2 ft³	TUR
		Pressure PSIA	Temperature °C	Reference ft³					
64.9254	10.860	14.9329	22.19	10.946	10.812	0.048	0.216		
124.3187	20.825	14.9895	22.17	21.054	20.716	0.109	0.414		
183.5513	30.765	15.0816	22.20	31.216	30.530	0.235	0.611		
253.1226	42.360	15.2338	22.26	43.465	42.094	0.266	0.842		
299.2143	49.995	15.3620	22.54	51.852	49.845	0.150	0.997		

Calibration certificate #

Serial Number:	ABCD7	Test stand:	1
Calibration Date:		Procedure:	POS-CAL-005
Instrument ID:		Decision rule:	Method #3

Final results



See the appendix for the guideline of decision rule

CERTIFICAT D'ÉTALONNAGE # 13427

Date d'étalonnage : 2020-12-21

Date d'émission du certificat : 2020-12-22

**Services Polytests
695 B Gaudette street
St-Jean-sur-Richelieu, Québec, Canada
J3B 7S7**

**Étalonnage d'un
Débitmètre volumétrique American Meter Company DTM-200A S/N : 99A274209**

CONFORMITÉ AU PROGRAMME DE QUALITÉ

Tous les étalonnages sont effectués conformément au manuel d'assurance qualité de Polycontrols qui est conforme à la norme ISO/IEC 17025: 2017, à la norme ISO 9001 – 2015 ainsi qu'à toutes autres exigences de qualité définies dans la description d'achat des clients. Les résultats ne sont valides que pour l'objet soumis à l'essai ou à l'étalonnage. Si applicable, la règle de décision est décrite au certificat.

TRAÇABILITÉ

La traçabilité des étalons de débit au National Institute of Standards and Technology, NIST, est maintenue par les laboratoires de Fluke Corporation de Phoenix, Arizona et est conforme aux normes ISO/IEC 17025, ANSI/NCSL Z540-1-1994, ISO-10012-1, MIL-STD 45662A.

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

APTITUDE EN MATIÈRE DE MESURE ET D'ÉTALONNAGE - CMC

Les rendements métrologiques d'étalonnage ont une incertitude de $\pm 0.2\%$ de la lecture pour les mesures entre 5 SCCM à 10 SLPM, $\pm 0.3\%$ de la lecture pour les mesures entre 10 SLPM à 30 SLPM, $\pm 0.2\%$ de la lecture pour les mesures entre 30 SLPM à 3000 SLPM, $\pm 0.3\%$ de la lecture pour les mesures supérieures à 3000 SLPM jusqu'à 6000 SLPM et $\pm 0.5\%$ pour les mesures inférieures à 5 SCCM jusqu'à concurrence de 1 SCCM, équivalent air ou azote. Les incertitudes exprimées sont élargies avec un facteur d'élargissement $k = 2$, et ce, pour un niveau de confiance d'environ 95 %, dans l'hypothèse d'une distribution normale incluant la résolution de l'instrument. Le rapport d'incertitude des essais (RIE) de cet étalonnage respecte un ratio de 4:1 à moins d'indication contraire.

SOMMAIRE DES CONDITIONS DE L'INSTRUMENT EN TEST

Conditions initiales	En bon état
Travail Effectué	Étalonnage de l'instrument
Résultats	Lectures Initiales = Lectures finales, aucun ajustement
Remarques	Lectures finales dans les tolérances
	Fréquence d'étalonnage aux 12 mois



Bernard Poirier
Métrologiste



Responsable du laboratoire

Certificat d'étalonnage # 13427

Numéro de série:	99A274209	Station de mesure:	3
Date d'étalonnage:	2020-12-21	Procédure:	POS-CAL-005
Identification de l'instrument:	EM-130	Règle de décision:	Méthode #3

Instrument de mesure de référence utilisé pour l'étalonnage final

Description	Modèle	# Série	Traçabilité	Date dû
Fluke molbloc_120 slpm	2E2-S	237	1500279836	2021-03-06
Fluke molbloc_30 slpm	3E4-VCR-V-Q	2403	1500285594	2021-06-10
Fluke molbox1	Molbox1	755	1500285062	2021-06-09
RTD Mist	M22	2208102	2020003043	2021-04-23
Module 44.5 PSI avec Baro 163671	Module 30	160659	2020003156	2021-04-28

Spécifications finales de l'appareil

Gaz
Température d'opération
Pression à l'entrée
Pression à la sortie
Température de référence
Pression de référence
Étendue d'échelle
Signaux Entrée/Sortie
Alimentation
Tolérance ±1 %O.R.

Air


0-200 ACFH
-

Condition d'étalonnage

Gaz
Température ambiante
Pression ambiante
Orientation
Élastomère
Valve
Air
21.5 °C
1005.15 mbar
Verticale
Viton
Viton

Lectures finales

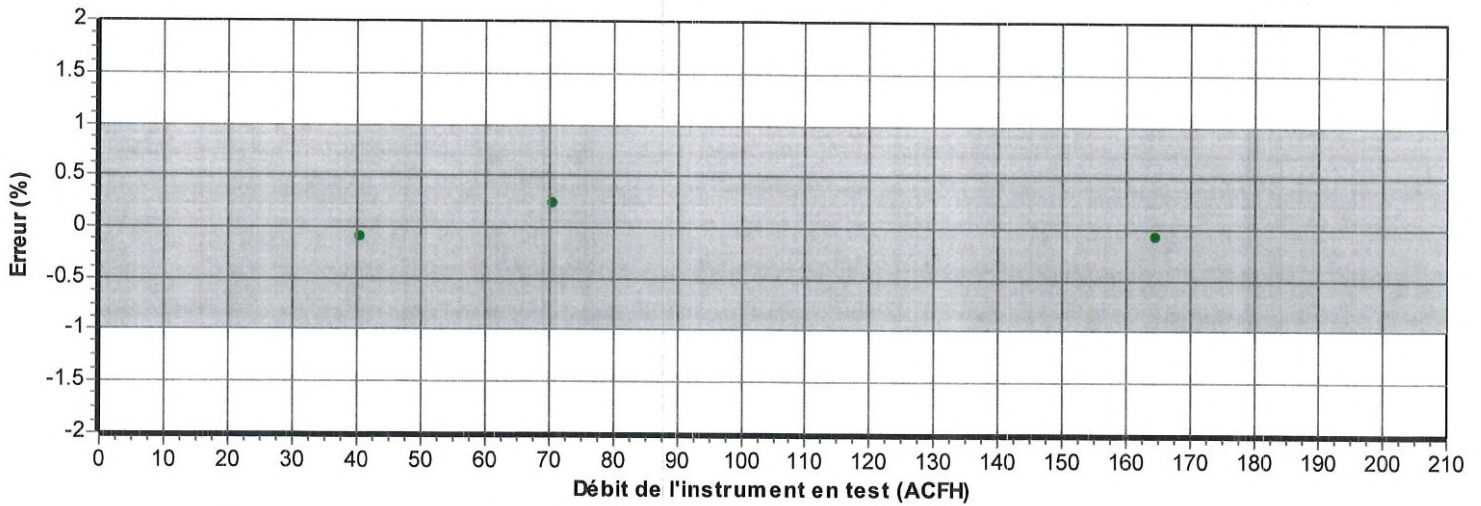
Débit du test ACFH	Instrument en test ft ³	Valeurs mesurées			Référence calculée ft ³	Erreur calculée ft ³	Tolérance acceptable ft ³	Incertitude k = 2 ft ³	TUR
		Pression PSIA	Température °C	Référence ft ³					
40.6438	6.760	14.5928	21.49	6.710	6.766	-0.006	0.068	0.023	2.92
70.7640	11.790	14.6081	21.33	11.683	11.762	0.028	0.118	0.029	>4
164.5625	27.430	14.7148	21.28	27.473	27.453	-0.023	0.275	0.068	>4

Fe. : 1.0008876

 2021.01.12

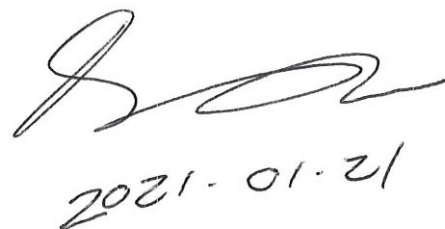
Certificat d'étalonnage # 13427

Numéro de série:	99A274209	Station de mesure:	3
Date d'étalonnage:	2020-12-21	Procédure:	POS-CAL-005
Identification de l'instrument:	EM-130	Règle de décision:	Méthode #3

Résultats finaux



Voir l'annexe pour la règle de décision



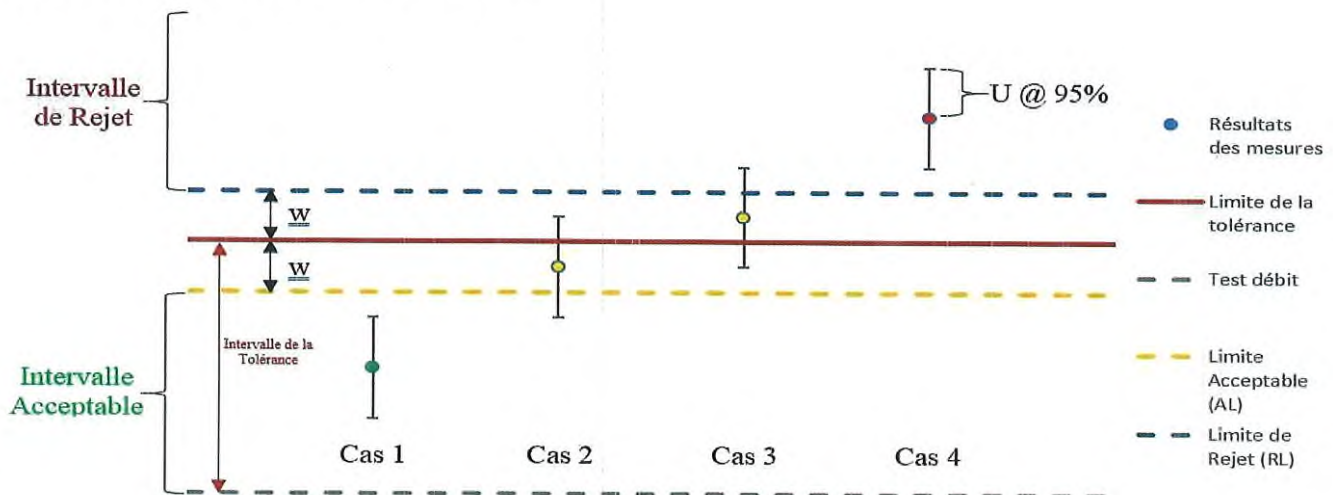
2021-01-21

Annexe pour la règle de décision

Méthode 3 Statut de Conformité Non-binaire avec Bande de Garde en considérant l'incertitude de la mesure directement

Cette méthode tient compte d'une bande de garde pour définir l'intervalle acceptable et de rejet. La limite acceptable du résultat de la mesure est calculée selon la méthode mathématique suivante $AL = TL - w$ et de rejet $RL = TL + w$, dont $w = rU$. Le multiple r de l'incertitude combiné élargie U peut être défini selon la table 1 section 5.2 du document ILAC G8 : 2019. L'incertitude de la mesure U est une incertitude combinée élargie ayant un niveau de confiance de 95% ($k = 2$). La règle de conformité non-binaire avec bande de garde est définie lorsqu'il y a quatre choix sur le statut de l'essai : dans la tolérance, acceptation conditionnelle, rejet conditionnel, et hors tolérance.

Les conformités de l'essai sont définies telles que :



Explication de la règle Non-Binaire avec Bande de Garde

Cas 1 – Inférieur à la limite acceptable AL, Statut : Dans les tolérances (In tolerance).

- Le résultat de la mesure est à l'intérieur de l'intervalle acceptable. Cependant, l'estimation du risque en assumant la probabilité d'une distribution normale d'être à l'extérieur de la limite de la tolérance est $< 2.5\%$. L'incertitude de l'essai est directement prise en considération. Couleur **verte**.

Cas 2 – Inférieur à la limite de la tolérance TL, supérieur à la limite acceptable AL, Statut : Dans les tolérances-Conditionnel.

- Le résultat de la mesure est à l'extérieur de l'intervalle acceptable mais inférieur à la limite de la tolérance. Cependant, la valeur observée est située dans la bande de garde $w = TL - AL$ et le statut du résultat est conditionnel à l'évaluation du risque du client. L'incertitude de la mesure est directement prise en considération. Couleur **jaune**.

Cas 3 – Supérieur à la limite de la tolérance, inférieur à RL, Statut : Hors tolérance-Conditionnel.

- Le résultat de la mesure est supérieur à la limite de la tolérance mais à l'extérieur de l'intervalle de rejet. Cependant, la valeur observée est située dans la bande de garde $w = TL - RL$ et le statut du résultat est conditionnel à l'évaluation du risque du client. L'incertitude de la mesure est directement prise en considération. Couleur **jaune**.

Cas 4 – Supérieur à la limite de rejet RL, Statut : Hors-tolérance (Out of tolerance).

- Le résultat de la mesure est à l'intérieur de l'intervalle de rejet. L'incertitude de l'essai est directement prise en considération. Couleur **rouge**.

CERTIFICAT D'ÉTALONNAGE # 13439

Date d'étalonnage : 2020-12-22
Date d'émission du certificat : 2020-12-23

Services Polytests
695 B Gaudette street
St-Jean-sur-Richelieu, Québec, Canada
J3B 7S7

Étalonnage d'un
Shinigawa DCDA-2c S/N : 23544

CONFORMITÉ AU PROGRAMME DE QUALITÉ

Tous les étalonnages sont effectués conformément au manuel d'assurance qualité de Polycontrols qui est conforme à la norme ISO/IEC 17025: 2017, à la norme ISO 9001 – 2015 ainsi qu'à toutes autres exigences de qualité définies dans la description d'achat des clients. Les résultats ne sont valides que pour l'objet soumis à l'essai ou à l'étalonnage. Si applicable, la règle de décision est décrite au certificat.

TRAÇABILITÉ

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APTITUDE EN MATIÈRE DE MESURE ET D'ÉTALONNAGE - CMC


Les rendements métrologiques d'étalonnage ont une incertitude de $\pm 0.2\%$ de la lecture pour les mesures entre 5 SCCM à 10 SLPM, $\pm 0.3\%$ de la lecture pour les mesures entre 10 SLPM à 30 SLPM, $\pm 0.2\%$ de la lecture pour les mesures entre 30 SLPM à 3000 SLPM, $\pm 0.3\%$ de la lecture pour les mesures supérieures à 3000 SLPM jusqu'à 6000 SLPM et $\pm 0.5\%$ pour les mesures inférieures à 5 SCCM jusqu'à concurrence de 1 SCCM, équivalent air ou azote. Les incertitudes exprimées sont élargies avec un facteur d'élargissement $k = 2$, et ce, pour un niveau de confiance d'environ 95 %, dans l'hypothèse d'une distribution normale incluant la résolution de l'instrument. Le rapport d'incertitude des essais (RIE) de cet étalonnage respecte un ratio de 4:1 à moins d'indication contraire.

SOMMAIRE DES CONDITIONS DE L'INSTRUMENT EN TEST

Conditions initiales	En bon état
Travail Effectué	Étalonnage de l'instrument
Résultats	Lectures initiales dans/hors tolérances-conditionnel Lectures finales dans les tolérances avec un K facteur de 0.98
Remarques	Fréquence d'étalonnage aux 12 mois


Bernard Poirier
Métrologiste


Responsable du laboratoire


2021.01.12

Certificat d'étalonnage # 13439

Numéro de série: 23544	Station de mesure: 3
Date d'étalonnage: 2020-12-22	Procédure: POS-CAL-005
Identification de l'instrument: EM-178	Règle de décision: Méthode #3

Instrument de mesure de référence utilisé pour l'étalonnage initial

Description	Modèle	# Série	Traçabilité	Date dû
Fluke molbloc_30 slpm	3E4-VCR-V-Q	2403	1500285594	2021-06-10
Fluke molbox1	Molbox1	755	1500285062	2021-06-09
RTD Mist	M22	2208102	2020003043	2021-04-23
Module 44.5 PSI avec Baro 163671	Module 30	160659	2020003156	2021-04-28

Spécifications initiales de l'appareil

Condition d'étalonnage

Gaz	Air	Gaz	Air
Température d'opération		Température ambiante	20.5 °C
Pression à l'entrée		Pression ambiante	1001.8 mbar
Pression à la sortie		Orientation	Horizontale
Température de référence		Élastomère	Viton
Pression de référence		Valve	
Étendue d'échelle	10-2000 ALH		
Signaux Entrée/Sortie	-		
Alimentation			
Tolérance ±2 %O.R.			

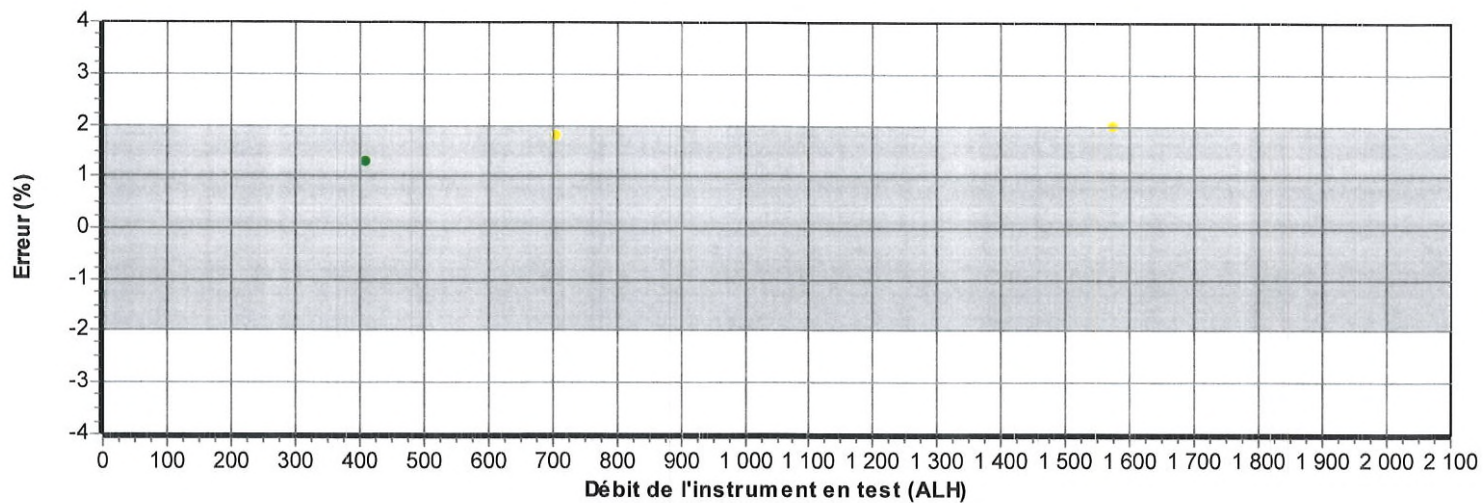
Lectures initiales

Débit du test ALH	Instrument en test L	Valeurs mesurées			Référence calculée L	Erreur calculée L	Tolérance acceptable L	Incertitude k = 2 L	TUR
		Pression PSIA	Température °C	Référence L					
409.8377	69.1750	14.5381	20.38	67.7339	68.2997	0.8753	1.3660	0.2264	>4
706.3275	119.7100	14.5430	20.40	116.6794	117.6206	2.0894	2.3524	0.3898	>4
1573.6968	266.9000	14.5563	20.40	259.8304	261.6944	5.2056	5.2339	0.8674	>4

Certificat d'étalonnage # 13439

Numéro de série: 23544	Station de mesure: 3
Date d'étalonnage: 2020-12-22	Procédure: POS-CAL-005
Identification de l'instrument: EM-178	Règle de décision: Méthode #3

Résultats initiaux



Voir l'annexe pour la règle de décision

Certificat d'étalonnage # 13439

Numéro de série: 23544	Station de mesure: 3
Date d'étalonnage: 2020-12-22	Procédure: POS-CAL-005
Identification de l'instrument: EM-178	Règle de décision: Méthode #3

Instrument de mesure de référence utilisé pour l'étalonnage final

Description	Modèle	# Série	Traçabilité	Date dû
Fluke molbloc_30 slpm	3E4-VCR-V-Q	2403	1500285594	2021-06-10
Fluke molbox1	Molbox1	755	1500285062	2021-06-09
RTD Mist	M22	2208102	2020003043	2021-04-23
Module 44.5 PSI avec Baro 163671	Module 30	160659	2020003156	2021-04-28

Spécifications finales de l'appareil


Condition d'étalonnage

Gaz	Air	Gaz	Air
Température d'opération		Température ambiante	21 °C
Pression à l'entrée		Pression ambiante	1002.18 mbar
Pression à la sortie		Orientation	Horizontale
Température de référence		Élastomère	Viton
Pression de référence		Valve	
Étendue d'échelle	10-2000 ALH		
Signaux Entrée/Sortie	-		
Alimentation			
Tolérance	±2 %O.R.		

Lectures finales

Débit du test ALH	Instrument en test L	Valeurs mesurées			Référence calculée L	Erreur calculée L	Tolérance acceptable L	Incertitude k = 2 L	TUR
		Pression PSIA	Température °C	Référence L					
403.8407	66.8703	14.5466	21.01	66.5447	67	-0.3356	1.3441	0	>4
696.9086	115.8066	14.5496	20.81	115.0861	116	-0.3173	2.3225	0	>4
1573.7245	261.4440	14.5575	20.48	260.0681	262	-0.5338	5.2396	1	>4

fc: 1.0019396



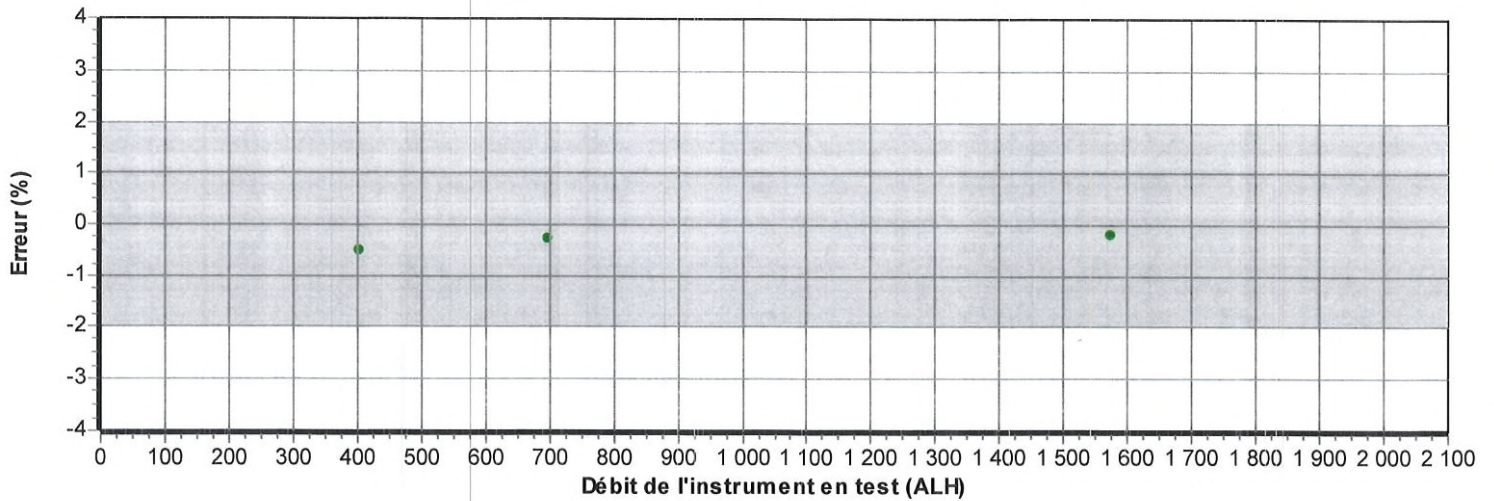
2021.01.21

Certificat d'étalonnage # 13439

Numéro de série: 23544
 Date d'étalonnage: 2020-12-22
 Identification de l'instrument: EM-178

Station de mesure: 3
 Procédure: POS-CAL-005
 Règle de décision: Méthode #3

Résultats finaux



Voir l'annexe pour la règle de décision

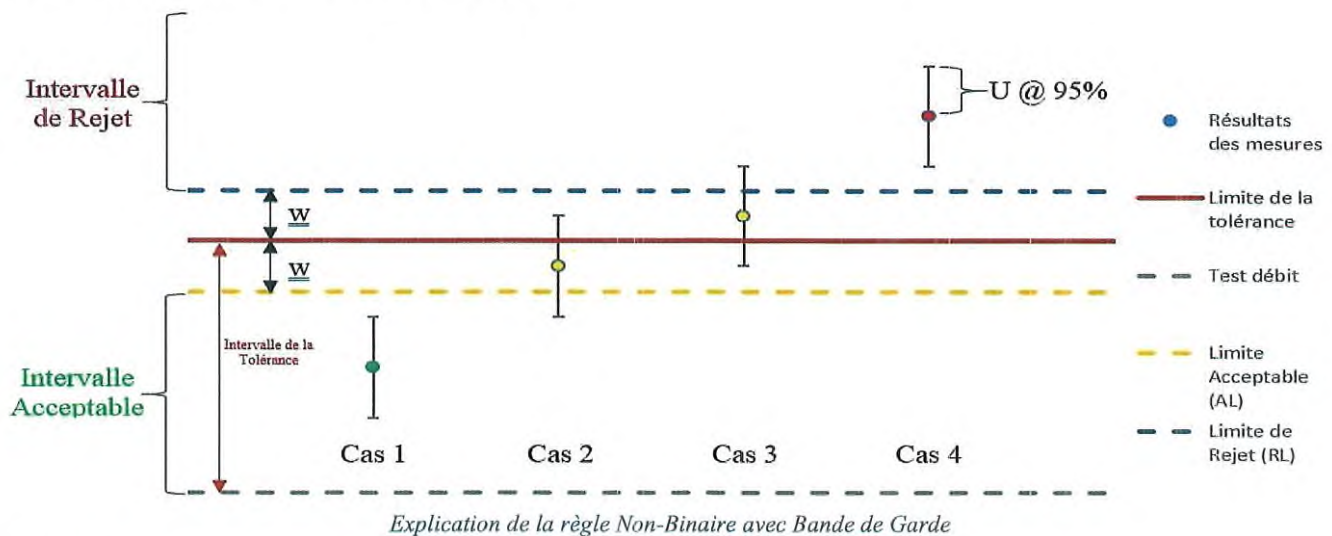
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Annexe pour la règle de décision

Méthode 3 Statut de Conformité Non-binaire avec Bande de Garde en considérant l'incertitude de la mesure directement

Cette méthode tient compte d'une bande de garde pour définir l'intervalle acceptable et de rejet. La limite acceptable du résultat de la mesure est calculée selon la méthode mathématique suivante $AL = TL - w$ et de rejet $RL = TL + w$, dont $w = rU$. Le multiple r de l'incertitude combiné élargie U peut être défini selon la table 1 section 5.2 du document ILAC G8 : 2019. L'incertitude de la mesure U est une incertitude combinée élargie ayant un niveau de confiance de 95% ($k = 2$). La règle de conformité non-binaire avec bande de garde est définie lorsqu'il y a quatre choix sur le statut de l'essai : dans la tolérance, acceptation conditionnelle, rejet conditionnel, et hors tolérance.

Les conformités de l'essai sont définies telles que :



Cas 1 – Inférieur à la limite acceptable AL, Statut : Dans les tolérances (In tolerance).

- Le résultat de la mesure est à l'intérieur de l'intervalle acceptable. Cependant, l'estimation du risque en assumant la probabilité d'une distribution normale d'être à l'extérieur de la limite de la tolérance est $< 2.5\%$. L'incertitude de l'essai est directement prise en considération. Couleur **verte**.

Cas 2 – Inférieur à la limite de la tolérance TL, supérieur à la limite acceptable AL, Statut : Dans les tolérances-Conditionnel.

- Le résultat de la mesure est à l'extérieur de l'intervalle acceptable mais inférieur à la limite de la tolérance. Cependant, la valeur observée est située dans la bande de garde $w = TL - AL$ et le statut du résultat est conditionnel à l'évaluation du risque du client. L'incertitude de la mesure est directement prise en considération. Couleur **jaune**.

Cas 3 – Supérieur à la limite de la tolérance, inférieur à RL, Statut : Hors tolérance-Conditionnel.

- Le résultat de la mesure est supérieur à la limite de la tolérance mais à l'extérieur de l'intervalle de rejet. Cependant, la valeur observée est située dans la bande de garde $w = TL - RL$ et le statut du résultat est conditionnel à l'évaluation du risque du client. L'incertitude de la mesure est directement prise en considération. Couleur **jaune**.

Cas 4 – Supérieur à la limite de rejet RL, Statut : Hors-tolérance (Out of tolerance).

- Le résultat de la mesure est à l'intérieur de l'intervalle de rejet. L'incertitude de l'essai est directement prise en considération. Couleur **rouge**.

CERTIFICAT D'ÉTALONNAGE # 13438

Date d'étalonnage : 2020-12-22
Date d'émission du certificat : 2020-12-23

Services Polytests
695 B Gaudette street
St-Jean-sur-Richelieu, Québec, Canada
J3B 7S7

Étalonnage d'un
Shinigawa DCDA-2c S/N : 23543

CONFORMITÉ AU PROGRAMME DE QUALITÉ

Tous les étalonnages sont effectués conformément au manuel d'assurance qualité de Polycontrols qui est conforme à la norme ISO/IEC 17025: 2017, à la norme ISO 9001 – 2015 ainsi qu'à toutes autres exigences de qualité définies dans la description d'achat des clients. Les résultats ne sont valides que pour l'objet soumis à l'essai ou à l'étalonnage. Si applicable, la règle de décision est décrite au certificat.

TRAÇABILITÉ

La traçabilité des étalons de débit au National Institute of Standards and Technology, NIST, est maintenue par les laboratoires de Fluke Corporation de Phoenix, Arizona et est conforme aux normes ISO/IEC 17025, ANSI/NCSL Z540-1-1994, ISO-10012-1, MIL-STD 45662A.

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

APTITUDE EN MATIÈRE DE MESURE ET D'ÉTALONNAGE - CMC


Les rendements métrologiques d'étalonnage ont une incertitude de $\pm 0.2\%$ de la lecture pour les mesures entre 5 SCCM à 10 SLPM, $\pm 0.3\%$ de la lecture pour les mesures entre 10 SLPM à 30 SLPM, $\pm 0.2\%$ de la lecture pour les mesures entre 30 SLPM à 3000 SLPM, $\pm 0.3\%$ de la lecture pour les mesures supérieures à 3000 SLPM jusqu'à 6000 SLPM et $\pm 0.5\%$ pour les mesures inférieures à 5 SCCM jusqu'à concurrence de 1 SCCM, équivalent air ou azote. Les incertitudes exprimées sont élargies avec un facteur d'élargissement $k = 2$, et ce, pour un niveau de confiance d'environ 95 %, dans l'hypothèse d'une distribution normale incluant la résolution de l'instrument. Le rapport d'incertitude des essais (RIE) de cet étalonnage respecte un ratio de 4:1 à moins d'indication contraire.

SOMMAIRE DES CONDITIONS DE L'INSTRUMENT EN TEST

Conditions initiales	En bon état
Travail Effectué	Étalonnage de l'instrument
Résultats	Lectures Initiales = Lectures finales, aucun ajustement
Remarques	Lectures finales dans les tolérances
	Fréquence d'étalonnage aux 12 mois


Bernard Poirier
Métrologiste


Responsable du laboratoire


2021-01-12

Certificat d'étalonnage # 13438

Numéro de série: 23543	Station de mesure: 3
Date d'étalonnage: 2020-12-22	Procédure: POS-CAL-005
Identification de l'instrument: EM-179	Règle de décision: Méthode #3

Instrument de mesure de référence utilisé pour l'étalonnage final

Description	Modèle	# Série	Traçabilité	Date dû
Fluke molbloc_30 slpm	3E4-VCR-V-Q	2403	1500285594	2021-06-10
Fluke molbox1	Molbox1	755	1500285062	2021-06-09
RTD Mist	M22	2208102	2020003043	2021-04-23
Module 44.5 PSI avec Baro 163671	Module 30	160659	2020003156	2021-04-28

Spécifications finales de l'appareil

Condition d'étalonnage

Gaz	Air	Gaz	Air
Température d'opération		Température ambiante	20.5 °C
Pression à l'entrée		Pression ambiante	1001.04 mbar
Pression à la sortie		Orientation	Horizontale
Température de référence		Élastomère	Viton
Pression de référence		Valve	
Étendue d'échelle	10-2000 ALH		
Signaux Entrée/Sortie	-		
Alimentation			
Tolérance	±2 %O.R.		

Lectures finales

Débit du test ALH	Instrument en test L	Valeurs mesurées			Référence calculée L	Erreur calculée L	Tolérance acceptable L	Incertitude k = 2 L	TUR
		Pression PSIA	Température °C	Référence L					
406.2081	68.3650	14.5370	20.32	67.0974	67.6478	0.7172	1.3530	0.2242	>4
735.9483	124.0750	14.5375	20.26	121.7199	122.6911	1.3839	2.4538	0.4066	>4
1572.2745	264.2100	14.5401	20.55	259.4897	261.7685	2.4415	5.2354	0.8678	>4

fc: 0,98995

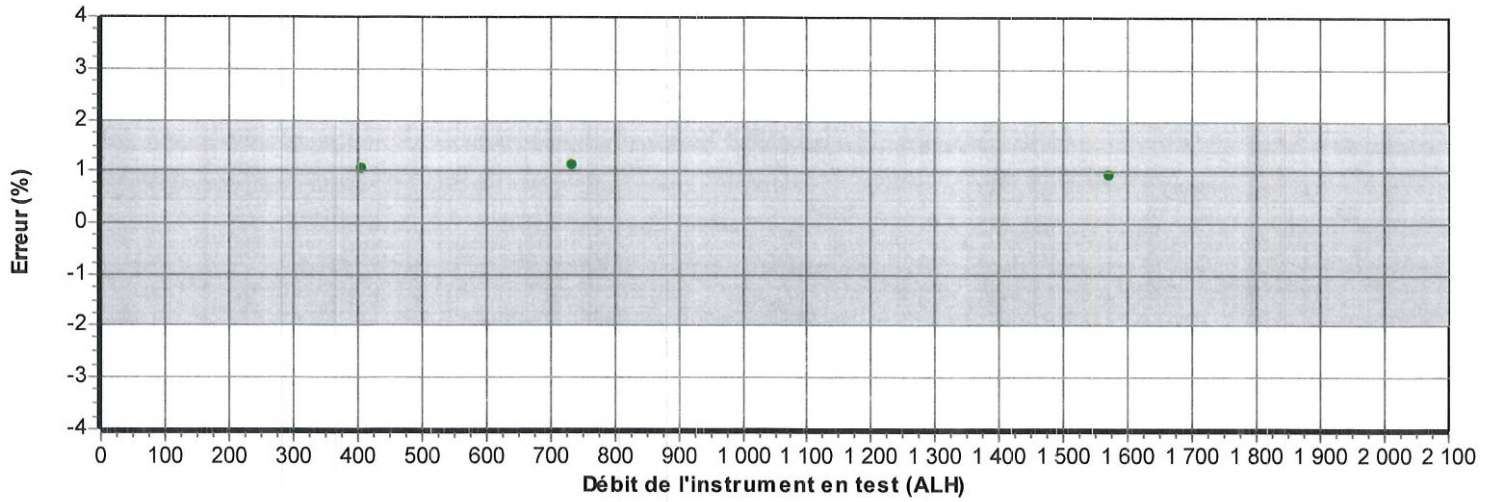


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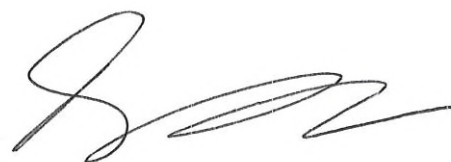
Certificat d'étalonnage # 13438

Numéro de série:	23543	Station de mesure:	3
Date d'étalonnage:	2020-12-22	Procédure:	POS-CAL-005
Identification de l'instrument:	EM-179	Règle de décision:	Méthode #3

Résultats finaux



Voir l'annexe pour la règle de décision



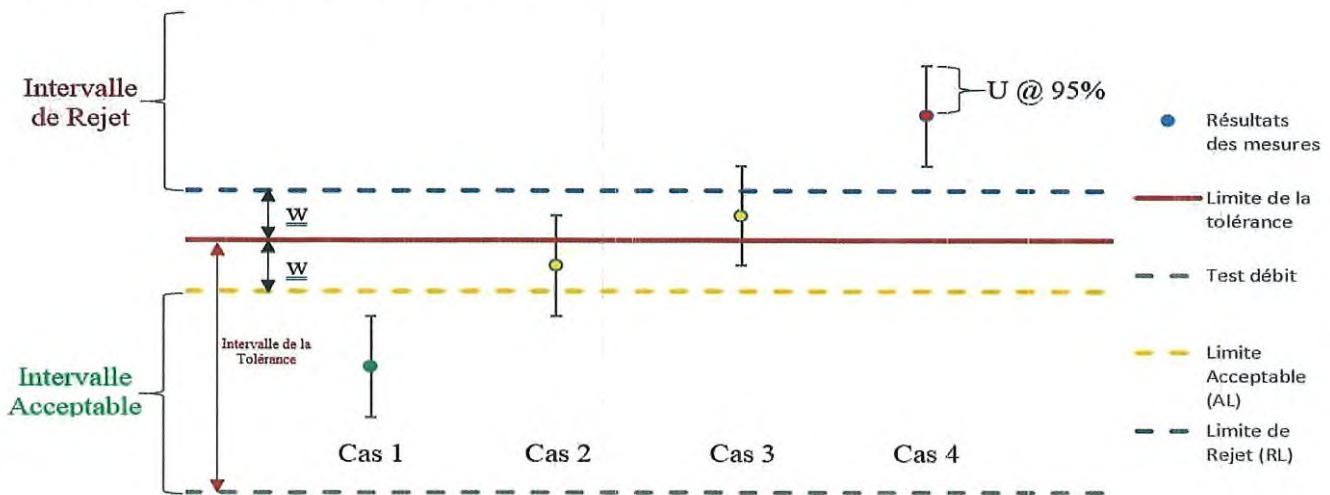
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Annexe pour la règle de décision

Méthode 3 Statut de Conformité Non-binaire avec Bande de Garde en considérant l'incertitude de la mesure directement

Cette méthode tient compte d'une bande de garde pour définir l'intervalle acceptable et de rejet. La limite acceptable du résultat de la mesure est calculée selon la méthode mathématique suivante $AL = TL - w$ et de rejet $RL = TL + w$, dont $w = rU$. Le multiple r de l'incertitude combiné élargie U peut être défini selon la table 1 section 5.2 du document ILAC G8 : 2019. L'incertitude de la mesure U est une incertitude combinée élargie ayant un niveau de confiance de 95% ($k = 2$). La règle de conformité non-binaire avec bande de garde est définie lorsqu'il y a quatre choix sur le statut de l'essai : dans la tolérance, acceptation conditionnelle, rejet conditionnel, et hors tolérance.

Les conformités de l'essai sont définies telles que :



Explication de la règle Non-Binaire avec Bande de Garde

Cas 1 – Inférieur à la limite acceptable AL, Statut : Dans les tolérances (In tolerance).

- Le résultat de la mesure est à l'intérieur de l'intervalle acceptable. Cependant, l'estimation du risque en assumant la probabilité d'une distribution normale d'être à l'extérieur de la limite de la tolérance est $< 2.5\%$. L'incertitude de l'essai est directement prise en considération. Couleur **verte**.

Cas 2 – Inférieur à la limite de la tolérance TL, supérieur à la limite acceptable AL, Statut : Dans les tolérances-Conditionnel.

- Le résultat de la mesure est à l'extérieur de l'intervalle acceptable mais inférieur à la limite de la tolérance. Cependant, la valeur observée est située dans la bande de garde $w = TL - AL$ et le statut du résultat est conditionnel à l'évaluation du risque du client. L'incertitude de la mesure est directement prise en considération. Couleur **jaune**.

Cas 3 – Supérieur à la limite de la tolérance, inférieur à RL, Statut : Hors tolérance-Conditionnel.

- Le résultat de la mesure est supérieur à la limite de la tolérance mais à l'extérieur de l'intervalle de rejet. Cependant, la valeur observée est située dans la bande de garde $w = TL - RL$ et le statut du résultat est conditionnel à l'évaluation du risque du client. L'incertitude de la mesure est directement prise en considération. Couleur **jaune**.

Cas 4 – Supérieur à la limite de rejet RL, Statut : Hors-tolérance (Out of tolerance).

- Le résultat de la mesure est à l'intérieur de l'intervalle de rejet. L'incertitude de l'essai est directement prise en considération. Couleur **rouge**.

CERTIFICAT D'ÉTALONNAGE # 13437

Date d'étalonnage : 2020-12-22

Date d'émission du certificat : 2020-12-23

**Services Polytests
695 B Gaudette street
St-Jean-sur-Richelieu, Québec, Canada
J3B 7S7**

**Étalonnage d'un
Débitmètre à déplacement positif Shinigawa DCSDa-2C S/N : S8020**

CONFORMITÉ AU PROGRAMME DE QUALITÉ

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TRAÇABILITÉ

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APTITUDE EN MATIÈRE DE MESURE ET D'ÉTALONNAGE - CMC

Les rendements métrologiques d'étalonnage ont une incertitude de $\pm 0.2\%$ de la lecture pour les mesures entre 5 SCCM à 10 SLPM, $\pm 0.3\%$ de la lecture pour les mesures entre 10 SLPM à 30 SLPM, $\pm 0.2\%$ de la lecture pour les mesures entre 30 SLPM à 3000 SLPM, $\pm 0.3\%$ de la lecture pour les mesures supérieures à 3000 SLPM jusqu'à 6000 SLPM et $\pm 0.5\%$ pour les mesures inférieures à 5 SCCM jusqu'à concurrence de 1 SCCM, équivalent air ou azote. Les incertitudes exprimées sont élargies avec un facteur d'élargissement $k = 2$, et ce, pour un niveau de confiance d'environ 95 %, dans l'hypothèse d'une distribution normale incluant la résolution de l'instrument. Le rapport d'incertitude des essais (RIE) de cet étalonnage respecte un ratio de 4:1 à moins d'indication contraire.

SOMMAIRE DES CONDITIONS DE L'INSTRUMENT EN TEST

Conditions initiales	En bon état
Travail Effectué	Étalonnage de l'instrument.
Résultats	Lectures initiales dans/hors tolérances-conditionnel avec K facteur de 1.02
	Lectures finales dans les tolérances sans K facteur
Remarques	Fréquence d'étalonnage aux 12 mois


Bernard Poirier
Métrologiste


Responsable du laboratoire

Certificat d'étalonnage # 13437

Numéro de série: S8020	Station de mesure: 3
Date d'étalonnage: 2020-12-22	Procédure: POS-CAL-005
Identification de l'instrument: EM 318	Règle de décision: Méthode #3

Instrument de mesure de référence utilisé pour l'étalonnage initial

Description	Modèle	# Série	Traçabilité	Date dû
Fluke molbloc_30 slpm	3E4-VCR-V-Q	2403	1500285594	2021-06-10
Fluke molbox1	Molbox1	755	1500285062	2021-06-09
RTD Mist	M22	2208102	2020003043	2021-04-23
Module 44.5 PSI avec Baro 163671	Module 30	160659	2020003156	2021-04-28

Spécifications initiales de l'appareil

Condition d'étalonnage

Gaz	Air	Gaz	Air
Température d'opération		Température ambiante	20 °C
Pression à l'entrée		Pression ambiante	1000.67 mbar
Pression à la sortie		Orientation	
Température de référence		Élastomère	
Pression de référence		Valve	
Étendue d'échelle	10-2000 ALH		
Signaux Entrée/Sortie	-		
Alimentation			
Tolérance ±2 %O.R.			

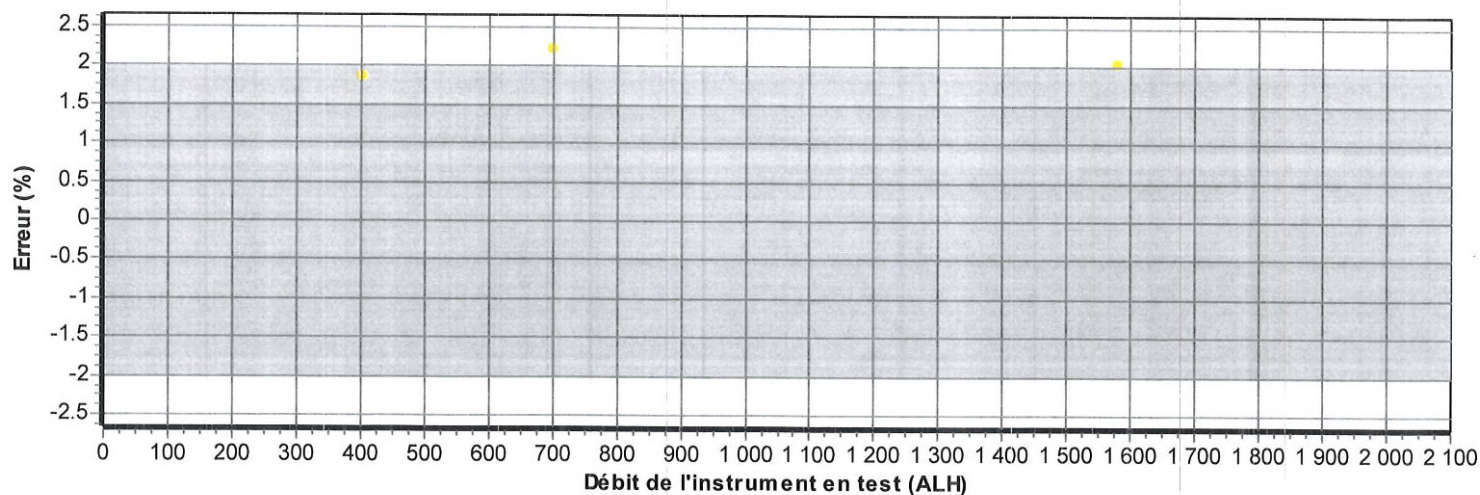
Lectures initiales

Débit du test ALH	Instrument en test L	Valeurs mesurées			Référence calculée L	Erreur calculée L	Tolérance acceptable L	Incertitude k = 2 L	TUR
		Pression PSIA	Température °C	Référence L					
402.2104	68.1309	14.5217	20.09	66.3221	66.8849	1.2460	1.3377	0.2216	>4
701.6001	119.1870	14.5233	20.03	115.6677	116.6124	2.5746	2.3322	0.3863	>4
1580.7486	268.4946	14.5355	19.98	261.3017	263.1697	5.3249	5.2634	0.8718	>4

Certificat d'étalonnage # 13437

Numéro de série:	S8020	Station de mesure:	3
Date d'étalonnage:	2020-12-22	Procédure:	POS-CAL-005
Identification de l'instrument:	EM 318	Règle de décision:	Méthode #3

Résultats initiaux



Voir l'annexe pour la règle de décision

Certificat d'étalonnage # 13437

Numéro de série: S8020	Station de mesure: 3
Date d'étalonnage: 2020-12-22	Procédure: POS-CAL-005
Identification de l'instrument: EM 318	Règle de décision: Méthode #3

Instrument de mesure de référence utilisé pour l'étalonnage final

Description	Modèle	# Série	Traçabilité	Date dû
Fluke molbloc_30 slpm	3E4-VCR-V-Q	2403	1500285594	2021-06-10
Fluke molbox1	Molbox1	755	1500285062	2021-06-09
RTD Mist	M22	2208102	2020003043	2021-04-23
Module 44.5 PSI avec Baro 163671	Module 30	160659	2020003156	2021-04-28


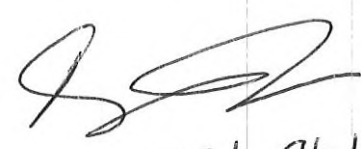
Spécifications finales de l'appareil

Condition d'étalonnage

Gaz	Air	Gaz	Air
Température d'opération		Température ambiante	20 °C
Pression à l'entrée		Pression ambiante	1000.6 mbar
Pression à la sortie		Orientation	
Température de référence		Élastomère	
Pression de référence		Valve	
Étendue d'échelle	10-2000 ALH		
Signaux Entrée/Sortie	-		
Alimentation			
Tolérance ±2 %O.R.			

Lectures finales

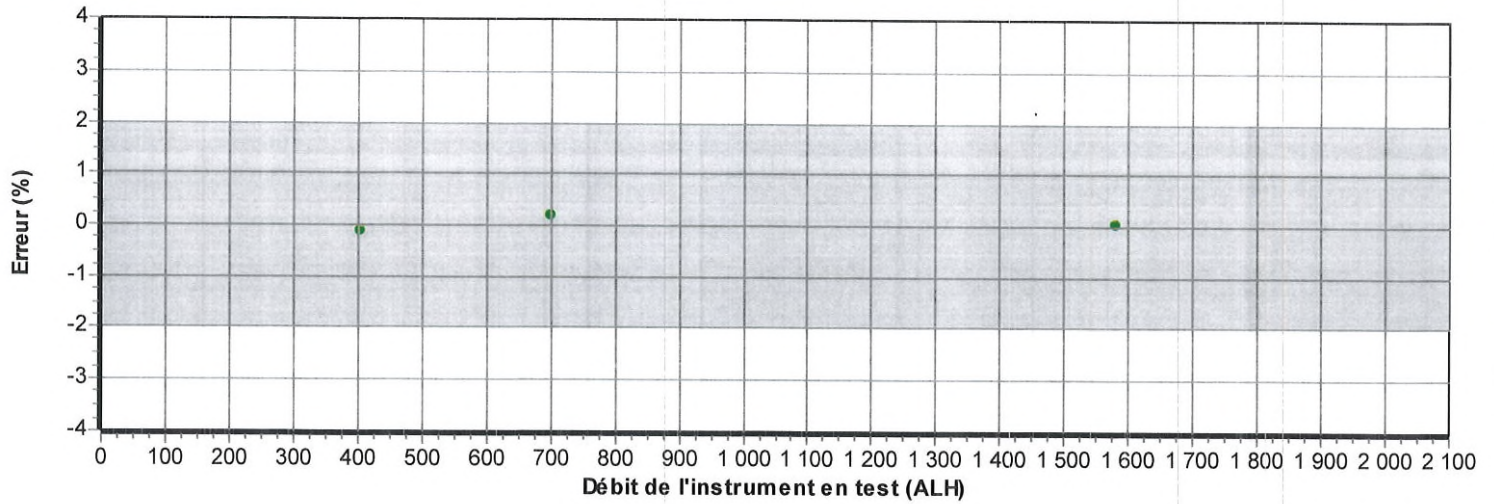
Débit du test ALH	Instrument en test L	Valeurs mesurées			Référence calculée L	Erreur calculée L	Tolérance acceptable L	Incertitude k = 2 L	TUR
		Pression PSIA	Température °C	Référence L					
402.2166	66.7950	14.5217	20.09	66.3221	66.8857	-0.0907	1.3377	0.2216	>4
701.6108	116.8500	14.5233	20.03	115.6677	116.6139	0.2361	2.3323	0.3863	>4
1580.7591	263.2300	14.5355	19.98	261.3017	263.1716	0.0584	5.2634	0.8718	>4

 : 1,00136

 2021-01-12

Certificat d'étalonnage # 13437

Numéro de série:	S8020	Station de mesure:	3
Date d'étalonnage:	2020-12-22	Procédure:	POS-CAL-005
Identification de l'instrument:	EM 318	Règle de décision:	Méthode #3

Résultats finaux



Voir l'annexe pour la règle de décision



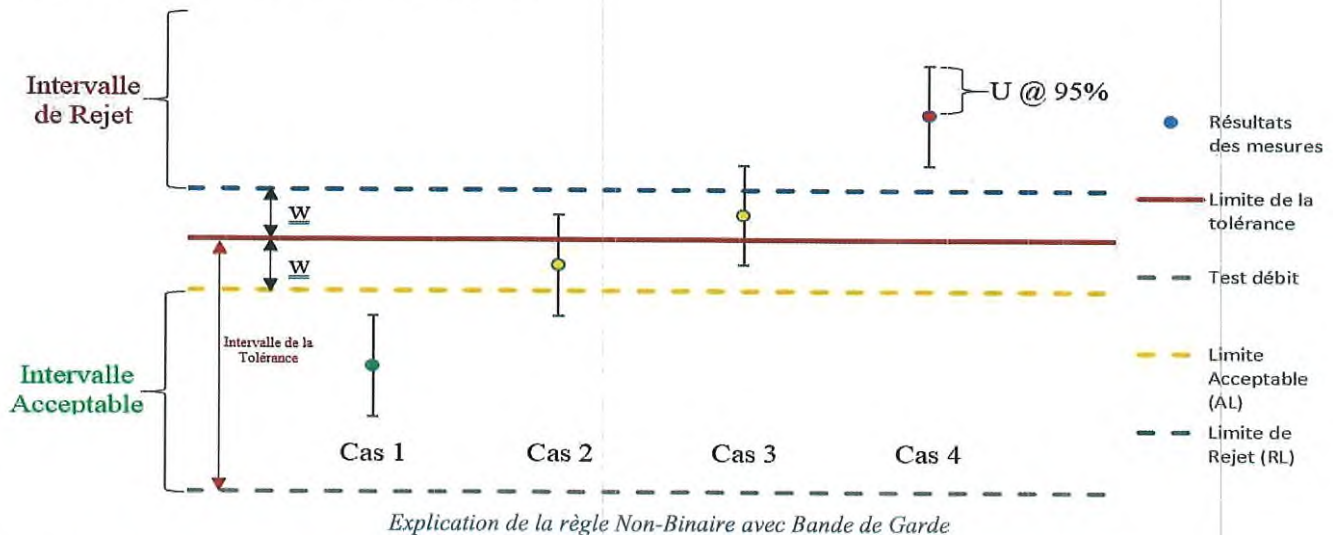
2021. 07. 12

Annexe pour la règle de décision

Méthode 3 Statut de Conformité Non-binaire avec Bande de Garde en considérant l'incertitude de la mesure directement

Cette méthode tient compte d'une bande de garde pour définir l'intervalle acceptable et de rejet. La limite acceptable du résultat de la mesure est calculée selon la méthode mathématique suivante $AL = TL - w$ et de rejet $RL = TL + w$, dont $w = rU$. Le multiple r de l'incertitude combiné élargie U peut être défini selon la table 1 section 5.2 du document ILAC G8 : 2019. L'incertitude de la mesure U est une incertitude combinée élargie ayant un niveau de confiance de 95% ($k = 2$). La règle de conformité non-binaire avec bande de garde est définie lorsqu'il y a quatre choix sur le statut de l'essai : dans la tolérance, acceptation conditionnelle, rejet conditionnel, et hors tolérance.

Les conformités de l'essai sont définies telles que :



Cas 1 – Inférieur à la limite acceptable AL, Statut : Dans les tolérances (In tolerance).

- Le résultat de la mesure est à l'intérieur de l'intervalle acceptable. Cependant, l'estimation du risque en assumant la probabilité d'une distribution normale d'être à l'extérieur de la limite de la tolérance est $< 2.5\%$. L'incertitude de l'essai est directement prise en considération. Couleur **verte**.

Cas 2 – Inférieur à la limite de la tolérance TL, supérieur à la limite acceptable AL, Statut : Dans les tolérances-Conditionnel.

- Le résultat de la mesure est à l'extérieur de l'intervalle acceptable mais inférieur à la limite de la tolérance. Cependant, la valeur observée est située dans la bande de garde $w = TL - AL$ et le statut du résultat est conditionnel à l'évaluation du risque du client. L'incertitude de la mesure est directement prise en considération. Couleur **jaune**.

Cas 3 – Supérieur à la limite de la tolérance, inférieur à RL, Statut : Hors tolérance-Conditionnel.

- Le résultat de la mesure est supérieur à la limite de la tolérance mais à l'extérieur de l'intervalle de rejet. Cependant, la valeur observée est située dans la bande de garde $w = TL - RL$ et le statut du résultat est conditionnel à l'évaluation du risque du client. L'incertitude de la mesure est directement prise en considération. Couleur **jaune**.

Cas 4 – Supérieur à la limite de rejet RL, Statut : Hors-tolérance (Out of tolerance).

- Le résultat de la mesure est à l'intérieur de l'intervalle de rejet. L'incertitude de l'essai est directement prise en considération. Couleur **rouge**.



**Instrumentation
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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-015 2021-04-20
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CLIENT		CALIBRATION SPECIFICATION	
Company:	Services Polytests Inc	Service Procedure:	4IN9101
Address:	695 B rue Gaudette	Required Precision:	+/- 2°C
	St-Jean-sur-Richelieu, Québec, J3B 7S7	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	Machine #:	N.A.

SPÉCIFICATION DES ÉTALONS			
Calibrator:	Fluke 744	Certification #:	2021001945
Serial #:	8180008	Certification Date:	2021-03-10
Certified by:	Alpha Controls	Next Certification:	2021-06-10
Comments:			



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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-015 2021-04-20
----------------------	-----------------------------

CALIBRATION RESULTS						
Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Tolerance	Uncertainty
Conformity	Comment					
-190.0 °C	-190.0 °C	191.1 °C	+1.1 °C	191.1 °C	+/- 2 °C	1.0 °C
Compliant	Input#1 TypeK					
0.0 °C	0.0 °C	-0.5 °C	-0.5 °C	-0.5 °C	+/- 2 °C	1.0 °C
Compliant	Input#1 TypeK					
750.0 °C	750.0 °C	749.6 °C	-0.4 °C	749.6 °C	+/- 2 °C	1.0 °C
Compliant	Input#1 TypeK					
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	+/- 2 °C	1.0 °C
Compliant	Input#2 TypeK					
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	+/- 2 °C	1.0 °C
Compliant	Input#3 TypeK					
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	+/- 2 °C	1.0 °C
Compliant	Input#4 TypeK					
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	+/- 2 °C	1.0 °C
Compliant	Input#5 TypeK					
100.0 °C	99.7 °C	99.7 °C	-0.3 °C	99.7 °C	+/- 2 °C	1.0 °C
Compliant	Input#6 TypeK					
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	+/- 2 °C	1.0 °C
Compliant	Input#7 TypeK					
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	+/- 2 °C	1.0 °C
Compliant	Input#8 TypeK					
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	+/- 2 °C	1.0 °C
Compliant	Input#9 TypeK					
100.0 °C	100.0 °C	99.9 °C	-0.1 °C	99.9 °C	+/- 2 °C	1.0 °C
Compliant	Input#10 TypeJ					
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	+/- 2 °C	1.0 °C
Compliant	Input#11 TypeJ					
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	+/- 2 °C	1.0 °C
Compliant	Input#12 TypeJ					
100.0 °C	100.0 °C	99.8 °C	-0.2 °C	99.8 °C	+/- 2 °C	1.0 °C
Compliant	Input#13 TypeJ					
100.0 °C	100.0 °C	99.8 °C	-0.2 °C	99.8 °C	+/- 2 °C	1.0 °C
Compliant	Input#14 TypeJ					
100.0 °C	100.0 °C	99.8 °C	-0.2 °C	99.8 °C	+/- 2 °C	1.0 °C
Compliant	Input#15 TypeJ					
100.0 °C	100.0 °C	99.8 °C	-0.4 °C	99.8 °C	+/- 2 °C	1.0 °C
Compliant	Input#16 TypeJ					
100.0 °C	100.0 °C	99.9 °C	-0.01 °C	99.9 °C	+/- 2 °C	1.0 °C
Compliant	Input#17 TypeJ					
100.0 °C	100.0 °C	99.8 °C	-0.2 °C	99.8 °C	+/- 2 °C	1.0 °C
Compliant	Input#18 TypeJ					

Version 1



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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-015 2021-04-20
----------------------	-----------------------------

CALIBRATION RESULTS						
Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Tolerance	Uncertainty
Conformity	Comment					
100.0 °C	100.0 °C	99.9 °C	-0.1 °C	99.9 °C	+/- 2 °C	1.0 °C
Compliant	Input#19TypeJ					
100.0 °C	100.0 °C	99.9 °C	-0.1 °C	99.9 °C	+/- 2 °C	1.0 °C
Compliant	Input#20TypeJ					
12.000 mA	12.000 mA	11.999 mA	-0.001 mA	11.999 mA	+/- 1 mA	1.00 mA
Compliant	Input#21					
12.000 mA	12.000 mA	11.999 mA	-0.001 mA	11.999 mA	+/- 1 mA	1.00 mA
Compliant	Input#22					


Environmental Conditions:	Temperature: N.A.	Humidity: N.A.
Comments:	Test avec EM-147	

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2021-04-20
Next Calibration:	2022-04-20
Certificate Date:	2021-04-20

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



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CALIBRATION CERTIFICATE

CERTIFICATE #		CE-EM-154 2021-04-20	
CLIENT		CALIBRATION SPECIFICATION	
Company:	Services Polytests Inc	Service Procedure:	4IN9101
Address:	695 B rue Gaudette	Required Precision:	+/- 2°C
	St-Jean-sur-Richelieu, Québec, J3B 7S7	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	Machine #:	N.A.
SPÉCIFICATION DES ÉTALONS			
Calibrator:	Fluke 744	Certification #:	2021001945
Serial #:	8180008	Certification Date:	2021-03-10
Certified by:	Alpha Controls	Next Certification:	2021-06-10
Comments:			



CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-154 2021-04-20
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CALIBRATION RESULTS						
Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Tolerance	Uncertainty
Conformity	Comment					
-17.000 mV Compliant	-17.000 mV Input#1	-17.014 mV	+0.014 mV	-17.014 mV	+/- 0.5 mV	0.1 mV
0.000 mV Compliant	0.000 mV Input#1	0.044 mV	+0.044 mV	0.044 mV	+/- 0.5 mV	0.1 mV
20.000 mV Compliant	20.000 mV Input#1	20.027 mV	+027 mV	20.027 mV	+/- 0.5 mV	0.1 mV
30.000 mV Compliant	30.000 mV Input#2	30.036 mV	+036 mV	30.036 mV	+/- 0.5 mV	0.1 mV
30.000 mV Compliant	30.000 mV Input#3 Non-Conforme	30.036 mV	+036 mV	30.036 mV	+/- 0.5 mV	0.1 mV
5.000 V.DC. Compliant	5.000 V.DC. Input#4	4.999 V.DC.	-0.001 V.DC.	4.999 V.DC.	+/- 0.05 V.DC.	0.1 V.DC.
30.000 mV Compliant	30.000 mV Input#5	29.985 mV	-0.015 mV	29.985 mV	+/- 0.5 mV	0.1 mV
30.000 mV Compliant	30.000 mV Input#6	29.992 mV	-0.008 mV	29.992 mV	+/- 0.5 mV	0.1 mV
100.00 Ohms Compliant	100.00 Ohms Input#7	100.09 Ohms	+0.09 Ohms	100.09 Ohms	+/- 0.1 Ohms	1.0 Ohms
100.00 Ohms Compliant	100.00 Ohms Input#8	100.07 Ohms	+0.07 Ohms	100.07 Ohms	+/- 0.1 Ohms	1.0 Ohms
100.00 Ohms Compliant	100.00 Ohms Input#9	100.03 Ohms	-0.03 Ohms	100.03 Ohms	+/- 0.1 Ohms	1.0 Ohms
100.00 Ohms Compliant	100.00 Ohms Input#10	100.08 Ohms	+0.8 Ohms	100.4 Ohms	+/- 0.1 Ohms	1.0 Ohms
100.0 °C Compliant	100.0 °C Input#11 TypeT	99.6 °C	-0.4 °C	99.6 °C	+/- 2 °C	1.0 °C
100.0 °C Compliant	100.0 °C Input#12 TypeT	99.6 °C	-0.4 °C	99.6 °C	+/- 2 °C	1.0 °C
100.0 °C Compliant	100.0 °C Input#13 TypeJ	99.7 °C	+0.3 °C	99.7 °C	+/- 2 °C	1.0 °C
100.0 °C Compliant	100.0 °C Input#14 TypeJ	99.7 °C	-0.3 °C	99.7 °C	+/- 2 °C	1.0 °C
100.0 °C Compliant	100.0 °C Input#15 TypeJ	99.8 °C	-0.2 °C	99.8 °C	+/- 2 °C	1.0 °C
100.0 °C Compliant	100.0 °C Input#16 TypeJ	99.6 °C	-0.4 °C	99.6 °C	+/- 2 °C	1.0 °C
100.00 Ohms Compliant	100.00 Ohms Input#17	10.04 Ohms	+0.04 Ohms	99.99 Ohms	+/- 0.1 Ohms	1.0 Ohms
100.00 Ohms Compliant	100.00 Ohms Input#18	100.06 Ohms	+0.06 Ohms	100.06 Ohms	+/- 0.1 Ohms	1.0 Ohms



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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-154 2021-04-20
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CALIBRATION RESULTS						
Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Tolerance	Uncertainty
Conformity	Comment					
100.00 Ohms Compliant	100.00 Ohms	100.02 Ohms	+0.02 Ohms	100.02 Ohms	+/- 0.1 Ohms	1.0 Ohms
100.00 Ohms Compliant	100.00 Ohms	100.03 Ohms	+0.03 Ohms	100.03 Ohms	+/- 0.1 Ohms	1.0 Ohms
12.000 mA Compliant	12.000 mA	11.999 mA	-0.001 mA	11.999 mA	+/- 0.1 mA	1.00 mA
12.000 mA Compliant	12.000 mA	11.999 mA	-0.001 mA	11.999 mA	+/- 0.1 mA	1.00 mA


Environmental Conditions:	Temperature: N.A.	Humidity: N.A.
Comments:	Test avec EM-147	

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2021-04-20
Next Calibration:	2022-04-20
Certificate Date:	2021-04-20

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



Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001



Cert. No.: 4199-11842976

Traceable® Certificate of Calibration for Dial Barometer

Manufactured for and distributed by: Traceable Product 12554 Galveston Rd B230, Webster, TX 77598

Instrument Identification:

Model: 4199 S/N: 192343395 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Digital Barometer	D4540001	22 Oct 2020	1000461276

Certificate Information:

Technician: 57 Procedure: CAL-33 Cal Date: 6 Oct 2020 Due Date: 6 Oct 2022
Test Conditions: 62.4 %RH 23.62°C 1015 mBar

Calibration Data: EM-304

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
mb/hPa	961.17	961	Y	961.30	961	Y	956	966	0.62	>4:1
mb/hPa	982.32	982	Y	982.10	982	Y	977	987	0.62	>4:1
mb/hPa	1,012.31	1,012	Y	1,012.22	1,012	Y	1,007	1,017	0.62	>4:1

This certificate indicates Traceability to standards provided by (NIST) National Institute of Standards and Technology and/or a National Standards Laboratory.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ±U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio; Accuracy=±(Max-Min)/2; Min = As Left Nominal (Rounded) - Tolerance; Max = As Left Nominal (Rounded) + Tolerance; Date=MM/DD/YY

Nicol Rodriguez
Nicol Rodriguez, Quality Manager

Aaron Judice
Aaron Judice, Technical Manager

Note:

Maintaining Accuracy:

In our opinion once calibrated your Dial Barometer should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Dial Barometers change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 12554 Galveston RD Suite B230 Webster TX USA 77598
Phone 281 482-1714 Fax 281 482-9448 service@contro13.com www.control3.com

Control Company is an ISO 17025:2005 Calibration Laboratory Accredited by (A2LA) American Association for Laboratory Accreditation, Certificate No. 1750.01.
Control Company is ISO 9001:2008 Quality Certified by (DNV) Det Norske Veritas, Certificate No. CERT-01805-2006-AQ-HOU-RVA.
International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA).



**Instrumentation
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CALIBRATION CERTIFICATE

CERTIFICATE #		CE-EM-136 2021-04-30	
CLIENT		CALIBRATION SPECIFICATION	
Company:	Services Polytests Inc	Service Procedure:	ISL-004
Address:	695 B rue Gaudette	Required Precision:	+/-2°C +/-3%RH
	St-Jean-sur-Richelieu, Québec, J3B 7S7	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.	Machine #:	N.A.
SPÉCIFICATION DES ÉTALONS			
Calibrator:	Vaisala HM141-HMP46	Certification #:	2020006676
Serial #:	V0820123-U4840010	Certification Date:	2020-09-10
Certified by:	Alpha Controls	Next Certification:	2021-09-10
Comments:			
Calibrator:	Probe etalon Hart	Certification #:	2021000790
Serial #:	A26317/00361	Certification Date:	2021-02-02
Certified by:	Alpha Controls	Next Certification:	2022-02-02
Comments: Meet the requirement as Secondary Standard Instrument (AMS17025F)			



**Instrumentation
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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-136 2021-04-30
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CALIBRATION RESULTS						
Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Tolerance	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	40.1 °C	+0.1 °C	40.1 °C	+/- 2.0 °C	1.0 °C
30.0 %RH	30.0 %RH	31.3 %RH	+1.3 %RH	31.3 %RH	+/- 3.0 %RH	-- %RH
55.0 %RH	55.0 %RH	55.7 %RH	+0.7 %RH	55.7 %RH	+/- 3.0 %RH	-- %RH
75.0 %RH	75.0 %RH	75.3 %RH	+0.3 %RH	75.3 %RH	+/- 3.0 %RH	-- %RH

Environmental Conditions:	Temperature: 22 °C	Humidity: 37 %RH
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Comments:

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2021-04-30
Next Calibration:	2022-04-30
Certificate Date:	2021-04-30

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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Martin Langlais - Technicien



**Instrumentation
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CALIBRATION CERTIFICATE

CERTIFICATE #		CE-EM-224 2021-04-20	
CLIENT		CALIBRATION SPECIFICATION	
Company:	Services Polytests Inc	Service Procedure:	ISL-022
Address:	695 B rue Gaudette	Required Precision:	+/- 1/32"
	St-Jean-sur-Richelieu, Québec, J3B 7S7	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	Machine #:	N/A
SPÉCIFICATION DES ÉTALONS			
Calibrator:	Tape mesure-2	Certification #:	2880456
Serial #:	20068976	Certification Date:	2020-02-18
Certified by:	Starrett	Next Certification:	2022-02-18
Comments:			



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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-224 2021-04-20
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CALIBRATION RESULTS						
Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Tolerance	Uncertainty
Conformity	Comment					
1.00 " Compliant	1.00 "	1.00 "	0.00 "	1.00 "	+/- 1/32 "	-- "
36.00 " Compliant	36.00 "	36.00 "	0.00 "	36.00 "	+/- 1/32 "	-- "
72.00 " Compliant	72.00 "	72.00 "	0.00 "	72.00 "	+/- 1/32 "	-- "
108.00 " Compliant	108.00 "	108.00 "	0.00 "	108.00 "	+/- 1/32 "	-- "
132.00 " Compliant	132.00 "	132.00 "	0.00 "	132.00 "	+/- 1/32 "	-- "


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

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2021-04-20
Next Calibration:	2022-04-20
Certificate Date:	2021-04-20

CALIBRATION CONFORMITY		
	Before	After
Compliant:	X	X
Non Compliant:		

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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-127 2021-04-20			
CLIENT		CALIBRATION SPECIFICATION		
Company:	Services Polytests Inc		Service Procedure:	4IN9106
Address:	695 B rue Gaudette		Required Precision:	+/- 1"Hg
	St-Jean-sur-Richelieu, Québec, J3B 7S7		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.	Machine #:	N.A.	
SPÉCIFICATION DES ÉTALONS				
Calibrator:	Crystal XP2i 300	Certification #:	2020008238	
Serial #:	870437	Certification Date:	2020-11-02	
Certified by:	Alpha Controls	Next Certification:	2021-11-02	
Comments:				



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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-127 2021-04-20
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CALIBRATION RESULTS						
Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Tolerance	Uncertainty
Conformity	Comment					
0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	+/- 1 "Hg	1 "Hg
Compliant	Vérification indicateur					
-7.50 "Hg	-7.50 "Hg	-7.53 "Hg	-0.03 "Hg	-7.53 "Hg	+/- 1 "Hg	1 "Hg
Compliant	Vérification indicateur					
-15.00 "Hg	-15.00 "Hg	-15.03 "Hg	-0.03 "Hg	-15.03 "Hg	+/- 1 "Hg	1 "Hg
Compliant	Vérification indicateur					
-22.50 "Hg	-22.50 "Hg	-22.54 "Hg	-0.04 "Hg	-22.54 "Hg	+/- 1 "Hg	1 "Hg
Compliant	Vérification indicateur					
-28.00 "Hg	-28.00 "Hg	-28.10 "Hg	-0.10 "Hg	-28.10 "Hg	+/- 1 "Hg	1 "Hg
Compliant	Vérification indicateur					
0.00 "Hg	10.0000 V.DC.	9.9990 V.DC.	-0,0010 V.DC.	9,9990 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
-7.50 "Hg	8.0000 V.DC.	8.0171 V.DC.	+0.0171 V.DC.	8.0171 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
-15.00 "Hg	6.0000 V.DC.	6.0212 V.DC.	+0.0212 V.DC.	6.0212 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
-22.50 "Hg	4.0000 V.DC.	3.9880 V.DC.	-0.0220 V.DC.	3.9880 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
-28.00 "Hg	2.5333 V.DC.	2.5164 V.DC.	-0.0169 V.DC.	2.5164 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					


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

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2021-04-20
Next Calibration:	2022-04-20
Certificate Date:	2021-04-20

CALIBRATION CONFORMITY		
	Before	After
Compliant:	X	X
Non Compliant:		

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CALIBRATION CERTIFICATE

CERTIFICATE #		CE-EM-126 2021-04-20	
CLIENT		CALIBRATION SPECIFICATION	
Company:	Services Polytests Inc	Service Procedure:	4IN9106
Address:	695 B rue Gaudette	Required Precision:	+/- 1"Hg
	St-Jean-sur-Richelieu, Québec, J3B 7S7	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.	Machine #:	N.A.
SPÉCIFICATION DES ÉTALONS			
Calibrator:	Crystal XP2i 300	Certification #:	2020008238
Serial #:	870437	Certification Date:	2020-11-02
Certified by:	Alpha Controls	Next Certification:	2021-11-02
Comments:			



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CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-126 2021-04-20
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CALIBRATION RESULTS						
Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Tolerance	Uncertainty
Conformity	Comment					
0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	+/- 1 "Hg	1 "Hg
Compliant	Vérification indicateur					
-7.50 "Hg	-7.50 "Hg	-7.65 "Hg	-0.11 "Hg	-7.61 "Hg	+/- 1 "Hg	1 "Hg
Compliant	Vérification indicateur					
-15.00 "Hg	-15.00 "Hg	-15.24 "Hg	-0.24 "Hg	-15.24 "Hg	+/- 1 "Hg	1 "Hg
Compliant	Vérification indicateur					
-22.50 "Hg	-22.50 "Hg	-22.84 "Hg	-0.34 "Hg	-22.84 "Hg	+/- 1 "Hg	1 "Hg
Compliant	Vérification indicateur					
-28.00 "Hg	-28.00 "Hg	-28.47 "Hg	-0.47 "Hg	-28.47 "Hg	+/- 1 "Hg	1 "Hg
Compliant	Vérification indicateur					
0.00 "Hg	10.0000 V.DC.	10.0066 V.DC.	+0.0066 V.DC.	10.0066 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
-7.50 "Hg	8.0000 V.DC.	8.0311 V.DC.	+0.0366 V.DC.	8.0366 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
-15.00 "Hg	6.0000 V.DC.	6.0068 V.DC.	+0.0068 V.DC.	6.0068 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
-22.50 "Hg	4.0000 V.DC.	3.9723 V.DC.	-0.0277 V.DC.	3.9723 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
-28.00 "Hg	2.5333 V.DC.	2.4845 V.DC.	-0.0488 V.DC.	2.4630 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					

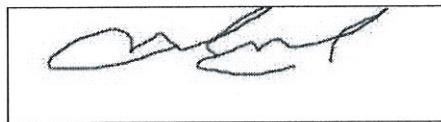
Environmental Conditions:	Temperature: N.A.	Humidity: N.A.
Comments:		

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2021-04-20
Next Calibration:	2022-04-20
Certificate Date:	2021-04-20

CALIBRATION CONFORMITY		
	Before	After
Compliant:	X	X
Non Compliant:		

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CALIBRATION CERTIFICATE

CERTIFICATE #		CE-EM-007 2021-04-20	
CLIENT		CALIBRATION SPECIFICATION	
Company:	Services Polytests Inc	Service Procedure:	4IN9106
Address:	695 B rue Gaudette	Required Precision:	+/- 0.25"H2O
	St-Jean-sur-Richelieu, Québec, J3B 7S7	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 #:	E23S020111/12	Range:	0-0.5"H2O
Location:	N.A.	Machine #:	N.A.
SPÉCIFICATION DES ÉTALONS			
Calibrator:	Fluke Pression	Certification #:	2020007634
Serial #:	3330050	Certification Date:	2020-10-30
Certified by:	Alpha Controls	Next Certification:	2021-10-30
Comments:			

5F09106 Version 1



CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-007 2021-04-20
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CALIBRATION RESULTS						
Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Tolerance	Uncertainty
Conformity	Comment					
0.0000 "H2O	0.0000 "H2O	0.0000 "H2O	0.0000 "H2O	0.0000 "H2O	+/- 0.25 "H2O	0.25 "H2O
Compliant	Vérification indicateur					
0.0250 "H2O	0.0250 "H2O	0.0247 "H2O	-0.0003 "H2O	0.0247 "H2O	+/- 0.25 "H2O	0.25 "H2O
Compliant	Vérification indicateur					
0.0500 "H2O	0.0500 "H2O	0.0494 "H2O	-0.0006 "H2O	0.0494 "H2O	+/- 0.25 "H2O	0.25 "H2O
Compliant	Vérification indicateur					
0.0750 "H2O	0.0750 "H2O	0.0730 "H2O	-0.0020 "H2O	0.0730 "H2O	+/- 0.25 "H2O	0.25 "H2O
Compliant	Vérification indicateur					
0.1000 "H2O	0.1000 "H2O	0.0951 "H2O	-0.0012 "H2O	0.0988 "H2O	+/- 0.25 "H2O	0.25 "H2O
Compliant	Vérification indicateur					
0.0000 "H2O	0.0000 V.DC.	0.0016 V.DC.	+0.0016 V.DC.	0.0016 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
0.0250 "H2O	2.5000 V.DC.	2.4395 V.DC.	-0.0605 V.DC.	2.4395 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
0.0500 "H2O	5.0000 V.DC.	4.9553 V.DC.	-0.0447 V.DC.	4.9553 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
0.0750 "H2O	7.5000 V.DC.	7.3682 V.DC.	-0.1318 V.DC.	7.4540 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
0.1000 "H2O	10.0000 V.DC.	9.8148 V.DC.	-0.1852 V.DC.	9.8828 V.DC.	+/- 0.5 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					


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

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2021-04-20
Next Calibration:	2022-04-20
Certificate Date:	2021-04-20

CALIBRATION CONFORMITY		
	Before	After
Compliant:	X	X
Non Compliant:		

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CALIBRATION CERTIFICATE

CERTIFICATE #		CE-EM-006 2021-04-20	
CLIENT		CALIBRATION SPECIFICATION	
Company:	Services Polytests Inc	Service Procedure:	4IN9106
Address:	695 B rue Gaudette	Required Precision:	+/-0.25"H2O
	St-Jean-sur-Richelieu, Québec, J3B 7S7	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.	Machine #:	N.A.
SPÉCIFICATION DES ÉTALONS			
Calibrator:	Fluke Pression	Certification #:	2020007634
Serial #:	3330050	Certification Date:	2020-10-30
Certified by:	Alpha Controls	Next Certification:	2021-10-30
Comments:			



CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-006 2021-04-20
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CALIBRATION RESULTS						
Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Tolerance	Uncertainty
Conformity	Comment					
0.0000 "H2O	0.000 "H2O	0.012 "H2O	+0.012 "H2O	0.012 "H2O	+/-0.25 "H2O	0.25 "H2O
Compliant	Vérification indicateur					
0.2500 "H2O	0.250 "H2O	0.249 "H2O	-0.001 "H2O	0.249 "H2O	+/-0.25 "H2O	0.25 "H2O
Compliant	Vérification indicateur					
0.5000 "H2O	0.500 "H2O	0.503 "H2O	+0.003 "H2O	0.503 "H2O	+/-0.25 "H2O	0.25 "H2O
Compliant	Vérification indicateur					
0.7500 "H2O	0.750 "H2O	0.754 "H2O	+0.004 "H2O	0.754 "H2O	+/-0.25 "H2O	0.25 "H2O
Compliant	Vérification indicateur					
1.0000 "H2O	1.000 "H2O	0.995 "H2O	-0.005 "H2O	0.995 "H2O	+/-0.25 "H2O	0.25 "H2O
Compliant	Vérification indicateur					
0.0000 "H2O	0.0000 V.DC.	0.0002 V.DC.	+0.0002 V.DC.	0.0002 V.DC.	+/-0.25 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
0.2500 "H2O	2.5000 V.DC.	2.4089 V.DC.	-0.0911 V.DC.	2.4089 V.DC.	+/-0.25 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
0.5000 "H2O	5.0000 V.DC.	4.8995 V.DC.	-0.1005 V.DC.	4.8995 V.DC.	+/-0.25 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
0.7500 "H2O	7.5000 V.DC.	7.4139 V.DC.	-0.0861 V.DC.	7.4139 V.DC.	+/-0.25 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					
1.0000 "H2O	10.0000 V.DC.	9.8323 V.DC.	-0.1677 V.DC.	9.8323 V.DC.	+/-0.25 V.DC.	0.5 V.DC.
Compliant	Vérification sortie analogique					


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

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2021-04-20
Next Calibration:	2022-04-20
Certificate Date:	2021-04-20

CALIBRATION CONFORMITY		
	Before	After
Compliant:	X	X
Non Compliant:		

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- ▣ 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



**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-001 2021-04-20	
CLIENT		CALIBRATION SPECIFICATION	
Company:	Services Polytests Inc	Service Procedure:	4IN9101
Address:	695 B rue Gaudette	Required Precision:	+/- 2.0°C
	St-Jean-sur-Richelieu, Québec, J3B 7S7	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.	Machine #:	N.A.
SPÉCIFICATION DES ÉTALONS			
Calibrator:	Fluke 744	Certification #:	2021001945
Serial #:	8180008	Certification Date:	2021-03-10
Certified by:	Alpha Controls	Next Certification:	2021-06-10
Comments:			



**Instrumentation
Saint-Laurent** inc.
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Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-001 2021-04-20					
CALIBRATION RESULTS						
Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Tolerance	Uncertainty
Conformity	Comment					
0.0 °C	0.0 °C	0.1 °C	+0.1 °C	0.1 °C	+/- 2.0 °C	1.0 °C
Compliant	T1 typeJ					
125.0 °C	125.0 °C	125.0 °C	0.0 °C	125.0 °C	+/- 2.0 °C	1.0 °C
Compliant	T1 typeJ					
250.0 °C	250.0 °C	250 °C	0.0 °C	250.0 °C	+/- 2.0 °C	1.0 °C
Compliant	T1 typeJ					
375.0 °C	375.0 °C	375.0 °C	0.0 °C	375.0 °C	+/- 2.0 °C	1.0 °C
Compliant	T1 typeJ					
500.0 °C	500.0 °C	500.0 °C	0.0 °C	500.0 °C	+/- 2.0 °C	1.0 °C
Compliant	T1 typeJ					
0.0 °C	0.0 °C	0.1 °C	+0.1 °C	0.1 °C	+/- 2 °C	1.0 °C
Compliant	T2 typeJ					
125.0 °C	125.0 °C	125.1 °C	+0.1 °C	125.1 °C	+/- 2 °C	1.0 °C
Compliant	T2 typeJ					
250.0 °C	250.0 °C	250.0 °C	0.0 °C	250.0 °C	+/- 2.0 °C	1.0 °C
Compliant	T2 typeJ					
375.0 °C	375.0 °C	375.0 °C	0.0 °C	375.0 °C	+/- 2.0 °C	1.0 °C
Compliant	T2 typeJ					
500.0 °C	500.0 °C	500.0 °C	0.0 °C	500.0 °C	+/- 2.0 °C	1.0 °C
Compliant	T2 typeJ					
0.0 °C	0.0 °C	0.2 °C	+0.2 °C	0.2 °C	+/- 2.0 °C	1.0 °C
Compliant	T1 typeK					
125.0 °C	125.0 °C	125.1 °C	+0.1 °C	125.1 °C	+/- 2.0 °C	1.0 °C
Compliant	T1 typeK					
250.0 °C	250.0 °C	250.0 °C	0.0 °C	250.0 °C	+/- 2.0 °C	1.0 °C
Compliant	T1 typeK					
375.0 °C	375.0 °C	375.0 °C	0.0 °C	375.0 °C	+/- 2.0 °C	1.0 °C
Compliant	T1 typeK					
500.0 °C	500.0 °C	500.0 °C	0.0 °C	500.0 °C	+/- 2.0 °C	1.0 °C
Compliant	T1 typeK					
0.0 °C	0.0 °C	0.2 °C	+0.2 °C	0.2 °C	+/- 2.0 °C	1.0 °C
Compliant	T2 typeK					
125.0 °C	125.0 °C	125.1 °C	+0.1 °C	125.1 °C	+/- 2.0 °C	1.0 °C
Compliant	T2 typeK					
250.0 °C	250.0 °C	250.0 °C	0.0 °C	250.0 °C	+/- 2.0 °C	1.0 °C
Compliant	T2 typeK					
375.0 °C	375.0 °C	375.0 °C	0.0 °C	375.0 °C	+/- 2.0 °C	1.0 °C
Compliant	T2 typeK					

Version 1



**Instrumentation
Saint-Laurent** inc.
Certified ISO 17025



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St-Joseph du lac
(Québec), J0N 1M0
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Fax: (450) 473-5207
Email: inst.st-laurent@videotron.ca

CALIBRATION CERTIFICATE

CERTIFICATE #	CE-EM-001 2021-04-20
----------------------	-----------------------------

CALIBRATION RESULTS						
Entry Source	Given Value	Actual Value	Deviation Error	After Calib Value	Tolerance	Uncertainty
Conformity	Comment					
500.0 °C	500.0 °C	500.0 °C	0.0 °C	500.0 °C	+/- 2.0 °C	1.0 °C
Compliant	T2 typeK					

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


Comments:

CALIBRATION DATE/ISSUANCE OF CERTIFICATE	
Calibration Date:	2021-04-20
Next Calibration:	2022-04-20
Certificate Date:	2021-04-20

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.



Marc Gingras - Technicien

Certificat d'Étalonnage / Certificate of Calibration

CLIENT :
SERVICES POLYTESTS INC.
695-B GAUDETTE
ST-JEAN-SUR-RICHELIEU, QUEBEC

Description: VÉRIFICATEUR D'HUMIDITÉ / MOISTURE METER
Fabricant/ Manufacturer: DELMHORST
Modèle/ Model : MCS-1 REFERENCE STANDARD
No série / Serial no : N/A
Inventaire / Asset # : EM-191

CERTIFICAT No / Certificate No:

312463

PROCÉDURE / Procedure :

TRESCAL - DELMHORST_MCS-1 REFERENCE STANDARD

Date étalonnage/ Calibration Performed :

aaaa - mm - jj
2020-12-29

Echéance/ Due Date :

2021-12-29

Type de résultat / Results type :

As-Found = As-Left

Conditions de mesure / Measurement conditions

Résultats d'essais / Test results :

Conforme / In Tolerance

TEMPÉRATURE / Temp. :

23°C

Usage restreint/ Restricted use :

HUMIDITÉ / Humidity :

36% RH

Réparation effectuée / Repair performed :

Ajustement effectué / Adjustment performed :

ÉTALONS UTILISÉS/ Standards Used:

Identification	Manuf.	Model	Description	Ser. #	Étalonné/ Cal.	Échéance/ Due
PRO373	H-P	34401A	MULTIMETER	US36069261	2020-11-13	2021-11-13

Les spécifications mentionnées comme limites de tolérances d'essai sont celles établies par le fabricant, sauf indication contraire.

Test tolerance limits are based on manufacturers specifications unless stated otherwise.

NOTES :



2021-01-19

Technicien :
Technician

M. BARRAK

Le système qualité de la société est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour le processus d'étalonnage sont retraçables au SI par l'entremise du CNRC et/ou du NIST.

Our quality system complies with the requirements of ISO 17025 and the standards used for the calibration are traceable to SI through NRC and/or NIST.

LE DROIT D'AUTEUR DE CE CERTIFICAT APPARTIEN À TRESICAL CANADA INC. LE CERTIFICAT NE PEUT ÊTRE REPRODUIT AUTREMENT QU'EN ENTIER ET AVEC LE CONSENTEMENT PRÉALABLE ÉCRIT DE TRESICAL CANADA INC.
TRESICAL CANADA, INC. OWN COPYRIGHT OF THIS CERTIFICATE. THE CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN CONSENT OF TRESICAL CANADA INC.

312463

SERVICES POLYTESTS INC.

VÉRIFICATEUR D'HUMIDITÉ / MOISTURE METER

DELMHORST

MCS-1 REFERENCE STANDARD

CLIENT / Customer :
DESCRIPTION / Description :
MANUFACTURIER / Manufacturer :
MODÈLE / Model :

DESCRIPTION Description		LIMITES Limits	LECTURES Readings	LIMITES Limits
DOUGLAS-FIR @ 80°F				Déviaton Mohms
	Nominal			
12 %	120 MOhms		115,9	4,1
22 %	1,10 MOhms		1,096	0,005

CERTIFICAT D'ÉTALONNAGE

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

Client :	Polytests	No. du Certificat :	152-4BB901-181
Adresse :	695 B rue Gaudette St-Jean-sur-Richelieu, QC J3B7S7	Date d'étalonnage :	09-01-2018

Technicien:
Simeonidis, Georgios



David Llorens, Responsable Qualité

DESCRIPTION DU SERVICE:

Description des masses :	ASTM E617	Date d'approbation :	09-01-2018
Classe de précision :	ASTM 6	Date prochain étalonnage :	09-01-2023
Densité :	7.95g/cm ³	Accréditation CCN n. :	668
Identification (si unique) :	EM-090	Certification CLAS n. :	2010-01
Condition d'essai :	Temp °C: 21.17	Pression kPa: 101.475	Humidité: 48.665

NOTES:

Pour l'étalonnage des masses, nous utilisons la procédure "Comparaison individuelle" PDL-09-MG-001 et la procédure "Détermination des incertitudes" PDL-09-MG-002. Le droit d'auteur du présent certificat appartient au laboratoire délivreur et doit être reproduit intégralement, à moins d'une autorisation écrite du laboratoire délivreur.

REMARQUES:



11 JANV. 2018

page 1 de 5

CERTIFICAT D'ÉTALONNAGE

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

Client :	Polytests	No. du Certificat :	152-4BB901-181
Adresse :	695 B rue Gaudette St-Jean-sur-Richelieu, QC J3B7S7	Accréditation CCN n. :	668
		Certification CLAS n. :	2010-01
		Classe d'exactitude :	ASTM 6
		Date d'étalonnage :	09-01-2018
Masse :	2 kg	Date du prochain étalonnage :	09-01-2023

RÉSULTAT DE L'ÉTALONNAGE, MASSE CONVENTIONNELLE:

Valeur Nominale	No de série	No d'inventaire	Masse conventionnelle	Masse conventionnelle après ajustement	Tolérance ± (mg)	Incertitudes ± (mg)
2 kg		EM-090	2.0001538 kg		200 mg	2.0 mg

CERTIFICAT D'ÉTALONNAGE

9900 Chemin de la Côte-de-Liesse, Lachine, QC H8T 1A1
www.dispersion.ca 1.866.390.5086

BALANCES UTILISÉES

Pour l'étalonnage manuel :

> 5 kg à 25 kg :	Mettler Toledo XP32003L, SNR 1123271214, max. 32100 g, d = 0.005 g
> 1 kg à 5 kg	Mettler Toledo PR5003, SNR 1115311634, max. 5100 g, d = 0.001 g
> 300 g à 2 kg :	Mettler Toledo XP2004S, SNR B131185222, max. 2100 g, d = 0.1 mg
> 100 g à 200 g :	Mettler Toledo AT201 SNR BA1115230146, max. 205 g, d = 0.01 mg
> 5 g à 100 g :	Mettler Toledo AX106 SNR 1127063924, max. 111 g, d = 1 µg
1 mg à 5 g :	Mettler UMX5, SNR 1121103055, max. 5.1 g, d = 0.1 µg

Pour l'étalonnage automatisé :

> 200 g à 1 kg :	Mettler Toledo AX1005 SNR 1127063210, max. 1109 g, d = 0.01 mg
> 5 g à 100 g :	Mettler Toledo AX106 SNR 1120143015, max. 111 g, d = 1 µg
1 mg à 5 g :	Mettler UMX5, SNR 1125140561, max. 5.1 g, d = 0.1 µg

Les balances sont vérifiées selon notre procédure de contrôle périodique PDL-11-MG-001.

INCERTITUDES:

Les incertitudes que nous retrouvons comprennent :

1. L'incertitude associée à l'opération de pesage.
2. L'incertitude associée à la densité de l'air.
3. L'incertitude associée à l'étalon utilisé.
4. L'incertitude associée à la densité de la masse à être étalonnée.

L'incertitude de l'opération de pesage comprend la reproductibilité à long terme.

Les incertitudes précisées dans ce rapport sont des incertitudes élargies représentant un niveau de confiance d'approximativement 95 %, obtenu en multipliant ensemble l'incertitude-type composée par un facteur de couverture de $k = 2$. Pour de plus amples renseignements, veuillez consulter la publication GUM (Guide pour l'expression de l'incertitude de mesure, édition de 1995).

TRAÇABILITÉ

Le Service d'évaluation de laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et a certifié des capacités d'étalonnage spécifiques de ce laboratoire et leur traçabilité à des étalons nationaux de mesure reconnus et au Système international d'unités (SI). Ce certificat d'étalonnage est émis conformément aux conditions de certification accordées par CLAS et aux conditions d'accréditation accordées par le Conseil canadien des normes (CCN). Le CLAS pas plus que le CCN ne peut garantir l'exactitude des étalonnages individuels effectués par des laboratoires accrédités.

D.P

CERTIFICAT D'ÉTALONNAGE

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

RÉFÉRENCES UTILISÉES

Poids	No de série	Fabricant	Date d'étalonnage	Date due
20kg	69976	Troemner	30-05-2017	30-05-2018
5kg	129099	Mettler Toledo	02-09-2017	02-09-2018
5kg	96-0888-50-3	Denver Instrument Company	02-09-2017	02-09-2018
2kg	129098	Mettler Toledo	02-09-2017	02-09-2018
2kg	96-0888-50-3	Denver Instrument Company	02-09-2017	02-09-2018
300g	96-0888-50-2	Denver Instrument Company	02-09-2017	02-09-2018
1kg - 1mg	MT-01	Mettler Toledo	02-09-2017	02-09-2018

ÉTALONS CERTIFIÉS PAR LE CNRC(Référence NRC MS-2016-0021)

Poids	No de série	Fabricant	Date d'étalonnage	Date due
100g	95170	Mettler Toledo	17-10-2016	17-10-2018
10kg	129100	Mettler Toledo	17-10-2016	17-10-2018
1kg	95171	Mettler Toledo	17-10-2016	17-10-2018

RÉFÉRENCES DE LA STATION ROBOTISÉE

Poids	No de série	Fabricant	Date d'étalonnage	Date due
1kg - 1mg	DK000A132	Laboratoire Dispersion	01-08-2017	01-08-2018

DP

CERTIFICAT D'ÉTALONNAGE

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

Client :	Polytests	No. du Certificat :	152-4BB901-182
Adresse :	695 B rue Gaudette St-Jean-sur-Richelieu, QC J3B7S7	Date d'étalonnage :	09-01-2018

Technicien:
Simeonidis, Georgios



David Llorens, Responsable Qualité

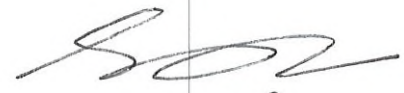
DESCRIPTION DU SERVICE:

Description des masses :	ASTM E617	Date d'approbation :	09-01-2018
Classe de précision :	ASTM 1	Date prochain étalonnage :	09-01-2023
Densité :	7.95g/cm ³	Accréditation CCN n. :	668
Identification (si unique) :	(items multiples)	Certification CLAS n. :	2010-01
Condition d'essai :	Temp °C: 21.265	Pression kPa: 101.565	Humidité: 49.58

NOTES:

Pour l'étalonnage des masses, nous utilisons la procédure "Comparaison individuelle" PDL-09-MG-001 et la procédure "Détermination des incertitudes" PDL-09-MG-002. Le droit d'auteur du présent certificat appartient au laboratoire délivreur et doit être reproduit intégralement, à moins d'une autorisation écrite du laboratoire délivreur.

REMARQUES:


11 JANV. 2018
page 1 de 5

CERTIFICAT D'ÉTALONNAGE

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

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> 5 g à 100 g :	Mettler Toledo AX106 SNR 1127063924, max. 111 g, d = 1 µg
1 mg à 5 g :	Mettler UMX5, SNR 1121103055, max. 5.1 g, d = 0.1 µg

Pour l'étalonnage automatisé :

> 200 g à 1 kg :	Mettler Toledo AX1005 SNR 1127063210, max. 1109 g, d = 0.01 mg
> 5 g à 100 g :	Mettler Toledo AX106 SNR 1120143015, max. 111 g, d = 1 µg
1 mg à 5 g :	Mettler UMX5, SNR 1125140561, max. 5.1 g, d = 0.1 µg

Les balances sont vérifiées selon notre procédure de contrôle périodique PDL-11-MG-001.

INCERTITUDES:

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CERTIFICAT D'ÉTALONNAGE

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

RÉFÉRENCES UTILISÉES

Poids	No de série	Fabricant	Date d'étalonnage	Date due
20kg	69976	Troemner	30-05-2017	30-05-2018
5kg	129099	Mettler Toledo	02-09-2017	02-09-2018
5kg	96-0888-50-3	Denver Instrument Company	02-09-2017	02-09-2018
2kg	129098	Mettler Toledo	02-09-2017	02-09-2018
2kg	96-0888-50-3	Denver Instrument Company	02-09-2017	02-09-2018
300g	96-0888-50-2	Denver Instrument Company	02-09-2017	02-09-2018
1kg - 1mg	MT-01	Mettler Toledo	02-09-2017	02-09-2018

ÉTALONS CERTIFIÉS PAR LE CNRC(Référence NRC MS-2016-0021)

Poids	No de série	Fabricant	Date d'étalonnage	Date due
100g	95170	Mettler Toledo	17-10-2016	17-10-2018
10kg	129100	Mettler Toledo	17-10-2016	17-10-2018
1kg	95171	Mettler Toledo	17-10-2016	17-10-2018

RÉFÉRENCES DE LA STATION ROBOTISÉE

Poids	No de série	Fabricant	Date d'étalonnage	Date due
1kg - 1mg	DK000A132	Laboratoire Dispersion	01-08-2017	01-08-2018



CERTIFICATE OF NIST TRACEABLE CALIBRATION

Calibration Certificate No: 84629

Customer Information

Customer: Services Polytests, Inc.
Address : 695-B Gaudette
St-Jean-sur-richelieu
J3B 7S7
Customer PO #: 100519



Calibration Procedure Information

Procedure ID: GTP AIRVEL Revision #: 7 Revision Date: 10/17/2018

Calibration Standards Information

Graffel ID	Manufacturer	Model #	Description	CAL Due
10017	Hart Scientific/Burns	1502A/3925	PRT, Temperature	8/3/2021
10086	Furness Controls	FC0332	DP Transmitter	5/7/2021
10100	Graffel	n/a	Temperature	10/18/2022
10171	Furness	FC0332-2W	0 - .4" H2O	5/7/2021
10187	Vaisala	PTB210	Barometric Pressure Gauge	12/1/2021
10157	HOBO	UX100-011	RH/Temp logger	10/15/2020

Sensor Information

Manufacturer: Omega Description: Velometer Method Used: Pitot Tube
Model #: HHF143 Rated Accuracy: \pm See Attachment Accuracy Specified By: Omega
Instrument ID#: EM153 Range: 40 to 5000 fpm Condition: Functional
Serial #: 1015949

Comments: Calibration Date: 08/27/2020 | Upper range limited to 5000fpm, 08-16-18.
Calibration Due: 08/27/2021

The calibrations within the certificate/report are traceable through NIST or another National Metrology Institute to the International System of Units (SI). The reported calibration uncertainty has a confidence level of 95% (k=2). A calibration uncertainty ratio of 4:1 was maintained unless required uncertainty is supported by analysis. Graffel Quality Assurance System complies with applicable requirements of ISO/IEC-17025-2017, ANSI/NSL Z540-1-1994 and ISO 9001: 2008. All results contained within this certificate relate only to item(s) calibrated. This certificate shall not be reproduced except in full and with the written consent of Graffel. Acceptance Criteria per Simple Acceptance Rule: Measurement Uncertainty is not applied to the measured value when in/out of tolerance statement is made.

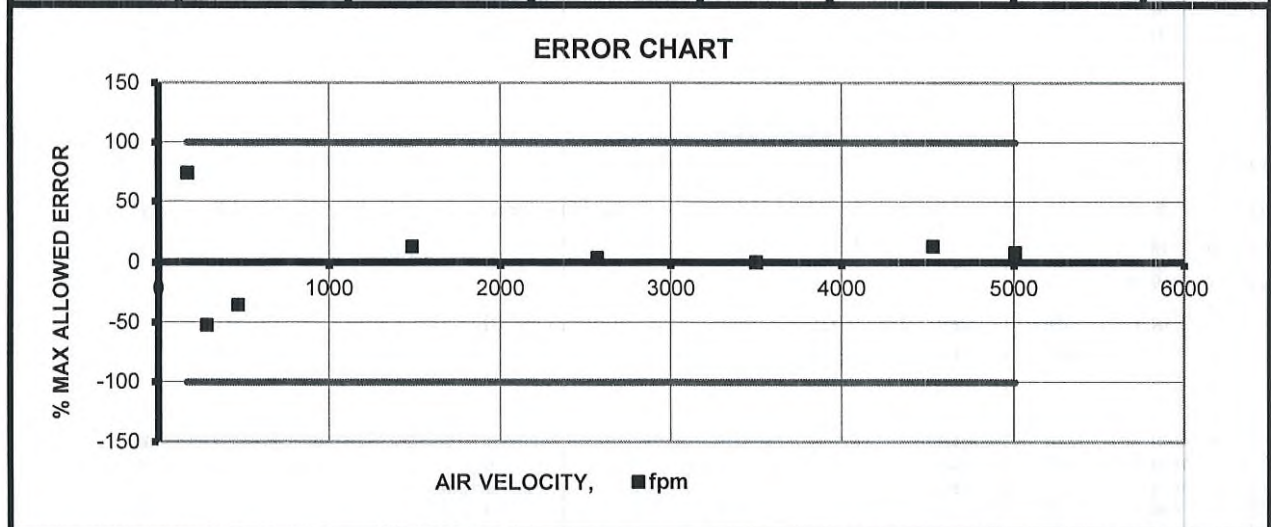
Performed By: Kevin Garcia Date: 8/27/2020
Kevin Garcia
Calibration Technician

Approved By: Scott Pickett Date: 8/28/2020
Scott Pickett
Vice President, Lab Services

**ATTACHMENT TO CALIBRATION CERTIFICATE 84629
AS FOUND / AS LEFT DATA**

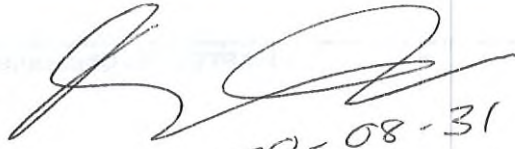
Page 2 of 2

Reading From Standard,	Lower Limit of Meter Reading,	Measured Reading From Meter,	Upper Limit of Meter Reading,	Error,	Measurement Uncertainty (k=2)	CMC (k=2)	STATUS
Actual Air Velocity							
fpm	fpm	fpm	fpm	fpm	fpm	fpm	STATUS
170	167	172	173	2	4	4	Pass
283	279	281	287	-2	6	6	Pass
466	460	464	472	-2	8	8	Pass
1483	1467	1485	1499	2	21	21	Pass
2568	2541	2569	2595	1	35	35	Pass
3500	3464	3500	3536	0	47	47	Pass
4531	4485	4537	4577	6	61	61	Pass
5007	4956	5011	5058	4	67	67	Pass



Instrument Specifications		
Test Fluid:	Air	
Lower Velocity Range:	40	fpm
Upper Velocity Range:	7800	fpm
Velocity Resolution:	1	
Velocity Accuracy:	+/- (1% Reading + 1 dgt)	
Laboratory Ambient Conditions		
Pressure:	14.26	psia
Humidity:	53.00	%RH
Temperature:	84.64	°F

	FLOW - TEMPERATURE - HUMIDITY - PRESSURE - DESIGN - CONSULTING - ENGINEERING
	NIST Traceable Calibration Data Sheet
WWW.GRAFTEL.COM	870 Cambridge Drive, Elk Grove Village, IL 60007 Phone: 847-364-2600 Fax: 847-364-2899


 2020-08-31

Certificat d'Étalonnage / Certificate of Calibration

CLIENT :
SERVICES POLYTESTS INC.
695-B GAUDETTE
ST-JEAN-SUR-RICHELIEU, QUEBEC

Description: STOPWATCH
Fabricant/ Manufacturer: EXTECH
Modèle/ Model : 365510
No série / Serial no : 131636
Inventaire / Asset # : EM-175

CERTIFICAT No / Certificate No:

312464

PROCÉDURE / Procedure :

TRESCAL - EXTECH_365510

Date étalonnage/ Calibration Performed :

aaaa - mm - jj
2020-12-24

Echéance/ Due Date :

2021-12-24

Type de résultat / Results type : As-Found = As-Left

Conditions de mesure / Measurement conditions

Résultats d'essais / Test results : Conforme / In Tolerance

TEMPÉRATURE / Temp. : 23°C

Usage restreint/ Restricted use :

HUMIDITÉ / Humidity : 36% RH

Réparation effectuée / Repair performed :

Ajustement effectué / Adjustment performed :

ÉTALONS UTILISÉS/ Standards Used:

Identification	Manuf.	Model	Description	Ser. #	Étalonné/ Cal.	Échéance/ Due
PRO313	H-P	53132A	UNIVERSAL COUNTER	3546A03142	2020-07-22	2021-07-22
PRO392	AGILENT	33250A	FUNCTION/ARBITRARY WAVEFORM GENERATOR	MY40008014	2019-06-12	2021-06-12

Les spécifications mentionnées comme limites de tolérances d'essai sont celles établies par le fabricant, sauf indication contraire.

Test tolerance limits are based on manufacturers specifications unless stated otherwise.

NOTES :



2021.01.19

Technicien :
Technician


D. MARTEL

Le système qualité de la société est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour le processus d'étalonnage sont retraçables au SI par l'entremise du CNRC et/ou du NIST.

Our quality system complies with the requirements of ISO 17025 and the standards used for the calibration are traceable to SI through NRC and/or NIST.

LE DROIT D'AUTEUR DE CE CERTIFICAT APPARTIEN À TRESCAL CANADA INC. CE CERTIFICAT NE PEUT ÊTRE REPRODUIT AUTREMENT QU'EN ENTIER ET AVEC LE CONSENTEMENT PRÉALABLE ÉCRIT DE TRESCAL CANADA INC.
TRESCAL CANADA INC. OWN COPYRIGHT OF THIS CERTIFICATE. THE CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN CONSENT OF TRESCAL CANADA INC.

CLIENT / Customer :

DESCRIPTION / Description :

MANUFACTURIER / Manufacturer :

MODÈLE / Model :

312464

SERVICES POLYTESTS INC.

STOPWATCH

EXTECH

365510

DESCRIPTION Description	LIMITES Limits	LECTURES Readings	LIMITES Limits
----------------------------	-------------------	----------------------	-------------------

Temps écoulé, chronomètre sous test / Elapsed time on test stopwatch

Minutes	Seconds	1/100 sec
23	6	87

Total au compteur / Reference timer: comptes/counts

(Δt) Deviation (1/100sec): 1,50

Deviation Par jour/ Per day (%): 0,0011 %

Deviation Par jour/ Per day (sec): 0,93 sec

* 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.

Min	LECTURES Readings	Max
	Comptes / Counts Chronomètre/timer 138687	
* Secondes -3,00	Deviation 24hrs 0,93	* Secondes 3,00



22 Albiston Way
Auburn, ME 04210
800-292-6218
207-777-6218
Fax 207-777-6215
www.specair.com

Date: 08/14/2017

Certificate of Analysis

Customer:

VAC OXY

Results are reported in mole percent, unless otherwise indicated. Mixes are prepared via partial pressure methods, or gravimetrically, using high load high sensitivity electronic scales. Prior to use, scales are verified for accuracy using applicable NIST traceable weights; analyses are calibrated against reference materials traceable to NIST weights and/or NIST gas reference materials.

Cylinder Serial #: 809277

Cylinder Size: K

CGA Connection: 350

Fill Pressure: 1450 PSI

Analysis: Certified Standard

Lot #: 4722621

Component(s):	Requested Concentration(s):	Actual Concentration(s):
Carbon Monoxide	3%	3.0%
Carbon Dioxide	18%	18.0%
Oxygen	2%	2.0%
Nitrogen	BALANCE	BALANCE

Expiration Date: 08/2020

Approved By:

Tom Bosse

EM-275

5-sept 2017

The information contained herein has been prepared at your request by qualified experts. While we believe that the information is accurate within the limits of the analytical methods employed, and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability arising out of the use of the information contained herein exceed the fee established for providing such information.



22 Albiston Way
Auburn, ME 04210
800-292-6218
207-777-6218
Fax 207-777-6215
www.specair.com

Date: 08/14/2017

Certificate of Analysis

Customer:

VAC OXY

Results are reported in mole percent, unless otherwise indicated. Mixes are prepared via partial pressure methods, or gravimetrically, using high load high sensitivity electronic scales. Prior to use, scales are verified for accuracy using applicable NIST traceable weights; analyses are calibrated against reference materials traceable to NIST weights and/or NIST gas reference materials.

Cylinder Serial #: K3886

Cylinder Size: K

CGA Connection: 590

Fill Pressure: 1450 PSI

Analysis: Certified Standard

Lot #: 4722622

Component(s):	Requested Concentration(s):	Actual Concentration(s):
Carbon Monoxide	1%	1.0%
Carbon Dioxide	10%	10.0%
Oxygen	10%	10.0%
Nitrogen	BALANCE	BALANCE

Expiration Date: 08/2020

Approved By:

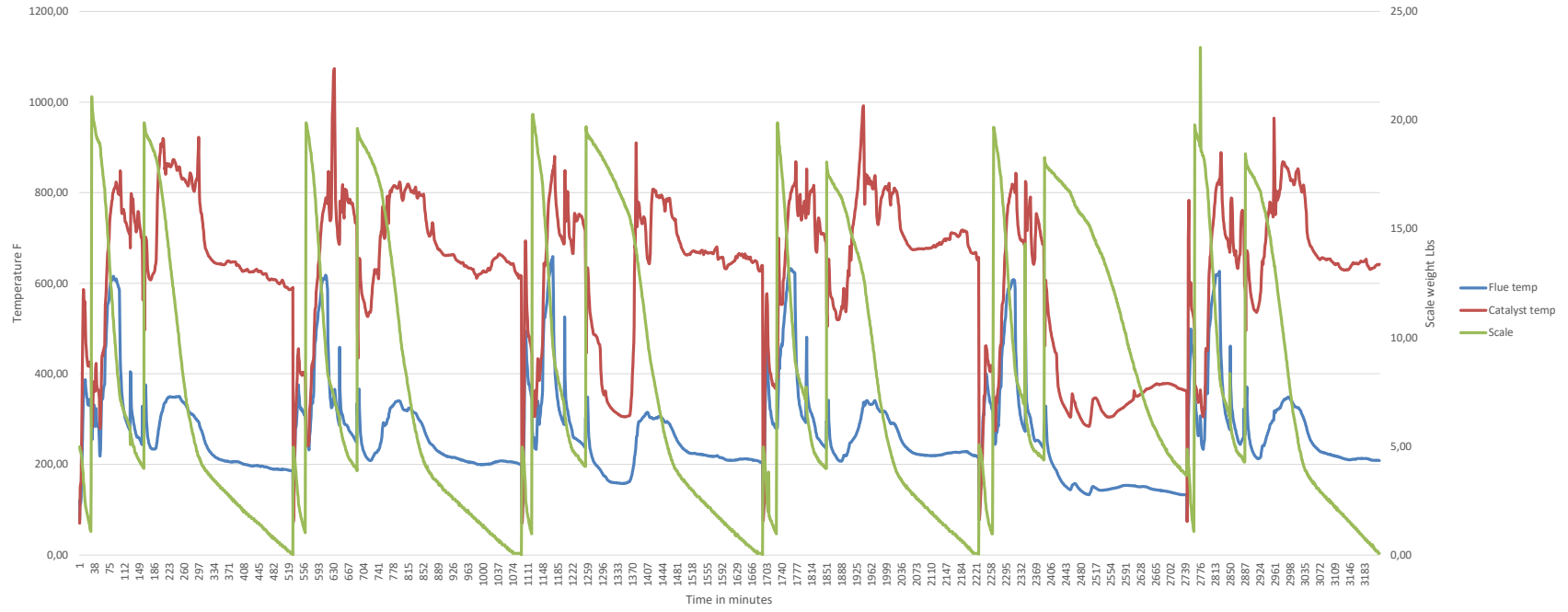
Tom Bosse

EM. 276
5 sept 2017

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APPENDIX 4: Unit pre burn

Aging Mansfield wood heater



Aging Mansfeld

time minute	Flue	Catalyst up	scale	Right	Back	bottom	Top	Left
	temp							
	°F	°F	lbs	°F	°F	°F	°F	°F
1	77,98	70,00	4,97	68,48	68,84	68,48	69,16	68,67
2	121,20	104,20	4,87	68,61	69,20	80,92	69,18	68,72
3	112,73	151,87	4,78	69,64	71,04	101,91	69,23	69,29
4	115,22	158,28	4,78	71,53	72,87	111,63	69,39	70,34
5	126,75	163,54	4,68	73,76	74,50	116,02	69,59	71,41
6	168,89	218,75	4,58	76,37	76,32	121,27	69,81	72,61
7	204,78	324,51	4,37	80,66	78,91	128,64	70,14	74,28
8	235,65	403,00	4,17	88,07	82,44	136,81	70,65	76,87
9	268,00	464,88	3,98	98,76	86,86	145,92	71,38	80,44
10	330,44	567,87	3,75	112,20	92,08	160,32	72,41	85,03
11	353,18	585,94	3,38	127,54	98,48	176,26	73,88	90,95
12	363,25	558,21	3,17	143,67	105,78	188,66	75,80	98,21
13	358,32	549,00	2,97	160,39	113,88	203,26	78,04	106,83
14	367,54	560,38	2,68	176,19	122,68	218,59	80,46	116,36
15	387,38	531,93	2,37	190,96	131,96	236,19	83,00	126,71
16	375,45	491,76	2,27	205,68	140,95	256,37	86,10	137,19
17	366,68	468,16	2,17	219,56	148,89	281,19	90,16	147,88
18	356,76	451,43	2,07	231,45	155,87	307,77	94,77	158,08
19	348,77	438,75	1,98	243,97	162,17	332,01	99,44	166,75
20	345,18	428,12	1,87	255,47	167,96	353,24	103,88	174,87
21	335,44	421,74	1,77	265,02	173,57	373,80	108,10	182,11
22	331,31	417,41	1,77	273,89	179,46	396,63	112,01	189,30
23	332,60	418,49	1,57	281,27	185,26	417,56	115,52	195,78
24	332,97	419,60	1,57	287,82	191,06	434,43	118,95	202,40
25	330,45	416,62	1,47	293,73	197,10	451,26	122,26	208,87
26	341,00	426,01	1,37	298,96	202,85	467,87	125,54	215,84
27	343,95	426,12	1,18	303,23	208,81	469,75	128,63	222,82
28	340,88	423,25	1,17	308,31	215,11	472,70	131,62	228,72
29	331,87	415,88	1,07	313,19	221,15	477,88	134,62	235,58
30	335,02	424,58	3,07	317,34	226,63	488,01	137,79	242,19
31	264,63	344,37	21,08	320,90	232,31	488,15	140,65	248,35
32	254,61	290,21	20,58	323,23	236,77	480,06	142,85	253,13
33	273,02	283,42	20,48	323,49	239,89	473,20	144,50	256,11
34	289,22	328,67	20,28	321,83	242,43	466,57	145,60	258,29
35	306,50	356,84	20,08	319,87	244,19	458,99	146,73	260,56
36	316,87	367,15	19,98	315,66	245,20	453,10	148,28	263,79
37	331,48	382,91	19,88	313,41	245,75	454,69	150,00	267,29
38	321,37	382,14	19,77	312,09	246,09	460,03	151,90	271,99
39	299,96	369,46	19,68	310,74	246,31	466,39	154,22	276,89
40	283,92	361,09	19,58	309,29	246,28	471,16	156,34	281,23
41	316,61	412,33	19,48	307,17	245,88	471,95	158,32	284,54
42	323,83	423,06	19,30	305,07	245,15	467,64	160,20	285,73
43	307,52	396,91	19,28	301,82	244,16	461,55	162,71	286,76
44	292,17	374,90	19,18	299,76	242,88	455,14	164,71	285,86
45	286,78	367,61	19,18	298,23	241,50	449,31	166,68	284,94
46	284,94	365,20	19,08	295,90	240,06	444,21	168,43	283,19
47	283,83	364,48	19,08	293,29	238,57	439,36	170,23	281,68
48	281,12	361,07	18,98	291,22	237,03	434,87	171,90	280,50
49	282,88	359,60	18,98	288,93	235,53	430,65	173,56	278,81
50	248,20	344,83	18,98	286,17	234,05	426,73	174,86	277,07
51	222,65	297,38	18,88	283,82	232,73	425,98	176,18	275,01
52	218,52	279,57	18,88	280,91	231,44	435,96	177,00	272,63
53	233,33	293,09	18,68	278,20	230,28	454,92	177,15	270,06
54	269,28	338,62	18,38	275,53	230,40	463,15	177,06	267,72
55	329,91	391,29	18,18	273,57	231,69	467,78	176,71	267,08
56	361,08	427,97	17,98	273,36	234,60	474,69	177,39	268,87
57	357,35	440,06	17,88	274,81	238,85	483,69	178,84	272,45
58	344,48	443,90	17,68	277,25	243,31	495,82	180,85	277,60
59	349,72	440,92	17,48	279,97	247,67	509,31	183,45	283,51
60	362,24	450,48	17,38	281,82	252,33	523,15	186,12	289,15
61	370,91	454,35	17,18	286,08	257,75	535,37	188,10	293,33
62	374,58	458,12	16,98	289,47	263,75	544,37	190,30	298,70
63	376,04	461,77	16,88	292,22	270,01	552,57	193,46	304,01
64	421,37	510,58	16,58	296,22	276,38	560,65	196,22	308,47
65	454,51	551,36	16,28	301,16	282,83	561,29	199,13	313,81
66	461,23	569,70	16,08	307,49	289,09	560,25	203,55	320,13
67	475,25	581,80	15,88	315,79	294,89	561,47	208,53	327,64
68	496,73	604,91	15,58	324,69	300,09	564,20	214,33	335,59
69	525,35	636,99	15,28	333,37	304,83	567,23	220,50	344,37
70	540,41	652,29	15,08	340,04	309,38	569,75	225,32	354,58

Aging Mansfeld

71	553,53	666,30	14,78	348,65	314,46	569,59	230,98	365,07
72	555,62	676,48	14,48	358,24	320,28	567,72	237,72	374,93
73	558,42	684,87	14,18	367,64	326,66	566,57	244,59	383,82
74	566,02	697,15	13,88	376,18	333,57	566,30	252,21	394,06
75	577,32	718,38	13,58	383,92	340,91	567,20	260,66	403,57
76	587,33	736,54	13,28	392,74	348,62	569,78	269,13	413,50
77	597,48	751,62	12,98	401,57	356,55	575,01	277,94	423,21
78	602,57	755,95	12,68	410,60	364,71	581,10	288,20	432,73
79	602,84	763,04	12,38	420,24	372,96	586,89	297,22	443,11
80	604,12	772,59	12,18	427,88	381,29	593,51	307,27	454,10
81	607,42	780,28	11,88	437,83	389,75	600,72	315,96	464,21
82	609,97	785,19	11,58	448,08	398,18	608,19	323,31	473,71
83	612,72	795,56	11,28	457,40	406,71	615,06	332,14	483,91
84	614,33	799,92	10,98	468,50	415,27	622,31	338,64	492,91
85	615,76	801,61	10,77	477,71	424,00	629,01	346,50	502,36
86	613,45	806,61	10,47	487,98	432,91	636,22	354,07	510,85
87	609,71	808,25	10,28	497,63	441,74	643,92	360,22	519,84
88	608,31	810,43	10,08	506,13	450,43	652,24	367,84	529,12
89	606,12	812,56	9,77	510,34	459,15	660,84	374,37	537,74
90	605,82	813,19	9,56	521,95	467,80	669,50	379,85	545,54
91	607,87	820,29	9,28	531,35	476,42	678,93	384,42	553,31
92	609,42	823,77	9,07	539,43	485,09	688,31	389,61	561,06
93	605,45	819,79	8,88	546,75	493,64	696,84	394,90	568,86
94	601,66	813,71	8,68	552,39	501,83	705,73	399,85	575,29
95	599,76	808,39	8,37	559,27	509,82	714,52	405,05	582,78
96	595,94	803,48	8,18	565,36	517,28	723,28	407,86	588,67
97	592,78	797,74	8,08	571,43	524,36	732,21	412,65	594,04
98	590,20	797,45	7,78	576,43	530,95	740,74	416,20	598,08
99	587,64	797,36	7,65	581,21	537,22	748,74	419,80	601,96
100	585,08	795,04	7,48	585,17	543,02	756,05	422,61	605,71
101	478,57	810,16	7,28	588,17	547,86	751,88	425,00	608,47
102	435,06	848,37	7,17	590,53	552,45	734,83	428,89	612,13
103	409,19	826,96	7,07	593,48	555,70	716,22	431,18	615,23
104	388,68	791,58	7,07	594,08	557,93	698,74	433,78	617,33
105	371,25	766,37	6,97	596,85	558,99	683,25	434,65	618,85
106	357,40	754,27	6,88	601,05	559,43	669,77	434,74	619,37
107	345,68	754,21	6,88	601,66	558,81	658,47	434,99	618,35
108	336,67	757,09	6,78	601,62	557,14	649,00	433,70	617,17
109	329,38	762,14	6,68	599,70	555,01	640,69	434,02	615,81
110	322,52	763,06	6,68	597,85	552,61	633,09	433,15	613,25
111	317,03	760,05	6,60	594,95	549,62	626,08	432,49	610,54
112	311,66	753,97	6,58	591,74	546,53	619,69	432,59	607,78
113	307,18	746,11	6,47	585,91	543,27	613,83	432,41	605,46
114	302,99	737,34	6,47	584,51	540,36	608,43	431,12	601,64
115	299,87	734,51	6,37	581,00	537,49	603,91	429,98	597,77
116	297,06	734,48	6,37	577,53	534,62	600,09	429,10	594,09
117	294,60	731,06	6,27	574,29	532,11	596,61	427,34	590,01
118	292,01	727,63	6,27	570,96	529,44	593,54	426,10	586,58
119	289,74	724,44	6,27	568,69	527,29	590,86	423,68	582,14
120	287,29	720,34	6,18	565,88	525,24	588,36	422,41	577,39
121	284,68	717,18	6,08	562,88	523,50	586,02	420,85	573,34
122	282,49	715,05	6,08	559,95	521,10	584,07	419,86	570,36
123	280,63	712,59	6,03	557,56	519,93	582,23	418,52	566,48
124	278,62	709,61	5,98	554,08	518,18	580,51	417,08	562,96
125	276,72	706,93	5,87	552,31	516,67	578,90	415,50	558,89
126	274,97	704,96	5,88	549,60	515,24	577,34	414,00	555,31
127	404,72	677,91	5,07	548,25	513,61	575,98	412,31	551,10
128	401,94	780,12	5,57	545,94	512,98	579,21	410,54	547,30
129	342,79	798,28	5,38	544,14	512,69	575,60	408,64	543,83
130	322,91	793,34	5,38	542,75	512,12	568,89	407,71	541,39
131	313,91	787,78	5,28	542,91	511,72	561,13	407,54	539,70
132	308,10	781,52	5,17	542,84	511,54	553,16	407,18	538,27
133	302,83	785,99	5,08	542,77	511,16	545,45	406,85	537,56
134	297,43	773,32	4,97	542,82	510,49	538,29	406,53	536,48
135	291,45	757,57	4,97	540,88	509,70	531,86	406,10	536,46
136	286,54	748,77	4,97	539,14	508,79	526,10	405,59	535,15
137	282,37	740,08	4,87	541,75	508,02	521,16	404,53	533,47
138	278,05	735,10	4,78	542,98	507,31	516,85	403,49	532,06
139	273,98	732,14	4,68	542,47	506,31	513,28	402,60	531,16
140	269,86	726,18	4,68	540,94	504,83	510,25	402,26	530,26
141	265,54	713,30	4,68	540,43	503,40	507,80	401,34	529,21
142	262,40	715,01	4,58	541,19	501,87	505,90	400,36	528,01
143	260,61	718,39	4,58	541,28	500,05	504,79	398,74	526,50
144	259,61	725,45	4,47	539,75	497,89	504,54	398,35	524,96

Aging Mansfeld

145	260,87	747,81	4,47	538,60	496,13	505,12	396,72	523,30
146	260,73	758,24	4,47	537,01	493,71	506,46	396,26	520,95
147	260,03	757,33	4,37	533,66	491,31	508,34	395,03	519,13
148	259,53	747,43	4,37	532,46	489,29	510,65	393,36	516,32
149	258,14	736,56	4,37	531,20	487,01	513,58	392,27	513,84
150	255,92	727,82	4,27	528,93	484,97	516,65	390,78	511,15
151	254,04	721,87	4,27	526,82	482,99	519,91	389,28	508,41
152	252,17	715,72	4,27	525,17	481,10	523,92	387,71	506,26
153	249,77	707,04	4,17	523,54	479,47	528,24	385,73	503,43
154	247,31	701,26	4,17	522,29	477,60	532,70	384,74	500,32
155	245,22	698,62	4,17	519,87	475,87	537,51	383,19	499,11
156	243,65	696,30	4,12	517,90	473,78	541,97	381,74	497,10
157	329,05	675,63	4,08	516,93	472,03	546,50	380,44	494,81
158	276,46	562,90	4,08	515,42	470,92	544,42	378,49	492,10
159	253,01	601,49	4,08	512,83	469,34	540,38	376,87	490,50
160	243,27	645,90	3,98	510,36	467,63	535,52	374,85	488,36
161	295,90	615,20	19,88	507,55	465,59	530,34	372,85	485,88
162	299,00	495,79	19,78	503,77	463,20	525,16	370,72	481,92
163	335,33	623,68	19,68	499,61	458,99	520,69	367,90	480,09
164	359,02	680,48	19,58	493,89	454,08	517,10	365,92	475,80
165	375,87	701,64	19,38	488,63	448,93	514,62	363,28	470,58
166	324,45	696,55	19,38	482,74	443,68	513,31	362,02	466,09
167	294,78	695,53	19,30	473,99	438,42	511,74	360,73	461,65
168	279,07	665,26	19,28	470,61	433,30	509,32	359,16	456,11
169	268,74	642,96	19,28	464,63	428,07	506,31	357,76	451,82
170	260,75	630,28	19,18	459,44	422,75	502,80	355,86	446,89
171	254,77	622,80	19,18	452,63	417,56	499,10	354,04	442,33
172	249,88	617,29	19,18	447,67	412,71	495,30	351,59	437,08
173	246,29	612,87	19,08	441,84	408,24	491,63	349,98	432,08
174	243,46	609,47	19,08	435,39	403,67	488,03	347,76	427,64
175	241,08	608,48	19,08	429,22	399,37	484,52	345,24	423,05
176	238,51	607,92	18,98	424,33	395,06	481,06	343,14	418,07
177	236,56	606,99	18,98	417,67	390,59	477,65	340,63	413,56
178	235,71	607,49	18,88	413,31	386,65	474,30	338,34	409,33
179	235,01	610,12	18,88	409,29	382,31	471,24	336,12	404,35
180	234,52	612,82	18,79	403,92	378,80	468,39	333,62	400,44
181	234,08	616,37	18,78	399,46	375,27	465,84	331,32	396,28
182	233,82	618,92	18,68	395,06	371,56	463,47	329,08	391,89
183	233,76	620,18	18,68	390,74	367,86	461,33	326,78	388,06
184	233,75	621,17	18,58	386,38	364,51	459,43	324,61	384,45
185	233,84	622,54	18,58	382,55	360,92	457,67	322,47	380,71
186	233,88	623,72	18,58	378,35	358,02	456,15	320,38	377,11
187	234,04	627,69	18,48	374,41	354,97	454,72	318,25	373,63
188	234,67	632,75	18,38	370,45	351,92	453,45	316,18	370,32
189	234,58	638,89	18,38	366,90	349,13	452,26	314,12	367,02
190	235,75	644,48	18,28	363,78	346,26	451,26	312,27	363,76
191	238,35	652,28	18,28	360,19	343,61	450,37	310,11	360,71
192	243,47	684,84	18,18	357,29	341,14	449,51	308,20	357,44
193	250,94	744,58	18,08	354,29	338,64	448,72	306,29	354,96
194	258,40	784,30	17,98	351,46	336,41	447,99	304,80	352,18
195	265,59	819,73	17,88	348,82	334,53	447,29	303,51	349,90
196	272,60	841,97	17,78	347,16	332,95	446,51	302,55	347,78
197	278,38	848,48	17,68	345,36	331,15	445,83	301,65	345,69
198	283,46	857,53	17,48	343,79	329,99	445,13	300,90	344,08
199	288,70	867,96	17,38	342,50	328,75	444,48	300,10	342,52
200	293,84	881,46	17,28	341,45	327,73	443,89	299,54	341,02
201	299,27	888,34	17,18	341,27	327,21	443,29	299,17	340,11
202	305,57	905,87	17,08	340,49	326,75	442,75	298,89	339,09
203	310,17	908,50	16,88	340,38	326,36	442,35	298,96	338,68
204	313,03	901,31	16,78	340,09	326,65	442,12	299,39	339,14
205	315,43	903,47	16,68	340,46	326,93	442,08	299,98	340,22
206	317,12	904,00	16,48	340,79	327,34	442,09	300,62	341,86
207	320,01	910,32	16,38	340,79	328,07	442,24	301,46	343,92
208	323,41	919,65	16,28	341,84	328,79	442,47	302,38	346,20
209	328,35	916,24	16,08	342,66	329,65	442,72	303,48	348,76
210	332,87	899,42	15,98	343,73	330,94	442,97	304,86	351,47
211	335,46	873,59	15,78	345,12	332,39	443,21	306,60	354,57
212	335,97	850,88	15,68	346,92	334,25	443,49	308,42	357,83
213	337,49	856,34	15,48	348,42	336,28	443,74	310,50	360,95
214	337,34	840,60	15,38	350,53	338,73	443,99	312,88	364,39
215	338,69	842,99	15,18	352,58	341,21	444,22	315,41	368,12
216	341,17	861,59	14,98	355,10	344,21	444,34	317,53	371,83
217	343,63	864,76	14,86	358,23	347,66	444,40	319,35	376,01
218	345,50	863,51	14,68	362,10	351,36	444,37	320,56	379,87

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219	346,03	860,56	14,48	366,74	355,56	444,29	321,59	384,27
220	346,92	857,90	14,38	371,48	359,76	444,26	322,31	388,58
221	347,98	861,00	14,18	376,17	364,03	444,33	323,09	392,98
222	348,36	863,76	14,07	381,06	368,46	444,54	323,95	397,10
223	348,43	862,51	13,82	385,79	372,90	444,80	324,62	401,10
224	349,57	861,49	13,68	390,64	376,87	445,08	325,23	405,04
225	349,50	857,75	13,48	395,26	381,01	445,29	325,83	409,19
226	349,85	856,96	13,38	399,86	385,57	445,34	326,50	413,26
227	349,43	856,96	13,18	404,53	389,43	445,18	327,22	417,23
228	349,16	857,96	13,07	408,66	393,69	444,89	327,89	421,24
229	348,76	860,48	12,88	413,28	397,96	444,52	328,53	425,43
230	348,76	861,58	12,68	417,05	402,04	444,01	329,20	429,69
231	347,97	866,78	12,58	421,29	406,13	443,44	329,81	433,84
232	348,40	871,29	12,38	424,94	410,21	442,82	330,40	438,03
233	348,40	872,68	12,28	428,93	413,97	442,19	330,96	442,25
234	348,02	872,51	12,08	432,60	417,83	441,55	331,46	446,36
235	348,70	872,68	11,97	436,41	421,56	440,95	332,16	450,34
236	348,51	870,80	11,78	439,82	425,16	440,38	332,60	454,24
237	348,25	867,72	11,68	443,67	428,91	439,83	333,26	458,01
238	348,47	865,93	11,38	446,85	432,58	439,31	333,90	461,61
239	349,28	864,23	11,28	450,04	436,50	438,62	334,43	465,48
240	349,24	860,68	11,18	453,68	440,33	437,79	335,03	468,78
241	348,90	854,12	10,99	456,97	443,80	436,93	335,60	472,26
242	349,64	850,11	10,78	460,44	447,59	436,26	335,98	475,22
243	349,48	848,63	10,68	463,30	451,20	435,66	336,61	478,83
244	349,80	849,72	10,48	467,22	455,36	435,13	337,02	482,08
245	349,64	852,90	10,28	470,32	459,06	434,70	337,68	485,26
246	350,51	855,96	10,18	473,35	462,78	434,37	338,31	488,38
247	350,28	856,44	9,98	476,50	466,05	434,19	338,82	491,32
248	350,51	857,61	9,78	479,22	469,80	434,08	339,25	494,10
249	349,49	855,37	9,58	482,29	473,92	434,16	339,79	496,99
250	347,70	848,99	9,48	485,11	477,47	434,39	340,40	499,10
251	345,98	841,89	9,28	487,94	480,84	434,62	340,96	501,96
252	343,96	837,70	9,07	490,34	484,23	434,90	341,42	505,11
253	342,44	834,13	8,98	493,82	488,00	435,08	341,99	507,84
254	340,52	831,57	8,78	496,68	491,88	435,24	342,75	510,27
255	338,87	829,17	8,58	499,78	495,53	435,28	343,45	513,03
256	338,41	829,27	8,48	502,20	499,07	435,26	343,99	515,58
257	337,65	831,20	8,28	505,47	502,35	435,09	344,64	517,86
258	337,69	831,70	8,18	507,99	505,23	434,84	345,28	520,51
259	336,83	830,85	8,04	510,54	508,35	434,67	346,01	522,69
260	335,57	829,69	7,88	513,20	510,84	434,55	346,69	525,23
261	334,43	828,94	7,77	515,58	512,95	434,51	347,42	526,70
262	333,54	828,47	7,58	517,15	515,25	434,52	348,26	529,33
263	332,15	827,08	7,48	519,85	517,34	434,61	348,91	531,68
264	331,42	823,77	7,28	521,29	519,31	434,81	349,53	533,76
265	329,50	822,44	7,18	523,72	521,20	435,04	350,18	536,07
266	327,36	820,92	6,97	526,10	522,53	435,37	350,90	537,89
267	326,21	821,13	6,88	528,17	524,04	435,70	351,68	540,09
268	324,93	818,82	6,88	530,31	525,14	436,02	352,52	541,76
269	322,14	815,36	6,78	532,12	526,30	436,30	353,36	543,46
270	320,58	814,67	6,58	533,49	528,05	436,35	354,14	545,41
271	318,39	817,88	6,47	535,04	529,14	436,23	354,86	547,22
272	316,20	825,17	6,37	536,59	530,11	435,99	355,86	549,11
273	314,41	833,02	6,30	538,48	531,03	435,81	357,07	550,60
274	313,70	840,27	6,24	539,96	531,16	435,75	358,10	551,95
275	314,00	843,59	6,18	541,14	531,09	435,83	359,16	553,10
276	312,46	842,51	6,08	541,55	531,36	436,15	360,54	553,69
277	311,18	838,64	5,98	542,56	531,12	437,11	361,62	554,74
278	311,09	837,65	5,88	542,97	530,89	438,73	362,83	554,39
279	311,31	831,92	5,77	541,83	530,81	440,67	363,91	555,39
280	310,83	820,98	5,67	542,08	530,53	442,66	364,98	555,36
281	310,69	813,57	5,57	541,29	530,49	444,65	366,12	555,62
282	309,33	809,76	5,57	541,23	530,65	446,59	366,88	555,67
283	308,67	806,49	5,48	540,35	530,63	448,41	367,46	555,50
284	307,86	803,62	5,38	540,83	531,11	449,95	368,18	555,96
285	306,70	802,75	5,28	541,45	531,31	451,26	368,92	555,19
286	304,93	804,80	5,18	540,18	531,28	452,60	369,48	555,98
287	303,18	811,96	5,10	542,40	531,68	453,95	370,18	555,72
288	301,94	820,25	5,07	542,24	532,10	455,47	370,65	556,10
289	300,89	825,92	4,97	542,28	532,27	456,93	371,15	556,74
290	299,96	828,27	4,87	541,57	531,96	458,23	371,34	556,77
291	298,54	829,77	4,78	540,64	532,08	459,48	372,28	556,99
292	298,00	829,08	4,78	542,32	532,07	460,50	373,24	556,64

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293	297,09	837,27	4,68	538,54	532,05	461,89	373,97	557,05
294	295,86	863,12	4,58	539,22	532,83	463,71	374,69	557,28
295	295,20	896,64	4,58	539,31	533,03	465,65	374,79	557,31
296	294,00	922,43	4,50	538,32	532,90	467,44	375,29	557,38
297	290,30	834,53	4,47	538,59	533,03	469,03	375,45	557,09
298	286,88	792,30	4,47	537,98	532,71	470,43	375,79	557,49
299	283,57	778,01	4,37	536,35	531,77	471,86	375,95	556,36
300	281,09	767,54	4,37	534,19	531,89	473,13	376,01	556,34
301	279,00	759,62	4,27	535,85	531,49	474,36	376,04	555,53
302	276,50	755,42	4,27	536,15	530,98	475,54	375,96	553,98
303	274,90	754,16	4,17	535,29	531,28	476,66	375,53	552,09
304	273,37	750,05	4,17	532,83	531,14	477,83	375,03	551,66
305	270,25	742,02	4,11	534,47	530,73	478,88	375,33	550,29
306	267,70	732,38	4,08	533,43	530,52	479,90	375,23	549,52
307	264,59	723,11	4,08	533,29	530,89	481,00	374,90	548,11
308	261,28	715,10	4,08	532,07	530,62	482,09	374,29	547,08
309	257,96	704,88	3,98	531,22	530,43	483,22	373,92	546,96
310	254,86	694,51	3,98	531,32	529,78	484,39	373,52	545,11
311	251,72	686,65	3,98	530,10	529,16	485,50	372,80	544,28
312	249,25	681,16	3,91	528,87	528,59	486,51	372,15	543,54
313	246,08	676,60	3,88	528,97	527,69	487,54	371,64	542,04
314	244,03	674,63	3,88	527,36	527,36	488,59	370,88	541,78
315	242,28	672,40	3,88	525,92	526,62	489,59	370,21	540,94
316	240,29	670,30	3,88	525,52	525,38	490,62	369,41	538,88
317	238,52	668,43	3,77	524,19	524,58	491,48	368,49	537,95
318	236,41	665,88	3,77	522,64	523,39	491,87	368,04	537,31
319	234,73	663,30	3,77	521,59	521,74	492,21	367,50	535,89
320	233,28	661,24	3,77	520,97	520,93	492,34	366,57	535,63
321	231,86	659,76	3,67	519,87	520,24	492,38	366,01	534,81
322	230,47	658,98	3,67	519,06	519,30	492,46	365,23	533,60
323	228,84	657,71	3,67	517,92	518,13	492,68	364,22	532,58
324	227,69	656,21	3,67	516,54	517,29	492,95	363,42	531,69
325	227,24	655,11	3,67	515,42	515,82	493,23	362,34	529,98
326	226,15	653,77	3,57	514,23	514,68	493,55	361,76	529,19
327	224,59	652,61	3,57	513,40	513,39	493,83	360,69	527,59
328	223,61	651,69	3,57	511,10	512,50	493,99	359,87	527,48
329	222,80	650,91	3,57	510,23	511,44	494,01	358,74	526,16
330	221,67	649,88	3,47	509,49	510,06	494,11	358,03	524,40
331	220,88	649,03	3,47	506,98	509,20	494,27	357,06	523,11
332	220,18	647,77	3,47	506,02	508,04	494,49	355,97	522,60
333	219,24	646,79	3,47	505,32	506,57	494,72	355,08	521,08
334	218,79	646,09	3,47	503,09	506,01	494,95	353,95	520,54
335	218,09	645,75	3,38	503,36	505,00	495,15	352,80	518,86
336	217,01	645,51	3,38	503,14	503,89	495,40	351,93	517,51
337	216,39	644,75	3,38	502,47	502,82	495,70	350,88	516,46
338	215,75	643,93	3,38	500,95	501,70	496,05	350,06	514,93
339	215,32	643,83	3,38	499,67	501,24	496,48	349,01	514,09
340	214,63	643,46	3,29	499,12	499,86	496,87	348,19	513,10
341	214,53	643,52	3,28	498,22	498,45	497,33	347,13	511,69
342	214,09	643,58	3,28	496,41	498,66	497,85	346,36	511,04
343	213,59	643,06	3,25	496,21	497,49	498,52	345,50	509,93
344	212,69	643,00	3,28	494,81	496,30	499,21	344,45	508,50
345	212,15	642,92	3,21	493,93	495,51	499,90	343,40	507,35
346	211,58	642,90	3,17	492,74	493,96	500,55	342,69	506,99
347	211,26	642,91	3,17	491,34	494,01	501,17	341,56	506,88
348	211,01	642,59	3,17	491,46	493,02	501,65	340,54	504,69
349	210,42	642,23	3,17	490,50	491,78	502,02	339,60	503,51
350	210,63	642,50	3,07	488,30	491,25	502,35	338,70	503,06
351	210,45	642,71	3,07	487,34	490,33	502,74	337,69	501,97
352	210,17	642,50	3,07	486,33	489,66	503,16	336,72	499,69
353	209,89	641,72	3,07	486,04	489,32	503,66	335,73	499,19
354	209,21	641,20	3,07	484,93	488,29	504,13	334,88	497,90
355	209,29	640,83	3,07	484,09	487,90	504,55	333,94	496,75
356	209,10	640,86	2,97	483,71	486,94	504,78	333,09	495,88
357	209,04	640,90	2,99	481,57	486,30	504,99	332,03	494,64
358	208,63	640,80	2,97	479,73	485,54	505,19	331,10	494,46
359	208,28	640,75	2,97	479,34	485,34	505,60	330,73	493,17
360	207,77	641,15	2,97	478,43	484,21	506,03	329,62	492,19
361	207,33	641,77	2,94	476,22	483,67	506,42	329,04	491,15
362	206,99	642,55	2,87	476,42	483,30	506,28	328,22	490,39
363	207,22	643,42	2,87	475,92	482,35	506,00	326,99	489,47
364	206,93	644,44	2,87	474,74	481,31	505,77	326,00	488,04
365	206,77	646,50	2,87	472,70	480,17	505,68	325,09	487,19
366	206,95	648,10	2,87	473,34	479,60	505,64	324,28	486,32

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367	206,84	648,68	2,77	472,48	478,95	505,69	323,46	485,39
368	207,09	648,78	2,77	471,05	477,86	505,71	322,48	484,55
369	207,09	649,27	2,77	469,89	477,71	505,77	321,53	484,15
370	206,07	649,03	2,77	469,01	476,79	505,93	320,74	484,05
371	206,13	648,43	2,77	467,79	476,21	506,18	319,99	483,29
372	206,02	648,08	2,68	466,79	475,50	506,35	319,23	481,77
373	206,12	647,69	2,68	465,84	474,85	506,54	318,34	481,19
374	206,15	646,50	2,68	465,07	474,12	506,71	317,50	480,40
375	205,56	645,78	2,68	463,94	473,82	506,80	316,77	479,33
376	205,42	645,80	2,68	463,02	472,54	506,87	316,23	478,33
377	205,58	646,11	2,57	462,10	471,90	506,81	315,59	477,73
378	205,73	646,61	2,57	460,90	471,35	506,87	314,69	477,18
379	205,96	646,75	2,57	460,78	471,22	506,80	313,91	476,21
380	205,57	646,95	2,57	459,48	470,98	506,66	313,23	476,14
381	206,01	647,38	2,47	458,87	470,27	506,62	312,49	475,15
382	206,28	647,65	2,57	457,64	469,84	506,59	311,62	474,35
383	206,10	647,65	2,47	456,85	469,30	506,69	311,02	473,84
384	206,24	647,44	2,47	456,49	468,79	506,69	310,29	473,20
385	206,18	647,02	2,47	455,87	468,21	506,60	309,50	472,42
386	206,03	646,80	2,47	455,27	467,92	506,54	308,79	471,73
387	206,61	647,12	2,37	454,60	467,36	506,46	308,13	471,21
388	206,11	646,95	2,37	453,71	466,85	506,19	307,38	470,31
389	206,56	640,88	2,37	453,36	466,10	504,38	307,02	469,59
390	206,16	638,91	2,37	451,65	465,83	502,58	306,26	469,45
391	206,11	641,24	2,37	450,89	464,98	501,26	305,47	468,26
392	206,14	641,29	2,33	450,19	464,12	500,36	304,85	467,48
393	206,20	641,11	2,27	448,77	463,44	499,78	304,23	466,66
394	206,07	640,10	2,27	448,30	461,98	499,34	303,59	465,73
395	205,33	639,26	2,27	447,09	461,08	499,09	302,79	464,71
396	205,23	639,12	2,27	446,06	459,59	499,01	302,35	463,81
397	204,74	637,34	2,27	445,02	458,38	499,20	301,56	462,92
398	204,23	635,29	2,27	443,35	457,40	499,48	300,96	460,90
399	204,15	633,26	2,17	442,10	456,13	499,73	300,24	460,37
400	203,41	632,43	2,17	440,99	455,45	499,90	299,67	459,78
401	203,00	631,86	2,17	439,37	454,11	500,12	298,96	458,52
402	202,86	629,55	2,17	438,25	453,02	500,36	298,12	457,81
403	202,21	627,66	2,07	437,21	451,76	500,52	297,45	456,43
404	201,63	626,56	2,07	436,51	450,91	500,73	296,73	455,44
405	201,65	626,15	2,07	435,42	449,96	500,92	296,12	455,46
406	201,02	626,64	2,07	434,81	448,64	500,99	295,54	454,45
407	200,80	627,05	1,98	434,13	447,65	500,91	294,87	452,96
408	200,70	627,40	2,07	433,82	446,49	500,83	294,33	452,24
409	199,95	627,36	2,01	432,45	445,48	500,74	293,68	451,58
410	199,91	628,52	1,98	431,39	444,70	500,61	293,18	450,19
411	199,82	628,40	1,97	431,17	443,45	500,61	292,64	449,71
412	199,84	628,05	1,97	430,34	442,66	500,59	291,92	449,31
413	199,41	628,33	1,97	429,57	441,74	500,60	291,27	448,35
414	199,39	628,41	1,87	428,56	440,79	500,60	290,75	447,78
415	199,45	629,59	1,88	427,77	439,66	500,53	290,27	446,53
416	199,40	630,98	1,87	426,96	438,95	500,27	289,78	446,25
417	198,88	630,64	1,87	425,83	437,98	499,98	289,13	445,40
418	198,76	628,39	1,87	425,00	436,96	499,77	288,48	444,72
419	198,57	626,46	1,87	424,52	435,91	499,57	287,95	443,80
420	198,27	625,42	1,77	423,66	435,36	499,44	287,46	443,01
421	198,02	625,13	1,77	421,72	434,66	499,29	287,02	442,43
422	197,58	624,83	1,77	421,96	433,96	499,16	286,45	441,50
423	197,55	624,47	1,77	420,81	433,25	499,06	285,75	440,37
424	197,51	624,80	1,77	420,18	432,58	498,86	285,20	439,76
425	196,99	625,13	1,77	418,82	431,47	498,50	284,66	438,44
426	197,12	625,35	1,77	418,13	431,10	498,21	284,20	438,08
427	196,90	625,31	1,67	416,63	430,48	498,03	283,48	438,11
428	196,70	624,97	1,67	416,68	429,63	497,91	283,06	436,56
429	196,71	625,42	1,67	415,84	428,85	497,82	282,34	436,09
430	196,34	625,58	1,67	415,67	428,63	497,77	281,89	435,29
431	196,63	625,31	1,67	414,98	427,94	497,63	281,40	433,95
432	196,62	625,14	1,67	414,66	428,00	497,42	281,04	433,57
433	196,73	626,14	1,67	414,24	427,27	497,27	280,50	432,94
434	196,85	627,00	1,57	413,62	426,68	497,06	279,92	432,26
435	197,19	628,55	1,57	412,98	425,41	496,98	279,54	431,21
436	197,38	628,73	1,57	412,52	425,26	496,97	279,05	430,81
437	197,22	628,97	1,57	412,21	424,80	496,99	278,55	429,73
438	197,17	628,94	1,57	411,63	423,96	497,13	277,90	429,02
439	197,58	630,90	1,57	410,89	423,39	497,42	277,58	428,40
440	197,64	630,54	1,47	410,36	422,63	497,77	277,10	427,68

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441	197,82	629,95	1,47	409,78	422,73	498,07	276,66	426,79
442	197,40	627,48	1,47	408,84	422,19	498,30	276,30	426,38
443	197,24	625,21	1,47	408,51	421,98	498,37	275,84	425,82
444	197,40	625,75	1,47	407,66	421,30	498,40	275,32	424,47
445	196,54	626,77	1,47	406,67	421,00	498,46	274,94	423,72
446	196,21	626,88	1,42	406,42	420,37	498,56	274,29	423,76
447	196,36	626,02	1,37	406,17	420,31	498,73	274,07	422,87
448	195,60	626,70	1,37	406,48	419,51	498,99	273,64	422,52
449	195,97	626,45	1,37	405,87	418,57	499,30	273,13	422,27
450	195,80	626,63	1,37	405,32	418,75	499,82	272,76	421,59
451	196,59	626,00	1,37	404,91	418,23	501,11	272,25	421,12
452	196,28	623,03	1,34	404,57	418,50	502,75	271,86	420,50
453	196,13	621,52	1,27	403,42	417,05	504,34	271,33	419,78
454	196,05	620,70	1,27	403,53	416,53	505,83	271,11	419,15
455	195,83	619,82	1,27	402,82	416,40	507,11	270,90	417,61
456	195,30	619,21	1,27	403,06	415,89	508,26	270,47	417,39
457	194,93	619,35	1,17	403,19	415,66	509,32	269,96	417,74
458	194,57	620,18	1,17	403,08	414,73	510,31	269,46	417,35
459	194,53	620,69	1,17	402,98	413,85	511,16	269,17	416,84
460	194,51	620,44	1,17	402,54	413,19	511,99	268,80	415,82
461	194,48	620,60	1,17	402,72	412,49	512,75	268,56	414,98
462	194,62	621,22	1,17	402,26	412,64	513,55	268,17	415,39
463	194,71	621,23	1,11	402,31	411,87	514,55	267,54	414,59
464	194,38	618,41	1,07	402,22	412,04	515,81	267,07	414,32
465	193,96	614,71	1,07	401,20	411,25	516,93	266,77	413,63
466	193,33	612,50	1,07	401,69	410,43	517,93	266,33	413,29
467	193,13	611,07	1,01	401,13	410,31	518,85	266,09	412,49
468	193,21	610,09	0,97	400,94	409,58	519,64	265,73	412,54
469	192,86	608,96	0,97	400,62	409,56	520,39	265,47	412,00
470	192,19	607,78	0,97	399,97	409,14	521,22	265,29	412,05
471	191,46	607,34	0,97	398,96	408,96	522,00	265,19	411,30
472	191,58	607,33	0,97	398,25	408,60	522,76	264,93	411,25
473	190,82	607,33	0,87	398,64	408,14	523,47	264,73	411,02
474	190,89	608,19	0,87	398,29	407,62	524,14	264,49	411,05
475	190,82	608,84	0,87	396,92	407,50	524,76	264,01	410,93
476	190,29	608,85	0,87	397,22	407,32	525,32	263,78	410,57
477	190,04	609,50	0,87	397,06	407,11	525,89	263,74	410,64
478	190,10	608,76	0,77	396,11	406,82	526,61	263,29	410,90
479	189,51	607,83	0,87	396,99	406,70	527,30	263,08	410,34
480	189,46	607,56	0,77	396,70	406,30	527,83	262,75	410,29
481	189,12	607,86	0,77	395,82	406,06	528,33	262,71	410,06
482	189,54	608,52	0,77	395,30	406,04	529,16	262,43	409,90
483	189,79	608,02	0,74	396,02	405,76	530,02	262,12	409,52
484	189,78	608,11	0,77	394,41	405,22	530,85	261,77	409,47
485	189,48	607,89	0,77	395,23	405,01	531,66	261,53	409,54
486	189,69	607,82	0,67	393,96	404,65	532,39	261,46	408,99
487	189,22	607,48	0,67	394,16	403,82	533,05	261,09	408,45
488	189,41	606,30	0,67	393,35	403,70	533,58	260,62	408,09
489	189,70	604,98	0,67	393,25	403,11	534,04	260,38	407,61
490	189,91	603,60	0,67	392,49	402,80	534,36	260,09	407,38
491	189,93	601,74	0,57	391,70	402,62	534,53	259,76	406,81
492	190,30	601,02	0,57	389,87	402,39	534,74	259,41	406,88
493	189,15	600,38	0,57	389,37	402,22	535,05	259,25	406,50
494	189,02	599,71	0,57	389,15	401,66	535,31	259,02	406,28
495	188,69	598,57	0,57	388,79	401,31	535,42	258,99	405,45
496	188,73	598,53	0,57	388,51	400,86	535,57	258,64	405,05
497	188,57	599,79	0,47	388,66	400,76	535,62	258,20	404,35
498	188,68	600,85	0,47	388,16	400,46	535,59	257,91	403,95
499	188,58	600,79	0,47	388,08	400,22	535,14	257,57	403,33
500	189,07	601,35	0,47	387,90	399,97	534,69	257,27	402,73
501	188,70	603,88	0,47	387,34	399,86	534,36	257,08	402,30
502	189,37	605,83	0,47	387,06	399,49	534,15	256,74	401,87
503	189,26	606,83	0,47	386,15	399,32	533,98	256,38	401,29
504	189,50	606,13	0,37	385,72	398,91	533,81	256,15	400,77
505	189,24	603,73	0,37	385,04	398,74	533,78	255,94	400,38
506	189,10	601,19	0,37	384,77	398,44	533,92	255,51	399,86
507	189,24	598,42	0,37	384,01	398,17	534,92	255,26	399,68
508	189,06	595,59	0,37	383,57	397,70	536,12	255,08	399,01
509	189,07	593,12	0,37	383,38	397,17	537,32	254,83	398,86
510	188,81	591,52	0,37	383,05	396,53	538,52	254,54	398,68
511	188,92	591,38	0,27	382,53	396,26	539,79	254,20	398,26
512	188,75	591,77	0,27	382,23	395,70	541,00	253,85	398,07
513	188,42	591,73	0,27	381,80	394,85	542,18	253,61	397,61
514	188,24	591,14	0,27	381,49	394,36	543,21	253,31	397,35

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515	188,41	590,76	0,27	381,61	393,67	544,20	253,01	397,34
516	187,83	590,19	0,17	381,10	393,21	545,17	252,68	396,87
517	187,90	588,65	0,17	380,81	392,69	546,13	252,41	396,63
518	187,24	587,26	0,17	380,22	391,93	547,03	252,11	396,44
519	187,14	586,55	0,17	379,70	391,64	547,89	251,75	396,00
520	187,29	585,99	0,17	379,25	391,12	548,74	251,55	395,62
521	186,80	585,36	0,17	378,74	390,90	549,46	251,26	395,39
522	186,30	585,86	0,16	378,28	390,32	550,05	250,96	395,06
523	186,26	586,68	0,07	377,97	390,21	550,62	250,62	394,95
524	186,50	586,70	0,07	377,62	389,52	551,18	250,40	394,31
525	186,10	587,24	0,07	377,13	389,16	551,68	250,05	394,10
526	186,50	587,78	0,07	376,48	388,83	552,01	249,78	393,82
527	186,02	587,37	0,07	376,27	388,53	552,17	249,56	393,54
528	186,04	587,84	0,07	375,89	387,91	551,67	249,23	393,28
529	186,09	590,92	0,00	375,36	387,21	550,75	248,93	392,70
530	75,23	71,52	4,97	70,33	70,16	70,66	70,58	70,27
531	113,73	82,95	4,87	70,35	70,27	87,53	70,56	70,34
532	151,55	134,60	4,67	70,66	71,14	111,74	70,73	71,08
533	200,99	188,13	4,51	71,72	73,28	135,74	71,03	73,34
534	223,59	241,60	4,37	73,86	77,11	157,87	71,63	77,63
535	250,08	281,25	4,17	77,36	82,70	181,22	72,54	84,13
536	283,52	315,49	3,97	82,00	89,89	205,10	73,73	92,61
537	282,39	339,43	3,77	87,70	98,22	228,69	75,21	102,78
538	288,28	353,44	3,49	94,06	107,44	250,55	76,80	113,78
539	299,21	368,60	3,37	100,99	117,50	269,98	78,46	125,33
540	322,15	394,43	3,07	108,62	127,90	286,90	80,21	136,78
541	349,24	437,16	2,87	116,74	138,70	303,27	82,05	148,17
542	344,02	445,55	2,67	125,64	149,75	318,13	84,02	159,93
543	375,62	455,33	2,37	134,77	160,83	334,67	86,03	172,03
544	359,04	436,75	2,27	144,31	172,25	344,09	88,32	184,52
545	347,89	426,83	2,17	154,78	183,67	352,72	91,30	197,01
546	333,49	407,95	2,07	165,54	194,38	354,59	94,63	208,81
547	328,90	405,03	1,97	175,89	204,25	356,58	98,21	219,50
548	323,50	402,48	1,87	185,57	213,06	361,75	101,74	228,86
549	321,68	399,77	1,77	194,73	220,58	369,47	105,15	237,11
550	324,02	401,66	1,67	203,36	226,56	375,86	108,53	243,98
551	321,09	398,59	1,67	212,21	231,53	382,52	111,94	250,02
552	317,75	396,34	1,57	219,95	235,50	389,91	115,17	255,34
553	319,89	400,68	1,47	226,51	238,78	398,06	118,28	260,19
554	317,57	403,64	1,37	232,44	241,60	407,06	121,34	265,02
555	314,81	403,35	1,37	237,20	244,04	416,14	124,31	270,08
556	312,33	402,09	1,27	241,43	246,33	424,81	127,20	275,33
557	310,88	400,71	1,17	246,01	248,49	432,94	130,01	280,24
558	307,96	396,67	1,17	248,95	250,48	442,32	132,66	285,19
559	313,97	401,32	1,07	253,47	252,64	451,15	135,18	289,27
560	315,25	403,28	1,02	257,19	254,71	460,20	137,72	292,98
561	293,21	342,26	14,38	261,16	257,05	466,72	140,24	296,68
562	277,61	267,83	19,88	264,28	259,19	463,34	142,50	300,15
563	257,02	253,61	19,78	265,97	260,30	456,47	144,30	302,30
564	257,32	249,81	19,71	266,26	260,78	448,38	145,78	303,89
565	253,90	242,62	19,58	265,92	261,12	440,41	146,79	305,45
566	246,21	243,24	19,48	264,89	261,09	433,32	147,66	307,99
567	238,89	240,96	19,38	263,18	261,07	429,45	148,34	311,98
568	240,28	241,80	19,28	261,17	261,10	426,21	148,84	316,23
569	231,69	251,90	19,18	259,10	261,40	424,50	149,25	320,79
570	245,54	287,14	18,98	257,43	261,92	423,57	149,60	324,02
571	263,89	321,58	18,88	256,09	262,44	424,85	149,96	326,21
572	273,25	332,56	18,68	255,89	263,10	426,75	150,05	326,90
573	288,55	348,68	18,58	254,74	264,22	426,98	150,93	327,35
574	307,13	370,61	18,48	254,90	265,95	427,41	151,87	327,37
575	333,19	388,52	18,28	255,38	268,11	428,65	153,19	327,95
576	350,83	415,47	18,08	256,19	270,76	429,82	155,07	329,63
577	346,88	422,08	17,98	258,39	273,66	430,32	157,46	332,37
578	334,49	413,62	17,78	261,40	276,50	430,95	160,20	335,30
579	345,95	427,30	17,68	264,96	279,31	432,44	162,98	337,64
580	348,76	430,56	17,48	268,32	282,79	434,25	165,73	339,31
581	360,96	440,51	17,28	272,07	286,92	436,38	168,47	340,49
582	403,46	478,92	17,08	275,66	291,27	438,57	171,29	341,74
583	442,55	516,53	16,88	279,83	295,43	439,75	174,71	344,03
584	467,33	541,60	16,58	286,16	299,04	439,67	179,15	347,97
585	472,46	544,99	16,38	293,20	302,21	439,03	184,96	353,37
586	477,57	551,23	16,08	300,77	305,03	438,39	191,88	359,70
587	493,46	579,05	15,78	308,15	307,50	437,99	199,19	366,13
588	505,01	592,25	15,58	314,86	309,95	438,29	206,54	372,40

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589	509,11	599,03	15,28	323,21	312,78	439,28	214,01	378,33
590	513,05	605,24	14,98	331,35	316,17	440,88	221,28	384,65
591	523,52	614,59	14,78	340,27	320,08	442,91	228,50	391,07
592	536,16	638,27	14,48	348,87	324,59	445,20	235,45	397,45
593	541,87	647,20	14,18	357,25	329,55	447,38	242,59	403,85
594	545,59	656,75	13,88	365,15	335,06	449,40	249,68	410,19
595	549,66	665,02	13,58	373,17	341,01	451,20	256,70	416,62
596	556,45	676,13	13,38	381,15	347,48	452,84	263,79	422,54
597	563,01	693,19	13,08	390,02	354,31	454,60	270,82	428,84
598	570,92	703,82	12,85	398,19	361,48	456,45	277,88	434,99
599	582,70	718,65	12,48	407,15	369,02	458,39	285,12	441,61
600	594,99	731,06	12,18	416,82	376,76	460,16	292,25	447,31
601	600,78	737,54	11,98	426,17	384,89	462,01	300,21	454,77
602	603,99	746,32	11,67	436,36	393,07	463,96	307,78	461,56
603	607,42	751,75	11,32	445,84	401,54	466,38	317,10	468,74
604	611,19	758,31	11,08	456,52	410,02	469,37	325,48	475,66
605	610,44	759,65	10,78	466,19	418,77	472,83	334,39	483,92
606	608,74	763,79	10,58	476,19	427,46	476,69	341,61	491,21
607	609,27	770,12	10,28	486,16	436,27	480,82	350,20	498,29
608	611,40	774,30	10,07	495,63	444,87	485,24	357,41	506,40
609	615,04	779,56	9,77	505,01	453,35	489,89	364,34	513,23
610	618,41	784,49	9,58	514,66	461,72	494,73	371,24	520,41
611	617,01	788,75	9,27	523,88	469,85	499,52	377,94	526,65
612	613,34	788,63	9,07	532,70	477,80	504,17	384,20	533,38
613	607,43	786,34	8,88	541,79	485,58	508,79	390,55	539,36
614	599,92	783,55	8,78	549,98	493,14	513,48	396,28	545,74
615	585,91	775,58	8,35	558,31	499,63	518,46	401,57	550,82
616	477,50	812,92	8,28	565,27	505,96	522,31	404,73	556,64
617	438,19	846,81	8,18	571,26	511,05	521,52	408,92	562,07
618	411,70	806,84	8,08	576,76	514,87	517,83	412,28	567,39
619	389,97	768,26	8,08	581,07	517,33	513,04	414,68	571,84
620	372,22	747,50	7,98	583,92	518,92	508,11	416,37	575,32
621	358,13	739,16	7,87	585,49	519,71	503,43	417,55	577,44
622	346,67	737,87	7,87	585,34	518,92	499,15	418,45	578,16
623	337,93	740,96	7,77	583,56	517,92	495,55	418,34	577,80
624	330,94	744,45	7,77	582,44	516,59	492,58	418,01	576,62
625	324,60	766,47	7,67	578,78	514,86	490,29	417,87	574,36
626	326,08	899,67	7,58	574,96	512,03	489,47	416,95	571,77
627	330,49	968,34	7,58	571,34	509,78	490,20	415,54	568,89
628	335,89	1001,76	7,48	566,52	506,61	491,93	415,22	565,34
629	340,78	1032,52	7,38	561,52	503,19	494,34	413,52	561,40
630	347,51	1062,32	7,37	556,41	499,25	497,15	412,47	556,50
631	353,74	1071,36	7,28	550,85	496,32	500,01	411,51	553,06
632	360,07	1074,43	7,17	545,54	493,86	502,91	410,11	549,09
633	366,04	986,85	7,07	540,48	491,68	505,21	408,23	544,60
634	354,52	851,25	6,97	536,13	490,57	505,66	407,16	541,27
635	343,75	784,83	6,88	532,48	489,97	505,04	406,21	538,13
636	333,84	755,42	6,88	530,44	490,79	503,86	404,87	535,75
637	325,83	741,07	6,78	528,14	491,35	502,49	404,03	534,05
638	319,53	732,51	6,76	526,58	491,85	501,17	403,41	532,50
639	313,32	721,36	6,68	525,14	493,13	499,70	402,71	531,18
640	306,93	707,60	6,57	524,16	493,39	497,93	401,54	529,77
641	300,77	699,12	6,57	522,52	493,76	495,96	400,44	528,87
642	295,17	692,24	6,47	520,58	493,43	493,94	399,35	527,74
643	290,79	688,41	6,43	519,73	493,90	491,91	397,64	526,88
644	286,43	685,71	6,37	518,74	494,05	489,95	396,81	525,43
645	458,86	693,75	6,18	517,84	493,78	488,11	395,83	524,06
646	364,62	781,31	5,98	515,54	493,95	486,07	394,42	523,26
647	336,54	763,12	5,87	514,87	493,96	483,17	393,91	523,14
648	323,96	756,86	5,77	514,12	494,10	479,38	394,10	523,24
649	317,64	767,86	5,67	514,11	494,27	475,20	393,85	523,14
650	313,12	772,42	5,57	513,55	494,60	470,96	394,89	524,37
651	310,89	795,25	5,48	515,18	494,31	466,95	395,99	525,29
652	309,00	817,39	5,38	516,02	494,18	463,23	396,34	525,98
653	305,40	790,22	5,27	516,07	494,35	460,02	397,24	526,84
654	300,98	761,65	5,27	517,05	494,37	457,21	397,96	527,11
655	296,24	748,63	5,17	517,22	494,16	454,80	398,89	527,64
656	291,97	743,29	5,17	517,56	493,58	452,83	399,47	527,75
657	289,07	765,90	5,07	517,52	492,87	451,21	400,42	527,69
658	288,56	797,29	5,01	517,52	491,97	449,92	401,25	527,53
659	288,16	807,88	4,97	516,11	490,52	448,96	402,28	527,98
660	287,51	803,97	4,87	515,42	489,56	448,31	403,81	527,62
661	286,93	804,29	4,78	513,15	488,33	448,08	405,24	527,47
662	287,12	805,06	4,78	512,08	487,49	448,43	406,45	526,80

Aging Mansfeld

663	286,41	794,82	4,68	509,49	486,15	449,40	407,86	527,40
664	283,86	787,79	4,68	507,62	484,88	451,05	409,16	528,07
665	283,07	783,45	4,57	504,99	483,77	453,47	410,07	527,68
666	281,95	779,23	4,52	503,29	482,73	456,20	410,72	527,40
667	278,96	777,42	4,47	500,59	481,44	459,06	411,55	527,11
668	276,14	780,39	4,47	499,82	480,75	461,90	411,54	526,17
669	274,22	783,97	4,40	497,10	479,79	464,56	411,67	525,28
670	273,06	785,77	4,37	495,58	479,12	466,90	410,96	523,92
671	271,67	783,58	4,37	493,86	478,44	469,05	409,93	522,88
672	270,15	779,66	4,37	492,44	477,57	471,01	409,10	521,47
673	269,31	775,92	4,30	490,83	476,61	472,92	407,55	519,81
674	268,13	774,93	4,27	488,91	475,60	474,79	405,77	517,91
675	267,07	777,39	4,27	487,20	475,18	476,63	403,96	515,71
676	265,68	777,21	4,26	485,00	474,32	478,42	402,06	513,89
677	263,75	775,84	4,17	483,32	473,27	480,15	400,31	511,81
678	262,90	769,28	4,17	481,13	472,60	481,86	398,19	510,19
679	261,52	762,40	4,17	479,10	471,89	483,50	396,19	507,79
680	259,68	756,36	4,08	477,33	471,29	485,12	394,46	505,63
681	258,24	751,93	4,08	475,65	470,36	486,73	392,61	503,90
682	256,86	747,57	4,08	473,58	468,99	488,27	389,73	501,80
683	254,83	740,35	4,08	471,88	468,60	489,80	388,24	499,64
684	253,24	733,23	4,08	470,19	467,82	491,31	386,15	498,30
685	251,21	734,46	3,97	469,05	466,91	492,78	384,32	497,01
686	249,92	735,65	3,98	467,49	465,97	494,26	382,72	494,62
687	248,35	733,69	3,98	465,89	465,26	495,65	380,71	492,97
688	334,90	675,29	3,87	464,35	464,79	498,67	378,73	491,62
689	308,88	505,52	19,62	462,90	464,17	499,88	376,95	489,82
690	304,63	434,17	19,48	461,07	462,28	498,36	374,47	487,53
691	338,72	585,87	19,40	457,58	458,48	495,68	371,53	485,01
692	354,61	624,46	19,38	453,28	454,68	492,31	368,90	481,02
693	366,76	647,80	19,28	448,37	449,40	488,43	366,23	477,19
694	322,05	655,42	19,18	444,48	444,56	484,51	363,96	472,13
695	292,44	652,41	19,17	439,15	440,00	480,66	362,04	467,31
696	275,93	629,20	19,08	434,22	435,33	476,88	360,35	462,43
697	264,95	607,98	19,08	429,27	430,76	473,18	358,50	457,97
698	256,42	593,92	19,08	423,84	425,99	469,44	356,44	452,93
699	249,78	584,24	18,98	419,17	421,27	465,73	354,32	447,80
700	244,21	577,01	18,98	414,45	416,67	462,08	352,07	442,72
701	240,05	572,21	18,98	409,90	411,78	458,49	349,62	437,41
702	236,27	568,56	18,88	405,48	407,46	454,97	347,37	432,30
703	232,78	565,27	18,88	400,91	402,97	451,54	345,03	427,35
704	230,12	562,83	18,88	395,85	398,87	448,24	342,39	422,35
705	227,95	560,20	18,78	391,78	394,24	444,99	339,63	417,74
706	225,59	556,75	18,78	386,97	390,19	441,92	337,44	412,85
707	223,52	552,37	18,78	382,54	386,22	438,89	334,90	408,36
708	221,66	547,37	18,78	377,77	382,50	435,96	332,04	403,76
709	219,63	542,33	18,68	373,92	378,63	433,10	329,36	399,75
710	217,70	537,94	18,68	371,34	375,50	430,24	327,11	392,04
711	216,53	534,08	18,67	367,61	372,13	427,45	324,35	389,66
712	215,04	530,20	18,58	364,10	368,68	424,81	321,75	384,60
713	214,04	527,68	18,58	360,50	365,33	422,18	319,53	380,20
714	212,58	526,43	18,48	356,59	361,95	419,62	317,28	376,38
715	211,87	526,48	18,48	352,10	358,82	417,22	315,15	373,96
716	211,12	529,33	18,48	349,23	355,89	414,83	312,72	370,74
717	210,03	533,57	18,48	346,22	352,82	412,57	310,67	366,91
718	209,93	536,31	18,38	343,40	349,73	410,34	308,07	363,76
719	209,41	536,07	18,38	339,08	346,26	408,26	306,30	360,36
720	208,82	535,22	18,28	335,92	343,08	406,20	303,95	357,32
721	208,32	535,28	18,28	333,36	340,09	404,21	301,98	354,40
722	208,34	540,11	18,27	330,74	337,15	402,28	299,83	351,38
723	208,91	548,71	18,18	328,03	334,36	400,43	297,59	348,57
724	209,92	561,93	18,18	325,47	331,44	398,62	295,51	345,65
725	211,63	578,04	18,08	322,47	329,06	396,90	293,38	343,25
726	213,57	588,93	18,08	319,60	326,33	395,19	291,31	340,52
727	215,00	596,34	17,98	317,69	323,99	393,57	289,32	337,93
728	216,76	604,38	17,98	314,82	321,57	392,00	287,29	335,60
729	218,87	612,02	17,98	312,07	319,62	390,50	285,36	333,42
730	220,42	620,32	17,88	309,34	317,49	389,07	283,45	331,25
731	222,42	627,29	17,88	307,51	315,29	387,66	281,60	329,06
732	223,92	630,32	17,78	305,16	313,46	386,35	280,01	327,33
733	225,57	626,91	17,78	302,65	311,68	385,05	278,12	325,49
734	226,04	622,44	17,68	300,97	309,83	383,88	276,57	323,69
735	226,07	621,99	17,61	298,94	308,23	382,67	274,73	322,26
736	226,29	625,66	17,58	297,05	306,54	381,61	273,12	321,04

Aging Mansfeild

737	227,07	628,41	17,48	295,29	304,90	380,54	271,59	319,94
738	227,63	630,27	17,48	293,21	303,57	379,56	270,07	318,60
739	230,15	630,69	17,44	291,30	302,23	378,61	268,67	317,51
740	231,48	618,47	17,38	290,26	300,97	377,74	267,16	316,53
741	231,10	609,88	17,28	288,43	299,86	376,91	265,92	315,99
742	231,86	620,30	17,18	287,07	298,66	376,10	264,97	315,66
743	234,37	651,03	17,18	285,54	297,72	375,28	264,26	315,90
744	237,68	676,84	17,08	284,69	296,81	374,45	263,79	316,08
745	240,50	691,88	16,98	283,42	295,88	373,70	263,47	315,86
746	245,37	704,81	16,98	282,45	295,07	372,98	263,09	315,50
747	247,74	704,07	16,88	281,93	294,26	372,37	262,57	314,96
748	251,73	714,16	16,78	280,38	293,69	371,81	261,97	315,01
749	258,67	710,86	16,78	279,41	293,42	371,33	261,33	314,88
750	266,22	730,85	16,58	278,51	293,35	370,90	260,81	315,82
751	277,66	762,46	16,48	277,97	293,46	370,40	260,65	317,38
752	286,73	771,18	16,36	279,42	294,13	369,94	261,00	319,08
753	291,18	765,21	16,18	280,39	295,25	369,35	261,81	320,96
754	292,30	740,88	16,08	283,65	296,48	368,76	263,18	323,71
755	289,81	708,55	15,98	286,96	298,19	368,15	265,23	326,13
756	286,96	698,41	15,88	290,29	299,37	367,50	267,58	328,91
757	285,89	703,08	15,78	293,69	301,07	366,87	269,89	331,61
758	287,13	712,80	15,68	295,99	302,70	366,31	271,95	334,43
759	289,01	732,60	15,57	299,09	304,18	365,79	273,83	337,21
760	289,42	744,42	15,40	301,46	305,90	365,30	275,53	339,94
761	289,55	745,00	15,35	303,88	307,93	364,78	277,45	343,33
762	293,86	765,80	15,18	306,06	310,82	364,36	278,87	346,46
763	297,99	792,04	15,08	307,54	312,51	364,01	280,99	349,80
764	300,53	774,95	14,98	309,55	315,19	363,72	282,61	353,36
765	302,23	754,79	14,88	311,31	317,70	363,49	284,43	356,55
766	304,27	731,66	14,68	313,21	320,95	363,24	286,11	359,61
767	310,55	774,47	14,48	315,78	324,25	363,03	288,31	363,51
768	316,03	792,21	14,38	319,41	327,93	362,80	290,38	366,48
769	318,89	792,34	14,18	321,31	332,01	362,53	293,21	371,39
770	323,13	802,73	14,08	329,06	336,87	362,16	294,88	374,83
771	325,52	805,65	13,88	333,78	340,87	361,83	297,53	379,35
772	325,84	802,51	13,78	340,50	345,94	361,52	299,31	383,70
773	327,10	801,13	13,67	346,48	351,16	361,15	301,09	388,13
774	326,96	805,89	13,48	353,41	355,95	360,81	303,12	392,55
775	328,31	810,60	13,32	359,39	361,31	360,52	305,02	396,98
776	330,00	811,47	13,18	365,51	366,58	360,28	306,68	401,27
777	329,73	811,74	13,08	371,84	371,33	360,04	308,71	405,87
778	331,48	813,14	12,88	378,59	376,70	359,84	310,43	410,07
779	332,69	815,67	12,78	384,39	381,12	359,70	312,25	414,31
780	333,63	815,94	12,61	390,75	385,74	359,57	313,60	418,66
781	334,92	815,03	12,48	397,36	390,26	359,46	315,38	422,90
782	336,63	815,31	12,28	403,14	395,12	359,40	316,73	427,04
783	337,56	814,68	12,18	408,92	400,07	359,33	317,98	431,80
784	338,32	812,56	11,98	414,28	404,64	359,27	319,29	435,76
785	338,73	811,20	11,88	420,22	408,79	359,22	320,75	439,69
786	339,12	810,59	11,68	424,94	414,06	359,20	321,90	444,33
787	339,38	809,97	11,48	430,17	418,37	359,20	323,08	448,35
788	339,40	808,99	11,38	435,55	422,23	359,21	324,91	452,49
789	339,88	809,05	11,18	440,74	427,74	359,19	325,75	456,08
790	340,49	811,60	10,98	445,53	431,70	359,22	327,26	460,75
791	340,54	815,73	10,88	450,02	435,79	359,25	328,19	464,68
792	340,53	818,51	10,68	454,61	439,95	359,30	329,31	468,87
793	340,35	823,76	10,48	458,89	444,46	359,33	330,64	472,77
794	340,11	823,66	10,28	463,11	448,38	359,35	331,76	476,58
795	338,23	819,16	10,18	466,54	452,92	359,34	332,76	480,42
796	336,51	812,44	9,98	469,95	457,14	359,33	333,60	484,28
797	334,28	803,50	9,82	473,72	461,01	359,32	334,53	487,92
798	331,35	795,94	9,68	477,13	465,08	359,31	335,49	491,41
799	328,66	788,78	9,48	478,74	469,12	359,31	336,04	495,61
800	326,03	783,72	9,38	482,84	472,80	359,29	337,51	498,94
801	323,90	782,64	9,28	486,45	476,64	359,26	338,55	499,96
802	322,30	783,81	9,18	490,15	479,24	359,29	339,13	504,89
803	321,15	788,69	9,07	492,41	482,03	359,33	340,62	508,03
804	321,16	794,55	8,91	495,62	484,21	359,37	341,83	511,11
805	320,52	799,93	8,78	498,57	486,65	359,45	343,25	514,09
806	319,90	803,45	8,68	500,82	488,24	359,50	344,88	517,01
807	319,82	806,89	8,58	504,48	489,87	359,62	346,63	519,45
808	320,27	808,00	8,47	507,32	491,18	359,75	347,98	521,40
809	319,58	809,52	8,37	510,43	493,05	359,88	349,04	521,76
810	319,08	811,67	8,28	513,36	494,64	360,05	350,54	522,45

Aging Mansfeld

811	318,23	812,93	8,18	515,98	495,87	360,29	352,34	523,43
812	318,37	814,96	7,98	518,28	496,90	360,52	354,38	523,75
813	318,44	818,43	7,87	520,71	497,95	360,77	355,70	524,90
814	320,30	818,49	7,77	523,39	498,81	361,04	357,62	524,98
815	322,76	819,05	7,67	525,31	499,64	361,36	359,19	524,78
816	324,00	816,88	7,58	526,97	500,75	361,76	360,93	526,80
817	324,23	815,15	7,48	528,27	501,46	362,26	361,91	526,77
818	324,44	811,70	7,37	530,25	502,55	362,79	362,80	527,11
819	324,15	809,35	7,17	532,03	503,72	363,37	363,77	527,51
820	324,73	807,50	7,07	533,06	504,53	364,08	364,13	532,25
821	323,84	804,74	6,97	534,85	505,91	364,69	365,01	533,18
822	321,92	801,28	6,88	535,61	506,91	365,35	365,60	536,44
823	320,61	800,88	6,68	537,72	508,14	365,97	366,07	538,47
824	319,04	801,78	6,57	541,00	508,79	366,56	366,54	540,18
825	318,30	803,61	6,47	542,74	510,70	367,21	367,47	541,41
826	316,69	803,86	6,37	545,15	511,67	367,82	368,03	543,02
827	315,86	804,10	6,27	547,34	513,19	368,35	368,97	544,21
828	315,18	801,65	6,18	548,75	514,12	368,84	369,97	545,99
829	314,50	798,20	6,08	549,87	514,97	369,33	370,67	547,02
830	313,75	800,67	5,98	549,68	516,05	369,88	371,52	548,76
831	313,51	807,28	5,98	550,95	517,29	370,43	372,57	549,59
832	313,97	809,91	5,77	551,79	518,73	371,07	373,85	550,36
833	313,44	812,58	5,67	552,72	520,42	371,77	374,36	550,79
834	312,49	806,00	5,67	553,54	522,29	372,48	375,09	551,44
835	310,48	798,87	5,57	554,96	523,89	373,25	375,56	551,62
836	308,56	791,49	5,48	555,79	524,54	374,04	376,32	552,63
837	306,62	788,68	5,38	555,25	526,29	374,81	377,24	552,99
838	304,50	787,84	5,28	556,17	526,99	375,55	378,03	553,57
839	302,84	789,71	5,17	555,52	527,85	376,32	378,93	553,89
840	300,83	793,38	5,17	556,62	528,69	377,10	379,94	554,29
841	299,67	800,68	5,07	556,01	529,32	377,89	380,96	554,62
842	298,19	800,52	4,97	557,02	529,54	378,71	381,80	554,76
843	297,67	795,14	4,87	557,34	529,89	379,56	382,93	554,89
844	295,49	794,16	4,87	555,54	530,41	380,41	383,80	555,45
845	294,68	794,93	4,78	556,28	530,52	381,24	384,44	555,27
846	293,63	794,94	4,68	556,85	531,03	382,08	385,26	555,53
847	292,67	793,97	4,68	557,17	531,30	382,95	385,94	556,33
848	290,85	793,88	4,58	557,29	530,60	383,80	386,37	557,00
849	288,90	793,33	4,58	557,41	531,50	384,64	387,03	557,93
850	286,82	792,94	4,47	558,02	531,76	385,44	387,56	556,65
851	284,81	794,62	4,47	557,46	532,21	386,28	387,86	558,25
852	282,84	795,61	4,37	557,03	532,09	387,17	388,11	559,53
853	280,32	796,95	4,27	557,71	532,04	388,01	388,20	559,07
854	277,66	785,80	4,27	555,21	531,92	388,90	388,48	559,24
855	274,75	772,44	4,27	556,17	531,33	389,80	388,35	558,95
856	272,27	762,66	4,17	556,68	531,10	390,77	388,68	558,49
857	269,89	754,41	4,17	556,66	530,69	391,74	388,46	557,85
858	267,58	746,97	4,08	557,01	530,14	392,72	388,18	556,81
859	265,31	739,30	4,08	556,72	529,53	393,71	387,85	556,16
860	263,25	733,09	4,02	555,88	528,71	394,68	387,74	555,42
861	261,20	726,08	3,98	555,86	528,42	395,66	387,18	554,17
862	258,46	717,47	4,08	556,03	527,77	396,65	386,73	553,23
863	256,95	714,81	3,98	554,95	527,46	397,60	386,49	552,34
864	254,60	711,36	3,88	553,85	526,33	398,50	386,09	551,77
865	252,44	707,69	3,88	553,77	525,71	399,46	385,77	550,28
866	251,06	705,87	3,88	552,91	525,10	400,42	385,16	549,52
867	249,12	703,84	3,77	551,79	524,66	401,39	384,58	547,74
868	248,01	703,82	3,77	550,85	523,66	402,35	384,07	546,66
869	246,66	706,35	3,77	549,48	522,87	403,30	383,63	545,54
870	245,52	706,57	3,77	547,73	521,87	404,21	383,05	544,00
871	245,02	709,83	3,67	546,36	520,99	405,10	382,54	543,16
872	244,11	715,21	3,67	544,71	519,87	405,94	381,90	542,11
873	243,37	719,86	3,67	543,20	519,36	406,79	381,20	540,85
874	243,04	727,40	3,57	541,55	518,35	407,63	380,64	539,54
875	242,95	734,05	3,59	539,92	517,44	408,52	380,04	538,58
876	241,88	730,23	3,57	537,87	516,81	409,44	379,17	537,28
877	240,87	719,23	3,51	536,15	515,59	410,31	378,58	536,45
878	239,33	707,79	3,47	534,80	514,85	411,22	377,74	535,04
879	237,97	698,52	3,47	532,77	513,90	412,00	376,57	533,68
880	236,44	694,77	3,47	532,59	513,26	412,70	375,57	531,08
881	235,89	691,90	3,47	530,43	511,98	413,43	374,46	530,93
882	235,35	689,54	3,47	529,49	511,63	414,00	373,09	528,17
883	233,90	687,41	3,47	526,84	510,61	414,67	372,06	528,57
884	232,74	685,58	3,38	525,02	509,56	415,30	370,86	527,79

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885	231,57	683,42	3,38	524,74	508,99	415,94	369,86	526,00
886	230,73	681,16	3,38	523,85	507,36	416,58	368,56	524,96
887	230,18	678,59	3,38	522,36	506,17	417,30	367,10	523,51
888	229,24	676,09	3,38	520,92	505,33	417,96	366,22	522,67
889	228,41	674,86	3,28	519,44	503,82	418,64	364,97	521,06
890	228,30	674,96	3,28	518,62	503,27	419,25	363,66	519,72
891	227,93	675,31	3,21	517,28	501,88	419,92	362,20	518,62
892	227,90	674,72	3,28	515,10	500,84	420,58	361,20	519,02
893	227,01	673,18	3,28	513,97	499,85	421,20	360,20	516,59
894	226,18	671,73	3,17	512,88	498,38	421,82	359,18	515,71
895	225,07	670,57	3,17	511,65	497,33	422,41	357,92	514,80
896	224,82	670,11	3,17	510,95	496,26	422,97	356,84	513,42
897	223,95	669,13	3,17	509,94	494,88	423,58	355,28	511,91
898	223,81	667,58	3,17	508,66	494,16	424,19	354,24	511,64
899	223,46	666,41	3,07	507,25	493,32	424,76	352,74	510,53
900	223,28	665,07	3,07	506,19	492,36	425,34	351,41	509,01
901	222,27	663,73	3,07	505,95	491,56	425,93	349,89	506,78
902	221,68	662,81	2,97	503,67	490,63	426,53	348,56	505,57
903	221,37	662,39	2,97	502,16	489,45	427,04	347,53	505,22
904	221,09	662,08	2,97	500,45	487,68	427,62	346,32	504,70
905	220,53	661,73	2,97	499,97	486,98	428,15	345,41	503,10
906	219,92	661,28	2,97	497,77	486,20	428,72	344,59	501,92
907	219,27	661,51	2,97	496,55	485,42	429,17	343,44	500,95
908	219,05	661,55	2,87	495,26	484,56	429,58	342,24	499,44
909	218,16	661,30	2,87	494,30	483,49	430,10	341,32	498,89
910	217,71	661,09	2,87	493,23	482,77	430,59	340,28	497,38
911	218,05	661,41	2,87	491,99	482,70	431,07	339,11	496,27
912	217,56	661,74	2,87	489,70	480,75	431,60	337,95	495,08
913	217,69	662,22	2,87	489,24	479,93	432,12	337,12	493,95
914	217,11	662,11	2,86	488,21	479,45	432,70	335,86	492,74
915	217,22	661,90	2,77	487,03	478,79	433,18	334,89	491,32
916	217,28	661,91	2,77	485,94	477,79	433,67	333,87	489,82
917	217,03	662,13	2,77	484,83	476,55	434,17	332,53	488,80
918	216,71	662,21	2,77	483,86	476,59	434,62	331,59	488,15
919	216,38	662,07	2,77	481,52	475,69	435,13	330,56	487,05
920	216,13	662,01	2,72	480,90	474,45	435,67	329,79	485,87
921	215,53	662,00	2,68	479,34	473,59	436,17	328,87	484,28
922	215,63	662,02	2,68	478,50	473,13	436,69	327,44	484,04
923	215,26	662,66	2,68	477,15	472,00	437,22	326,75	482,57
924	215,23	663,02	2,68	475,73	471,10	437,65	325,43	481,17
925	215,19	663,59	2,57	474,45	470,24	438,06	324,56	480,93
926	215,63	663,32	2,57	473,40	469,70	438,52	323,43	480,16
927	215,80	662,73	2,57	472,21	469,13	439,02	322,59	478,61
928	215,42	661,81	2,57	470,60	468,57	439,46	321,58	477,27
929	215,44	660,37	2,57	469,37	467,93	439,81	320,62	476,29
930	215,37	658,04	2,57	468,50	467,58	440,24	319,87	475,62
931	215,30	655,75	2,57	466,07	467,33	440,72	318,93	474,87
932	214,61	653,73	2,47	465,29	467,02	441,22	318,08	472,95
933	214,25	652,05	2,47	464,03	466,48	441,68	317,26	472,09
934	213,67	651,01	2,47	462,91	466,02	442,09	316,24	470,93
935	213,64	650,56	2,47	461,89	465,38	442,51	315,25	470,07
936	213,11	649,83	2,47	460,97	464,40	442,91	314,49	468,58
937	212,84	649,00	2,47	459,65	464,31	443,27	313,57	467,25
938	212,84	648,40	2,37	459,02	463,93	443,65	312,61	466,05
939	212,37	648,05	2,37	458,08	463,61	443,95	311,78	465,10
940	211,87	647,87	2,37	457,19	462,84	444,20	310,76	463,95
941	211,62	646,84	2,27	455,68	462,99	444,36	310,17	462,99
942	211,56	646,39	2,37	455,15	461,82	444,39	309,12	462,99
943	211,62	646,06	2,27	454,32	461,86	444,39	308,08	461,86
944	210,40	645,21	2,27	452,74	462,14	444,30	307,26	461,22
945	210,32	644,27	2,27	451,45	461,81	444,20	306,73	460,32
946	209,91	644,00	2,27	451,29	461,73	444,08	306,02	459,42
947	209,39	644,72	2,27	450,95	461,20	443,94	305,14	458,35
948	209,62	645,79	2,17	449,63	461,15	443,79	304,47	456,68
949	209,66	645,86	2,17	449,18	460,93	443,62	303,68	456,33
950	209,25	645,60	2,17	448,74	460,62	443,48	303,02	455,18
951	208,98	644,81	2,17	448,21	459,74	443,30	302,29	454,32
952	209,03	642,28	2,17	447,30	459,97	443,23	301,46	453,43
953	208,72	639,11	2,17	446,87	460,00	443,48	300,61	452,53
954	207,74	637,88	2,07	446,05	459,67	443,90	300,11	451,79
955	207,27	638,45	2,07	444,99	459,39	444,45	299,07	451,13
956	207,32	638,84	2,07	444,97	459,16	445,04	298,49	450,06
957	206,97	639,20	2,07	444,29	458,55	445,53	297,82	449,11
958	206,76	639,00	2,07	442,99	457,95	446,11	296,88	449,36

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959	206,30	637,58	1,97	443,09	457,34	446,52	296,26	449,09
960	206,11	636,19	1,98	442,53	457,39	446,90	295,67	448,20
961	206,15	635,32	1,97	441,69	456,78	447,29	295,01	447,74
962	205,59	634,77	2,07	440,64	456,15	447,67	294,12	447,61
963	205,27	634,18	1,97	440,14	455,19	447,91	293,45	447,03
964	205,18	633,49	1,97	439,89	455,12	448,13	292,82	446,38
965	204,79	632,73	1,97	440,00	454,31	448,28	292,14	445,88
966	205,01	632,97	1,87	439,24	453,91	448,44	291,33	445,58
967	204,69	633,42	1,87	438,88	453,10	448,60	290,78	444,60
968	205,02	633,49	1,87	438,49	452,35	448,76	290,10	444,36
969	205,20	633,23	1,87	438,31	451,75	448,87	289,42	443,28
970	204,97	632,89	1,87	437,80	451,34	449,00	288,75	443,23
971	204,49	632,37	1,87	437,36	450,55	449,15	288,16	442,28
972	204,60	631,36	1,77	436,25	450,43	449,24	287,53	441,39
973	204,44	630,56	1,77	436,08	449,48	449,38	287,04	441,11
974	204,21	630,70	1,77	435,36	448,59	449,53	286,25	440,94
975	204,58	631,37	1,77	435,01	448,46	449,61	285,56	440,09
976	204,75	630,41	1,77	434,54	447,91	449,62	285,22	439,32
977	204,04	626,44	1,69	434,21	447,13	449,48	284,55	439,11
978	203,43	623,40	1,67	433,61	446,52	449,27	283,88	438,94
979	202,83	621,49	1,67	433,61	446,27	449,04	283,32	438,49
980	202,94	620,40	1,70	433,00	445,05	448,82	282,66	437,90
981	202,59	619,77	1,67	432,46	444,27	448,72	282,19	438,01
982	201,82	619,00	1,67	431,50	444,83	448,86	281,88	436,81
983	201,32	613,95	1,57	431,36	443,76	449,75	281,51	437,00
984	200,91	611,08	1,573	430,3257	443,26	450,38	280,84	436,653687
985	200,50	612,31	1,573	429,7865	442,41	450,65	280,51	436,176208
986	200,15	614,05	1,573	429,5344	441,23	450,75	279,84	435,701965
987	200,03	615,81	1,573	429,1029	440,19	450,80	279,17	435,241118
988	199,86	617,97	1,493	428,4535	439,16	450,84	278,64	434,715851
989	199,74	619,46	1,573	427,9111	438,41	450,88	278,13	434,034912
990	199,88	620,00	1,472	427,2863	437,23	450,93	277,65	433,385803
991	200,22	619,83	1,472	426,7863	436,36	451,06	277,17	432,727112
992	200,01	619,86	1,472	426,0394	435,32	451,29	276,71	432,110413
993	199,77	620,04	1,472	425,8312	434,51	451,54	276,19	431,475128
994	199,56	620,84	1,472	425,0031	433,51	451,69	275,78	430,760834
995	199,91	621,06	1,378	424,4805	432,46	451,82	275,36	429,954529
996	199,65	621,86	1,372	423,8795	431,72	451,94	274,86	429,335999
997	199,99	622,93	1,372	423,5649	430,87	452,07	274,35	428,597717
998	199,74	624,39	1,372	422,5935	429,68	452,15	274,04	428,084503
999	199,64	626,11	1,372	422,1513	429,02	452,20	273,55	427,325592
1000	199,51	627,14	1,275	421,4973	428,28	452,24	273,22	426,765747
1001	200,08	627,13	1,372	420,9193	427,52	452,24	272,81	426,264587
1002	199,73	627,19	1,275	420,3842	426,36	452,30	272,32	425,518463
1003	199,86	625,78	1,275	420,1185	426,08	452,38	272,02	425,072205
1004	199,66	624,63	1,275	419,4410	425,07	452,43	271,60	424,509521
1005	200,11	624,49	1,275	419,1750	424,16	452,41	271,12	423,806641
1006	200,54	624,54	1,275	418,2784	423,73	452,47	270,88	423,236206
1007	200,42	624,56	1,174	418,2500	422,64	452,48	270,36	422,65036
1008	200,48	625,80	1,174	418,0197	421,94	452,44	270,02	422,299713
1009	200,63	625,80	1,174	417,6767	420,99	452,39	269,59	421,420715
1010	200,12	626,50	1,174	417,5156	420,31	452,34	269,33	420,981537
1011	200,43	629,29	1,174	416,7856	419,53	452,30	268,90	420,491211
1012	200,50	632,34	1,074	416,7761	418,67	452,28	268,42	419,922699
1013	200,81	632,76	1,074	416,4849	418,00	452,25	268,06	419,242584
1014	201,11	632,65	1,074	416,0651	417,19	452,24	267,66	418,648499
1015	201,20	630,30	1,074	415,6268	416,36	452,24	267,18	418,131287
1016	200,90	628,56	1,074	415,4917	415,59	452,25	266,87	417,691467
1017	200,73	629,01	0,973	415,3543	414,97	452,39	266,48	417,172791
1018	200,82	631,35	0,973	415,0322	414,44	452,73	266,09	416,471375
1019	201,10	635,23	0,973	414,7103	413,72	453,10	265,75	416,026123
1020	201,64	636,21	0,973	414,3285	413,11	453,23	265,36	415,304626
1021	201,90	638,74	0,973	413,9555	412,42	453,27	265,00	414,954987
1022	202,40	644,21	0,973	413,6717	411,67	453,18	264,80	414,32431
1023	202,29	648,16	0,973	413,1677	411,08	452,99	264,44	413,939392
1024	203,09	649,56	0,873	412,8678	409,94	452,67	264,06	413,604584
1025	203,40	651,24	0,873	412,1524	409,13	452,33	263,65	413,063141
1026	203,61	652,28	0,873	411,4240	408,26	451,97	263,25	412,482025
1027	204,40	652,95	0,873	411,1322	407,63	451,57	262,96	411,903717
1028	204,74	653,40	0,873	410,6749	407,47	451,20	262,52	411,336334
1029	205,25	654,87	0,873	410,0038	406,67	450,80	262,08	411,2612
1030	205,80	655,50	0,806	409,4947	405,46	450,39	261,76	410,707672
1031	205,89	655,54	0,772	408,4679	404,92	449,96	261,37	410,308868
1032	205,25	655,84	0,772	407,7416	404,00	449,48	261,11	409,896332

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1033	205,61	656,39	0,772	407,0614	403,56	448,98	260,72	409,290527
1034	205,89	657,68	0,724	406,9326	402,79	448,55	260,37	409,063843
1035	206,51	657,61	0,672	406,1718	402,26	448,01	260,06	408,615601
1036	205,93	658,78	0,713	405,7325	401,52	447,59	259,67	408,218781
1037	206,35	661,92	0,672	405,0236	400,84	447,23	259,26	407,867432
1038	206,94	663,35	0,672	404,4178	400,15	446,84	258,88	407,487701
1039	207,18	664,28	0,672	403,9032	399,73	446,46	258,61	406,972076
1040	206,90	664,63	0,574	403,0601	398,73	446,13	258,36	406,583405
1041	207,00	663,99	0,672	402,6865	398,36	445,81	257,94	406,288666
1042	207,59	662,95	0,574	401,8528	397,56	445,47	257,61	405,849091
1043	207,63	662,55	0,574	401,1396	397,07	445,16	257,35	405,453064
1044	207,76	662,01	0,574	400,4782	396,33	444,89	256,96	405,05249
1045	207,81	661,98	0,574	400,0497	395,89	444,65	256,63	404,749786
1046	207,95	661,75	0,574	399,5835	395,34	444,42	256,31	404,197174
1047	207,75	661,11	0,477	399,0281	394,50	444,15	255,99	403,968231
1048	207,67	660,52	0,474	398,3462	394,06	443,86	255,65	403,685486
1049	207,98	659,17	0,474	397,7093	393,42	443,53	255,29	403,33432
1050	207,92	658,27	0,474	397,2545	393,12	443,16	254,98	402,856567
1051	207,31	657,39	0,474	396,6929	392,44	442,74	254,72	402,540283
1052	207,15	656,71	0,474	396,0272	391,97	442,38	254,51	402,291382
1053	207,41	655,98	0,474	395,8462	391,31	442,06	254,29	402,025818
1054	207,14	655,13	0,474	395,2277	390,81	441,76	253,98	401,691925
1055	207,14	653,39	0,373	394,5819	390,38	441,50	253,72	401,298645
1056	207,03	651,21	0,374	394,2723	389,73	441,22	253,43	400,94043
1057	206,38	650,88	0,374	393,6864	389,33	440,89	253,12	400,59906
1058	206,27	649,92	0,374	393,2206	388,98	440,49	252,86	400,390533
1059	205,66	647,49	0,373	392,7849	388,82	439,91	252,65	400,042419
1060	206,04	646,62	0,273	392,1685	388,09	439,21	252,50	399,866516
1061	205,92	646,97	0,337	391,6073	387,43	438,46	252,13	399,440002
1062	206,21	647,40	0,273	391,0687	387,23	437,60	251,80	399,071716
1063	206,19	647,02	0,273	390,6299	386,76	436,66	251,58	398,689453
1064	205,97	646,52	0,273	389,9518	386,15	435,67	251,35	398,519287
1065	205,67	645,76	0,196	389,4415	385,42	434,65	251,16	398,124054
1066	205,87	644,71	0,273	388,8567	384,99	433,56	250,99	397,857361
1067	205,67	643,48	0,173	387,9476	384,56	432,49	250,70	397,412323
1068	205,69	642,01	0,173	387,6829	384,17	431,50	250,35	396,99646
1069	205,96	641,57	0,172	386,8452	383,31	430,52	250,26	396,634125
1070	205,82	642,48	0,172	386,2905	382,98	429,67	249,97	396,178192
1071	205,56	643,11	0,173	385,9516	382,25	428,86	249,62	395,885773
1072	205,25	643,54	0,114	385,2455	381,44	427,99	249,32	395,540771
1073	205,22	643,75	0,172	384,5347	380,93	427,09	249,05	395,124512
1074	205,17	643,77	0,072	383,8713	380,27	426,14	248,80	394,789703
1075	205,13	643,11	0,072	383,7156	379,96	425,24	248,69	394,316101
1076	204,77	638,89	0,072	383,1768	379,59	424,29	248,34	393,943756
1077	204,76	634,11	0,072	382,6177	378,96	423,36	248,11	393,507416
1078	204,13	630,29	0,072	381,9688	378,52	422,46	247,82	392,967407
1079	204,02	627,25	0,072	381,1387	378,14	421,62	247,64	392,652557
1080	204,24	625,10	0,072	380,4494	377,58	420,86	247,37	392,427673
1081	203,65	623,26	0,072	379,9758	376,66	420,49	247,19	392,085846
1082	203,65	623,35	0,072	379,4951	376,23	420,07	246,91	391,836823
1083	203,06	621,25	0,072	378,7835	375,64	419,54	246,58	391,413269
1084	202,96	618,32	0,072	377,9871	374,98	418,94	246,33	390,852356
1085	202,34	619,82	0,072	377,4113	374,47	418,35	246,02	390,509796
1086	202,44	620,60	0,072	376,5875	373,60	417,57	245,85	390,407318
1087	201,80	615,91	0,072	375,9689	373,54	416,90	245,75	389,970886
1088	201,31	611,36	0,072	375,1517	372,32	416,25	245,47	389,616791
1089	201,06	610,63	0,072	374,6282	371,70	415,62	245,23	389,394989
1090	200,53	613,15	0,072	373,8572	371,27	414,94	244,98	388,723724
1091	200,47	616,23	0,072	373,1375	370,61	414,24	244,99	388,374939
1092	200,45	617,12	0,072	372,1605	369,81	413,55	244,75	387,762024
1093	200,73	616,31	0,072	371,5955	369,05	412,83	244,46	387,285095
1094	200,47	616,30	0,072	371,2039	368,12	412,17	244,32	386,751774
1095	200,34	615,89	0,000	370,5611	367,28	411,58	244,11	386,240204
1096	70,36	70,96	4,775	71,9904	72,31	72,63	71,92	72,2395172
1097	74,76	72,36	4,972	71,9860	72,31	86,23	71,91	72,2378922
1098	109,72	89,31	4,872	72,0080	72,48	112,73	71,91	72,2680206
1099	147,49	143,79	4,774	72,3316	73,56	131,68	72,00	72,6908264
1100	179,54	210,23	4,674	73,3909	75,74	158,36	72,19	74,2222137
1101	225,55	294,07	4,473	75,5166	79,21	182,59	72,56	77,0583344
1102	296,59	376,31	4,172	79,4702	84,49	208,18	73,18	80,9663849
1103	387,22	530,76	3,773	86,8192	92,69	245,13	74,19	86,3153915
1104	443,84	666,14	3,374	99,5449	104,36	285,41	75,90	94,3868408
1105	476,62	693,65	2,972	117,0460	118,36	328,89	78,27	105,64222
1106	494,24	688,74	2,473	136,9226	134,61	373,98	81,23	119,532982

Aging Mansfeild

1107	454,65	598,49	2,272	157,0889	151,62	398,17	84,58	135,333832
1108	430,74	557,06	2,171	177,8908	167,30	420,08	88,97	151,97731
1109	425,15	540,90	1,974	197,3111	181,06	437,10	94,28	167,653763
1110	409,14	520,37	1,873	214,4961	192,75	441,99	100,07	182,47377
1111	393,91	497,22	1,773	230,0819	202,44	445,43	105,90	196,059006
1112	381,30	482,80	1,672	244,0788	210,29	450,17	111,32	208,633728
1113	376,57	481,26	1,572	256,2005	216,54	456,78	116,36	220,027786
1114	378,06	483,26	1,471	267,1370	221,71	471,14	121,00	230,158691
1115	374,20	476,71	1,371	278,0974	226,40	497,05	125,39	238,954208
1116	369,75	472,06	1,342	288,3043	231,03	519,37	129,55	246,920074
1117	364,16	468,88	1,194	296,9662	235,56	539,14	133,56	254,543167
1118	359,97	464,58	1,173	305,3479	239,93	557,52	137,35	261,489502
1119	354,42	458,79	1,073	313,1568	244,08	575,10	140,97	267,929901
1120	347,83	449,28	0,972	320,7326	248,09	596,02	144,23	273,798798
1121	343,64	440,12	7,460	327,7135	252,07	609,76	147,45	279,121887
1122	279,84	348,15	20,169	333,3599	256,28	587,97	150,18	283,823059
1123	259,37	313,88	20,279	337,3513	259,31	564,37	152,41	287,471113
1124	254,96	306,64	20,178	338,8545	261,02	542,88	154,02	289,444244
1125	250,61	305,31	20,081	337,6362	261,89	524,52	155,08	289,970032
1126	258,96	321,44	19,880	336,1635	262,28	508,41	155,93	289,187378
1127	245,72	308,16	19,780	333,7556	262,56	497,83	156,53	288,047211
1128	234,93	306,09	19,679	331,2065	262,93	490,02	157,06	286,633789
1129	244,52	320,23	19,478	329,2449	263,38	485,90	157,38	284,807465
1130	247,75	363,97	19,381	326,3926	264,64	480,02	157,57	282,479401
1131	233,52	328,49	19,280	324,8029	267,09	474,44	157,79	280,884216
1132	242,08	334,63	19,180	324,0045	269,48	472,32	157,93	278,932465
1133	250,90	357,07	18,979	323,3781	271,52	475,00	157,91	276,951843
1134	292,36	391,04	18,778	323,4243	272,89	480,23	158,37	275,11084
1135	324,25	419,06	18,681	325,2454	273,64	486,59	158,89	273,351715
1136	339,96	433,70	18,480	328,3209	274,37	493,91	160,14	272,264465
1137	318,78	414,66	18,379	332,3395	274,98	500,57	162,02	271,884155
1138	302,87	397,33	18,279	335,7298	275,19	508,04	164,21	271,876465
1139	288,48	385,40	18,178	338,6472	274,88	515,87	166,24	271,674164
1140	299,64	395,28	18,077	340,5702	274,21	520,36	168,16	271,037445
1141	303,28	397,93	17,980	341,6968	273,20	521,54	169,85	269,935242
1142	311,96	410,86	17,779	343,3243	272,15	522,94	171,36	268,772675
1143	324,90	427,53	17,679	345,4467	271,20	524,46	173,00	267,531494
1144	330,79	434,06	17,578	349,8530	270,55	527,60	174,70	266,508057
1145	334,98	437,38	17,478	355,5318	270,03	531,43	176,32	265,780518
1146	343,79	447,13	17,280	362,4473	269,79	532,80	178,27	265,290924
1147	360,22	465,06	17,079	369,6552	269,79	534,37	180,23	264,849304
1148	414,18	502,00	16,878	376,5507	270,28	535,56	182,38	264,855499
1149	464,78	554,65	16,580	383,7052	271,73	535,30	185,07	265,911163
1150	503,47	611,51	16,278	391,4976	273,70	536,15	190,36	269,030487
1151	520,78	643,91	15,977	399,0594	276,08	538,16	197,26	273,856079
1152	523,08	639,22	15,678	405,8058	278,69	539,42	205,62	280,361816
1153	524,00	638,53	15,477	412,9510	281,13	543,34	214,48	287,495453
1154	529,78	643,49	15,179	419,2174	283,26	548,70	223,48	294,721313
1155	538,28	650,05	14,878	424,7183	285,18	551,54	232,59	301,566162
1156	544,71	662,89	14,676	429,4193	287,03	554,32	241,09	307,893616
1157	548,41	672,22	14,378	434,7227	288,84	555,55	249,27	314,092621
1158	558,56	691,00	14,077	439,1498	290,66	557,20	257,19	320,063751
1159	565,21	700,73	13,876	444,3212	292,73	561,74	265,29	325,998016
1160	579,94	730,80	13,577	449,4844	295,24	573,13	273,06	332,304108
1161	593,17	760,95	13,276	454,2644	298,33	596,27	280,97	338,918915
1162	605,33	774,21	12,977	459,3511	302,09	614,70	288,96	346,244629
1163	614,35	786,97	12,576	464,7319	306,77	629,41	297,09	354,057404
1164	617,25	791,64	12,277	470,4511	312,15	642,76	305,44	362,099426
1165	620,78	796,41	12,076	476,5339	318,16	653,67	313,48	370,922607
1166	627,14	803,16	11,778	482,6880	324,46	664,88	321,50	379,997345
1167	634,87	811,16	11,376	489,5811	330,87	675,77	329,47	388,893585
1168	641,83	817,45	11,078	496,6757	337,47	683,26	337,40	398,054443
1169	648,88	825,08	10,776	504,9530	344,38	687,61	345,46	407,114105
1170	651,04	832,12	10,475	514,2025	351,61	691,98	353,67	416,328644
1171	651,47	838,65	10,177	522,8823	359,21	697,00	362,09	425,583618
1172	655,51	845,46	9,875	532,0111	367,19	703,93	370,65	434,683105
1173	659,02	850,46	9,577	540,7838	375,20	712,89	379,13	443,960541
1174	570,54	844,08	9,376	550,2830	382,74	713,38	385,69	452,444885
1175	494,38	858,57	9,175	558,4037	389,91	694,50	392,10	461,522583
1176	458,56	857,85	9,074	564,7839	397,12	673,50	397,91	470,566956
1177	435,05	879,84	8,877	570,4705	402,96	655,12	402,37	478,19754
1178	414,33	843,22	8,776	575,1219	409,31	639,39	405,65	485,340698
1179	396,93	809,25	8,676	578,7205	414,78	626,55	407,95	491,056702
1180	383,03	787,65	8,575	578,2445	420,06	616,40	409,51	495,969818

Aging Mansfeild

1181	372,27	774,19	8,475	579,0038	424,33	608,09	410,64	499,062927
1182	362,21	764,61	8,474	581,2806	428,17	601,19	411,52	502,041321
1183	354,24	756,34	8,307	580,5004	431,19	594,92	411,89	505,144226
1184	347,31	749,09	8,277	578,9676	434,43	589,33	412,29	508,193878
1185	340,66	740,26	8,176	577,1915	437,61	584,31	412,29	510,224487
1186	334,72	732,29	8,076	574,9877	440,58	579,73	411,56	512,264771
1187	329,02	723,77	7,975	572,2634	443,19	575,73	412,26	514,573425
1188	323,85	716,61	7,875	570,1076	445,50	572,01	411,15	516,05249
1189	318,70	710,53	7,875	567,6632	448,10	568,62	411,32	517,542175
1190	314,85	706,60	7,774	566,3544	449,73	565,42	411,58	518,173645
1191	311,25	704,47	7,674	563,8841	452,35	562,26	410,94	519,39502
1192	308,48	704,48	7,577	561,9467	454,32	559,07	410,75	520,298462
1193	305,77	704,52	7,576	560,2545	456,49	555,94	410,09	521,179504
1194	303,43	701,91	7,476	558,1325	458,88	552,86	409,29	522,074036
1195	300,31	698,44	7,376	556,5442	460,96	549,72	409,15	522,822632
1196	297,84	695,13	7,275	556,0498	463,94	546,40	407,98	522,931458
1197	295,44	692,62	7,175	553,6154	465,44	543,27	407,88	524,683289
1198	293,14	691,38	7,175	551,1802	467,81	540,32	407,38	524,569214
1199	290,83	688,07	7,074	549,6574	468,63	537,64	406,36	525,798645
1200	288,94	686,60	6,974	549,5935	470,82	535,26	406,05	526,165955
1201	287,69	687,36	6,877	547,7008	472,16	533,25	405,28	527,088379
1202	525,55	829,52	6,647	546,6818	474,87	532,11	404,81	528,209167
1203	399,40	849,11	6,374	544,9634	476,51	530,69	404,51	529,782349
1204	360,05	765,63	6,274	544,6190	478,53	527,05	404,37	530,34967
1205	343,54	736,34	6,076	543,5095	480,19	521,98	404,82	532,664246
1206	334,88	741,06	5,975	544,2219	481,23	516,24	405,12	532,29071
1207	328,22	752,34	5,875	544,0941	482,73	510,59	406,11	535,264221
1208	323,06	766,04	5,774	545,5167	483,65	505,32	406,97	536,043884
1209	320,06	802,90	5,674	546,8802	484,87	500,42	407,60	537,372742
1210	317,11	794,07	5,573	547,8132	485,54	495,99	408,10	538,794434
1211	311,45	757,26	5,476	548,5721	487,19	492,03	407,85	540,336548
1212	305,33	733,06	5,476	548,9473	488,22	488,33	408,13	541,926758
1213	300,01	714,52	5,376	549,6262	489,27	484,72	408,10	542,087891
1214	295,69	703,76	5,275	550,3995	490,26	481,26	407,71	542,165771
1215	292,00	698,89	5,175	550,4760	490,95	477,95	407,37	542,635986
1216	289,19	697,54	5,175	550,0939	491,36	474,78	406,87	542,930786
1217	286,16	695,69	5,074	549,7898	492,90	471,97	406,70	542,860046
1218	283,39	691,04	4,974	549,2010	492,70	469,34	406,09	543,146179
1219	280,21	683,84	4,974	547,8885	493,44	466,96	405,02	543,759949
1220	275,88	676,53	4,873	547,4880	494,11	464,70	404,89	543,502258
1221	271,58	669,35	4,873	546,0981	493,95	462,67	404,72	544,194092
1222	266,04	665,27	4,784	545,8026	493,92	460,66	403,84	541,894226
1223	261,68	665,74	4,776	544,4677	493,46	458,92	403,06	543,054077
1224	259,45	681,86	4,776	543,5782	492,87	457,28	402,11	542,284119
1225	258,32	721,27	4,757	541,8209	491,26	456,03	400,77	540,684021
1226	257,73	749,51	4,675	539,6453	489,60	455,15	399,78	538,67218
1227	257,75	754,94	4,675	536,7857	487,85	454,63	398,27	536,832336
1228	257,79	751,11	4,676	534,0117	485,30	454,39	396,46	534,181458
1229	257,95	745,99	4,676	530,8645	482,61	454,42	394,74	531,186279
1230	256,65	740,29	4,575	527,7339	479,56	454,64	393,04	528,013306
1231	256,11	736,91	4,575	523,9222	476,79	455,08	391,16	525,429932
1232	255,29	737,74	4,575	520,6615	474,03	455,69	389,31	522,181702
1233	254,26	738,81	4,575	516,9922	471,90	456,34	387,28	519,105835
1234	254,01	741,11	4,575	513,7982	469,16	457,06	385,51	516,346375
1235	253,45	743,93	4,574	510,5357	466,72	457,81	383,51	513,610779
1236	252,44	748,52	4,474	507,3613	464,30	458,56	381,42	510,687561
1237	251,90	751,97	4,474	504,2600	462,64	459,43	379,88	507,759521
1238	251,03	751,54	4,374	501,1331	460,18	460,28	377,64	505,540894
1239	250,74	751,93	4,374	498,2469	458,36	460,95	375,91	503,059082
1240	250,19	751,02	4,374	495,9268	456,56	461,65	374,10	500,67688
1241	249,18	748,26	4,374	493,3853	454,87	462,44	372,25	498,228577
1242	248,68	748,09	4,374	490,8701	452,94	463,30	370,43	495,901764
1243	247,71	748,74	4,273	488,3104	451,49	464,30	368,64	493,998322
1244	247,02	747,75	4,273	486,4222	450,06	465,35	366,77	491,572968
1245	245,87	745,01	4,273	483,8227	448,44	466,36	364,93	489,901001
1246	245,01	742,59	4,273	480,9483	447,23	467,21	363,35	488,104889
1247	244,54	739,03	4,173	478,3640	446,25	467,95	361,61	485,822632
1248	243,16	731,45	4,173	475,2613	445,20	467,98	359,94	484,882477
1249	241,38	727,06	4,173	474,0786	443,87	467,49	358,39	482,683655
1250	240,63	725,94	4,173	472,1337	442,55	466,90	356,69	480,819031
1251	239,16	723,07	4,089	469,6851	441,70	466,31	355,22	479,156769
1252	237,91	718,54	4,095	467,8875	440,91	465,89	353,42	477,127472
1253	236,94	714,38	4,076	465,5176	439,85	465,62	351,58	475,082336
1254	301,92	632,18	4,076	464,5645	438,89	467,32	350,54	473,769958

Aging Mansfeld

1255	290,75	493,29	19,700	463,0297	438,43	468,37	348,92	471,494812
1256	293,52	446,23	19,480	460,1442	436,40	468,52	346,89	469,871094
1257	321,60	558,83	19,479	456,9347	433,60	467,70	344,69	466,942963
1258	338,44	612,68	19,382	452,6958	429,65	466,26	342,24	463,189087
1259	348,66	634,36	19,281	448,2981	424,96	464,26	340,07	458,82312
1260	302,36	620,25	19,281	443,1776	420,11	462,01	338,05	453,572662
1261	275,33	603,12	19,181	437,6044	415,60	459,44	336,08	448,806305
1262	260,29	579,09	19,282	432,1434	411,12	456,78	334,29	444,289886
1263	249,79	560,09	19,181	427,5697	406,45	454,06	332,58	438,466614
1264	241,68	546,56	19,181	422,8899	401,87	451,22	330,58	433,092438
1265	235,45	536,43	19,181	418,0408	397,03	448,31	328,50	427,566498
1266	230,40	528,39	19,179	413,2092	393,40	445,35	326,41	422,575256
1267	226,20	521,72	19,081	408,5672	388,63	442,39	324,29	417,326996
1268	222,49	516,16	19,081	403,7870	384,65	439,44	322,23	412,612305
1269	219,12	510,42	19,080	399,1616	380,75	436,48	320,22	407,630066
1270	216,03	504,98	19,081	394,8839	376,59	433,63	318,09	402,559113
1271	213,20	499,43	18,980	390,5343	372,48	430,82	316,08	397,930145
1272	211,08	494,61	18,980	386,3983	368,28	428,03	314,04	393,213318
1273	208,35	490,11	18,880	382,1424	364,71	425,35	311,96	388,738373
1274	205,97	486,56	18,879	378,1403	360,75	422,78	309,93	384,377716
1275	204,54	485,93	18,880	374,1702	357,22	420,32	307,97	380,252899
1276	203,31	486,19	18,880	370,3859	353,87	417,99	305,98	376,070862
1277	201,96	486,25	18,880	366,7394	349,95	415,78	303,97	371,973022
1278	200,65	485,89	18,779	362,7633	346,80	413,67	302,02	368,008728
1279	199,36	484,65	18,779	359,5140	343,12	411,76	300,21	364,288757
1280	198,12	483,58	18,779	355,7604	340,03	409,91	298,27	360,702759
1281	197,52	482,49	18,682	352,3283	336,90	408,18	296,15	357,064453
1282	196,62	480,70	18,682	348,9767	334,00	406,50	294,36	353,92926
1283	196,10	477,57	18,682	345,7831	331,20	404,87	292,54	350,520935
1284	194,75	473,28	18,581	342,6552	328,58	403,29	290,84	346,945984
1285	193,66	470,13	18,581	339,5294	325,24	401,79	288,84	344,020142
1286	192,21	467,03	18,581	336,5782	322,70	400,23	287,18	341,225128
1287	191,51	465,73	18,581	333,4825	320,26	398,76	285,44	337,988861
1288	190,70	465,33	18,481	329,8602	316,74	397,28	283,39	335,552704
1289	189,46	464,41	18,481	327,9186	314,37	395,80	281,64	332,448212
1290	188,68	454,75	18,481	324,8206	311,53	394,39	279,77	329,64209
1291	187,27	431,64	18,392	322,2998	308,90	392,97	277,91	327,074432
1292	185,56	406,90	18,380	320,0018	306,13	391,58	276,06	324,175049
1293	183,99	388,33	18,380	317,3934	304,16	390,13	274,12	321,633667
1294	182,23	376,15	18,362	314,8857	301,62	388,82	272,40	319,046692
1295	180,57	368,44	18,280	312,4986	299,59	387,46	270,68	316,546448
1296	179,16	363,38	18,280	310,3231	297,30	386,16	269,08	314,058868
1297	177,70	359,68	18,179	307,6429	295,03	384,98	267,43	312,154877
1298	176,20	356,54	18,179	305,6717	293,09	383,74	265,91	309,636353
1299	174,96	353,66	18,179	303,2715	290,47	382,58	264,24	307,567719
1300	174,72	353,62	18,179	301,1569	288,50	381,40	262,48	305,408722
1301	174,11	359,50	18,079	299,1658	286,25	380,28	260,74	303,383911
1302	174,32	362,12	18,078	297,0901	284,80	379,12	259,28	301,434387
1303	172,93	361,67	17,982	295,3476	282,61	378,01	257,64	299,730347
1304	171,90	357,10	17,981	293,6979	281,31	376,90	256,33	298,052277
1305	170,73	349,82	17,982	292,0539	279,23	375,85	254,82	296,68689
1306	168,86	344,40	17,881	290,5085	277,79	374,84	253,41	294,712891
1307	167,51	340,81	17,881	288,8261	275,69	373,87	251,85	292,84552
1308	166,20	338,13	17,881	287,0456	274,37	372,91	250,54	291,056549
1309	165,15	336,01	17,780	285,4697	272,02	372,01	248,98	289,519135
1310	164,38	334,36	17,780	283,9355	270,20	371,15	247,43	287,65329
1311	163,79	332,86	17,780	282,1888	268,92	370,25	246,22	286,199432
1312	163,01	331,44	17,680	280,1578	267,12	369,40	244,91	284,785828
1313	162,30	329,97	17,679	278,9208	266,00	368,48	243,23	282,734467
1314	162,05	328,40	17,579	276,7460	264,13	367,70	241,97	281,583649
1315	161,45	326,92	17,579	275,3318	262,50	366,87	240,59	280,046417
1316	161,09	325,81	17,579	273,6760	261,04	366,02	239,18	278,480774
1317	160,89	324,79	17,479	272,2121	260,03	365,21	238,12	277,212341
1318	160,50	323,64	17,478	270,7106	258,05	364,51	236,85	275,9758
1319	160,34	322,76	17,478	269,2475	256,90	363,79	235,63	274,609711
1320	160,20	321,69	17,385	267,6941	255,35	363,08	234,22	273,597748
1321	160,08	320,57	17,378	266,3385	254,15	362,41	233,10	272,138306
1322	160,22	319,68	17,281	264,9348	253,05	361,77	231,90	271,159332
1323	159,69	318,74	17,281	263,4725	251,74	361,14	230,78	269,865082
1324	159,66	317,90	17,281	262,2005	250,69	360,55	229,72	268,82077
1325	159,55	317,22	17,180	260,5310	249,61	359,97	228,40	268,122559
1326	159,64	316,68	17,180	259,7206	248,66	359,37	227,45	266,941467
1327	159,45	316,11	17,180	257,6842	247,14	358,88	226,49	266,061768
1328	159,55	315,44	17,080	256,9727	246,03	358,39	225,39	264,951508

Aging Mansfeild

1329	159,37	314,69	17,080	254,9707	245,30	357,89	224,31	264,392487
1330	159,56	314,12	16,979	254,2217	244,20	357,42	223,26	263,290833
1331	159,33	313,47	16,979	253,0664	243,05	356,93	222,16	262,556427
1332	159,23	312,80	16,879	251,7217	242,11	356,51	221,19	261,979248
1333	158,89	312,05	16,879	250,8183	240,88	356,02	220,30	260,712097
1334	159,27	311,36	16,878	249,8447	240,07	355,57	219,39	260,264587
1335	159,05	310,83	16,778	248,7397	239,40	355,14	218,50	259,379456
1336	158,89	310,27	16,778	247,0044	238,55	354,68	217,56	258,891479
1337	158,63	309,42	16,677	246,5236	237,69	354,23	216,64	257,937958
1338	158,51	308,76	16,678	245,5726	236,76	353,82	215,83	257,508301
1339	158,50	308,06	16,583	244,6406	236,08	353,38	214,89	256,97995
1340	158,29	307,47	16,580	243,9000	235,74	352,96	214,31	256,417084
1341	158,21	307,01	16,581	242,5327	234,94	352,60	213,48	256,090576
1342	158,03	306,65	16,480	241,1890	234,54	352,26	212,61	255,334793
1343	157,76	306,33	16,480	240,6429	233,56	351,91	211,76	255,087463
1344	157,57	306,02	16,379	239,8751	233,18	351,58	211,00	254,416565
1345	157,72	305,76	16,379	239,1877	232,26	351,33	210,24	254,24292
1346	157,63	305,71	16,379	238,5967	231,80	351,06	209,55	253,596588
1347	157,86	305,65	16,279	237,5118	231,02	350,74	208,82	253,365051
1348	158,15	305,47	16,279	236,9674	230,67	350,53	208,15	253,34761
1349	158,07	305,14	16,178	236,3878	230,42	350,32	207,50	253,042847
1350	158,32	304,89	16,178	235,7193	229,74	350,16	206,75	252,751099
1351	158,45	305,03	16,078	235,0631	229,42	350,04	206,21	252,676376
1352	158,42	305,43	16,078	234,3751	228,65	349,98	205,59	252,476761
1353	158,42	305,24	15,977	233,9579	228,61	349,92	204,99	252,301575
1354	158,71	305,24	15,977	233,2453	228,04	349,85	204,40	252,261353
1355	159,27	305,47	15,911	232,6217	227,53	349,72	203,71	252,109909
1356	159,73	305,99	15,880	231,9457	227,26	349,62	203,23	252,02211
1357	160,06	306,36	15,880	231,6600	226,84	349,47	202,66	251,723602
1358	160,42	306,78	15,779	231,0996	226,46	349,37	202,25	251,692642
1359	160,77	306,91	15,779	230,5781	226,20	349,35	201,62	252,002396
1360	160,93	307,12	15,679	230,2981	225,88	349,27	201,15	252,01506
1361	161,59	307,36	15,679	229,8574	225,58	349,21	200,69	251,923737
1362	161,93	307,57	15,578	229,3557	225,41	349,19	200,11	252,128799
1363	162,54	308,04	15,575	229,0070	225,38	349,15	199,66	251,955154
1364	164,74	309,97	15,478	228,6460	225,08	349,19	199,25	252,145935
1365	166,09	320,90	15,377	228,1530	225,35	349,17	198,87	252,489288
1366	169,03	329,60	15,277	227,6922	225,54	349,04	198,69	253,389725
1367	172,17	341,40	15,180	228,5326	226,04	348,79	198,52	254,572952
1368	175,23	356,22	15,179	229,1479	226,83	348,51	198,56	256,49826
1369	178,69	374,03	15,079	230,0527	227,52	348,16	198,69	259,055817
1370	183,46	396,50	14,978	231,9069	228,82	347,75	199,06	262,030243
1371	188,25	421,11	14,878	234,5022	230,43	347,22	199,65	265,024109
1372	193,31	442,88	14,778	237,8816	232,39	346,60	200,51	268,191895
1373	199,19	468,55	14,677	241,7612	234,46	345,94	201,79	271,763947
1374	206,07	503,97	14,576	246,1089	236,99	345,21	203,45	275,630615
1375	215,46	617,78	14,479	250,4156	239,81	344,45	205,66	279,424164
1376	221,94	684,25	14,280	254,9077	242,59	343,73	208,12	282,909485
1377	227,88	676,76	14,278	259,7327	245,62	343,04	211,07	286,766785
1378	231,79	782,94	14,178	264,4840	248,38	342,54	214,17	290,578766
1379	251,13	909,97	14,075	268,2154	250,81	342,27	216,95	294,327209
1380	261,09	829,75	13,876	271,7430	252,56	342,45	219,08	296,873779
1381	263,18	724,77	13,779	273,8346	254,94	342,88	221,36	299,641541
1382	269,75	727,53	13,578	277,0845	258,08	343,22	223,36	302,048401
1383	280,80	771,78	13,477	280,8516	261,79	343,43	225,62	305,256683
1384	289,19	779,61	13,377	285,2055	266,03	343,51	227,63	309,24939
1385	293,97	778,11	13,175	290,4143	271,50	343,37	229,49	313,375092
1386	294,22	776,71	13,078	295,2305	277,10	343,12	231,66	318,544525
1387	294,72	767,96	12,878	300,9479	282,26	342,71	233,63	324,141144
1388	295,07	755,32	12,777	307,0514	288,66	342,18	235,77	329,730621
1389	295,60	746,81	12,576	313,2988	294,56	341,60	238,31	335,493591
1390	296,76	743,50	12,478	319,2723	300,59	341,05	240,41	341,476166
1391	297,90	742,55	12,378	325,7632	306,59	340,41	242,30	347,35144
1392	299,08	736,20	12,177	331,9703	312,24	339,83	244,91	353,43512
1393	300,35	731,66	12,076	338,1383	317,99	339,29	247,14	359,449127
1394	301,25	731,54	11,876	344,5719	324,27	338,69	249,46	365,276825
1395	302,49	733,99	11,778	350,4445	329,14	338,17	252,13	370,941132
1396	303,78	737,94	11,678	355,4629	334,54	337,62	254,85	376,606445
1397	305,06	743,77	11,477	361,7965	340,54	337,14	257,37	382,476288
1398	305,80	746,96	11,376	367,8080	345,85	336,65	259,99	387,895844
1399	306,33	744,96	11,175	372,9745	351,48	336,17	262,52	393,015076
1400	307,58	742,44	11,078	378,5030	356,68	335,76	265,59	398,172974
1401	308,93	737,32	10,877	383,7714	361,95	335,33	268,05	403,245819
1402	310,99	728,54	10,776	388,8467	367,44	334,98	270,80	408,381348

Aging Mansfeld

1403	311,64	710,71	10,575	393,6755	372,18	334,65	273,56	413,227234
1404	313,00	690,16	10,432	398,9302	377,24	334,33	276,10	417,688171
1405	314,05	672,36	10,277	403,7064	382,91	333,98	278,44	422,349304
1406	315,21	660,71	10,076	408,4023	388,07	333,68	280,90	426,824707
1407	315,28	654,30	9,976	412,9154	393,23	333,40	283,37	431,330475
1408	314,19	650,54	9,775	417,2762	398,28	333,09	285,52	435,904083
1409	312,35	648,54	9,677	421,8791	403,53	332,82	287,54	440,424957
1410	310,19	645,18	9,476	426,0938	409,01	332,51	289,84	444,621887
1411	307,18	642,68	9,376	430,4362	413,69	332,21	292,16	448,896515
1412	304,88	643,18	9,275	434,5023	418,53	331,92	294,39	452,997986
1413	303,50	649,97	9,175	438,2776	422,72	331,69	296,71	457,152893
1414	303,61	665,47	8,977	442,1143	426,37	331,46	299,10	461,005615
1415	303,63	708,44	8,877	445,9274	430,00	331,24	301,69	464,763214
1416	303,54	751,30	8,776	449,5872	433,01	331,09	304,19	468,181915
1417	303,80	774,11	8,676	452,4886	436,05	330,99	306,38	471,583954
1418	303,50	785,10	8,575	456,1241	438,16	330,88	308,52	474,75473
1419	301,41	798,67	8,475	459,4200	440,50	330,78	310,74	478,091248
1420	300,88	807,42	8,374	462,4665	442,90	330,81	312,73	480,890045
1421	300,69	807,17	8,277	465,6155	444,75	330,89	314,88	483,862946
1422	300,62	808,07	8,176	468,5127	446,53	331,05	316,67	486,926056
1423	300,82	803,87	8,076	471,0969	447,93	331,25	318,65	489,639099
1424	300,67	802,74	7,975	473,8033	449,38	331,50	320,52	492,175293
1425	301,55	804,28	7,875	476,0557	450,61	331,78	322,58	494,771942
1426	301,48	805,36	7,774	478,0046	452,36	332,14	324,37	497,34082
1427	302,70	803,10	7,674	480,0567	453,31	332,54	326,30	499,530487
1428	303,09	803,67	7,577	481,7391	454,86	332,98	328,08	501,605713
1429	303,18	796,65	7,476	483,4899	456,08	333,48	330,16	503,943115
1430	302,43	791,29	7,376	484,9677	456,85	334,05	332,13	506,015167
1431	302,21	791,45	7,275	486,5091	457,69	334,58	334,21	508,041718
1432	303,03	792,01	7,175	488,0729	458,85	335,10	336,24	510,042114
1433	304,77	792,08	7,074	489,7614	459,72	335,75	338,90	512,025513
1434	305,37	791,27	6,974	491,2777	460,60	336,43	341,23	513,947266
1435	305,84	789,07	6,877	493,0253	460,99	337,14	343,18	515,783264
1436	305,63	788,73	6,776	494,6179	461,50	337,81	345,54	517,587585
1437	306,12	793,40	6,675	496,3678	462,33	338,45	347,67	519,299622
1438	305,58	793,80	6,575	497,9605	462,88	339,07	349,66	521,166016
1439	305,79	793,37	6,474	499,4876	464,56	339,60	352,04	522,777771
1440	304,81	789,83	6,374	500,7369	465,71	340,01	353,90	524,689636
1441	304,40	792,23	6,362	502,8231	466,20	340,41	356,09	526,451782
1442	303,36	794,72	6,176	504,1206	467,06	340,86	357,91	527,865295
1443	302,45	792,22	6,176	505,4733	467,95	341,41	359,64	529,224365
1444	301,04	790,16	6,076	506,9118	469,31	341,99	361,91	530,893921
1445	299,96	788,07	5,975	508,4449	470,19	342,58	363,71	532,351135
1446	299,08	784,51	5,826	509,9998	471,50	343,21	365,50	534,005676
1447	298,01	781,86	5,675	511,1670	472,32	343,83	367,06	535,358704
1448	296,67	777,28	5,674	512,8619	473,44	344,51	368,39	537,134521
1449	295,02	769,72	5,573	514,1984	474,50	345,23	370,07	538,483459
1450	293,58	759,48	5,476	515,3043	476,01	345,98	371,88	540,198608
1451	292,88	759,98	5,378	516,5923	476,93	346,75	373,27	541,424561
1452	292,62	775,72	5,376	517,8478	477,66	347,48	374,73	542,728333
1453	293,54	783,86	5,275	519,0499	478,44	348,24	375,99	543,837646
1454	293,88	785,83	5,175	519,7680	479,05	348,98	377,31	544,975586
1455	293,83	786,42	5,175	520,3994	479,92	349,75	378,22	545,875854
1456	294,71	785,36	5,074	521,3309	481,06	350,58	379,85	546,841309
1457	293,80	781,55	4,974	522,0756	482,33	351,43	380,90	547,771667
1458	293,11	781,39	4,873	522,4146	484,38	352,26	381,87	547,696716
1459	291,96	787,18	4,873	522,8491	485,61	353,14	382,79	549,118774
1460	290,68	788,08	4,776	523,8483	488,02	354,09	383,41	550,210571
1461	289,50	786,62	4,675	524,0678	489,25	355,05	384,25	551,275635
1462	288,82	787,08	4,675	525,1766	490,98	356,05	384,75	551,996948
1463	287,56	781,58	4,575	525,4592	492,12	357,05	385,51	553,042969
1464	285,39	774,46	4,575	526,4626	493,76	358,05	386,16	553,546692
1465	283,51	764,51	4,474	527,0552	494,86	359,01	386,65	554,117432
1466	281,15	756,32	4,374	527,6398	496,23	359,94	386,73	554,830017
1467	279,64	749,79	4,374	528,7190	497,38	360,96	387,31	555,761658
1468	277,76	747,81	4,355	529,0641	498,27	361,93	387,74	555,988953
1469	276,29	745,83	4,273	529,3902	499,34	362,96	387,79	557,021729
1470	274,03	743,87	4,173	530,5468	500,86	363,99	387,61	556,550049
1471	272,26	743,07	4,173	531,2050	501,19	365,07	387,94	557,647888
1472	269,37	743,05	4,173	530,8864	501,73	366,13	388,04	557,977356
1473	267,49	741,30	4,076	531,6703	502,29	367,19	388,08	558,136536
1474	264,79	738,60	3,975	532,2100	503,17	368,28	387,84	558,465088
1475	262,98	738,88	3,975	533,1154	504,88	369,37	387,18	558,376831
1476	261,29	741,46	3,975	533,1292	506,27	370,52	386,73	557,552979

Aging Mansfeild

1477	259,69	733,75	3,971	532,6820	507,10	371,62	385,84	557,244568
1478	257,73	722,37	3,875	532,5720	508,23	372,76	384,83	556,771851
1479	256,01	713,85	3,875	532,0172	509,28	373,89	384,20	556,335999
1480	254,10	708,82	3,875	531,5978	509,46	374,93	382,92	555,750977
1481	252,14	705,70	3,875	530,9269	510,24	376,10	382,13	554,992615
1482	250,48	703,35	3,774	530,0609	510,37	377,20	380,85	553,75354
1483	249,03	701,96	3,774	529,2715	511,48	378,26	379,92	553,052185
1484	247,32	698,74	3,677	528,1782	511,64	379,34	379,02	552,098633
1485	246,25	695,04	3,674	527,1923	511,80	380,39	377,84	550,713257
1486	245,26	692,69	3,674	526,2327	512,36	381,40	376,56	549,666565
1487	244,01	690,96	3,674	524,5306	512,34	382,42	375,35	548,595703
1488	242,72	688,87	3,674	523,7963	512,79	383,45	374,10	546,983826
1489	242,09	686,76	3,573	522,8502	513,13	384,43	372,86	545,590881
1490	241,11	683,09	3,573	521,5571	512,82	385,48	371,64	544,195435
1491	239,81	679,10	3,573	521,0592	513,58	386,44	370,30	542,258118
1492	238,66	677,02	3,473	518,3200	512,31	387,48	369,09	542,154602
1493	237,35	675,52	3,473	518,0048	513,26	388,41	367,90	540,458252
1494	235,94	673,49	3,473	516,6899	512,15	389,42	366,98	538,879944
1495	234,62	671,99	3,473	515,7124	512,12	390,30	365,47	537,480774
1496	234,42	670,11	3,473	514,6932	511,77	391,16	364,28	536,741882
1497	234,03	668,33	3,375	514,0529	510,83	391,97	362,75	535,430725
1498	232,97	667,16	3,445	512,1973	510,49	392,79	361,76	534,577515
1499	232,35	665,75	3,375	511,6209	509,84	393,59	360,60	532,759155
1500	231,31	664,58	3,376	510,7427	509,74	394,36	359,58	531,376892
1501	230,73	663,61	3,375	509,5866	508,69	395,12	358,36	530,019104
1502	230,31	663,13	3,275	508,8268	508,33	395,91	357,22	528,723328
1503	229,58	662,90	3,275	507,5638	507,83	396,64	355,97	527,817749
1504	228,99	662,59	3,275	506,6127	506,68	397,40	354,78	526,499329
1505	228,45	662,02	3,275	505,3565	506,19	398,22	353,62	525,539795
1506	228,05	662,38	3,212	503,4619	506,13	399,00	352,36	524,785278
1507	226,92	663,15	3,175	503,5730	505,39	399,71	351,58	523,464722
1508	226,53	663,85	3,175	502,1432	504,74	400,42	350,46	522,398987
1509	226,36	664,13	3,175	501,0378	504,38	400,76	349,69	521,618896
1510	225,64	663,85	3,074	500,2288	503,18	401,05	348,41	520,013
1511	225,48	663,63	3,074	498,6306	502,82	401,35	347,44	518,986694
1512	224,61	663,17	3,074	498,0404	501,90	401,62	346,34	518,091858
1513	225,04	664,40	3,074	497,2371	501,33	401,97	345,17	516,304077
1514	224,54	666,56	3,074	496,1646	500,34	402,42	344,18	514,853699
1515	224,24	667,69	3,074	495,3480	499,63	402,88	343,23	513,891479
1516	224,42	668,58	2,973	494,3725	498,79	403,37	342,13	512,665161
1517	224,15	669,74	2,974	493,3470	497,64	403,87	341,10	511,25296
1518	224,29	670,62	2,973	492,4115	497,21	404,46	340,07	510,015747
1519	224,34	671,13	2,973	491,8412	495,53	405,01	338,87	508,866943
1520	224,05	671,18	2,974	490,7807	494,99	405,52	337,50	507,796661
1521	224,04	671,32	2,907	489,9578	494,61	405,99	336,44	506,624329
1522	223,99	671,24	2,873	489,3646	493,48	406,47	335,28	505,571289
1523	224,60	671,07	2,873	488,5572	492,80	406,96	334,16	504,560211
1524	224,46	670,75	2,873	487,7762	492,45	407,39	333,02	503,168243
1525	224,23	670,09	2,774	487,0668	491,24	407,79	331,94	502,357788
1526	224,04	668,96	2,772	486,0704	490,54	408,12	331,01	501,217896
1527	223,53	668,40	2,773	485,2899	490,05	408,46	329,94	500,026703
1528	223,77	668,85	2,773	483,8574	490,47	408,79	329,25	499,960297
1529	223,62	668,99	2,675	483,5579	489,23	409,11	328,36	498,619293
1530	222,85	668,88	2,675	482,8367	488,94	409,45	327,41	497,581696
1531	222,71	668,50	2,675	482,2391	487,57	409,76	326,43	496,201752
1532	222,74	668,59	2,675	481,2399	487,32	410,09	325,43	494,826477
1533	222,78	667,66	2,675	480,6081	486,33	410,40	324,60	493,260223
1534	222,25	667,71	2,675	479,9965	485,67	410,69	323,58	492,141296
1535	222,51	667,33	2,675	479,5747	484,80	410,97	322,46	491,277802
1536	222,56	667,42	2,675	479,0270	483,94	411,25	321,58	489,862793
1537	222,18	666,15	2,575	478,0926	483,38	411,50	320,78	488,702362
1538	221,80	667,97	2,575	477,3030	482,73	411,80	320,09	488,493622
1539	221,59	670,61	2,575	476,4853	481,70	412,05	319,12	487,112701
1540	222,06	672,04	2,575	475,8529	480,76	412,31	318,09	486,473816
1541	222,23	672,92	2,474	475,3267	480,11	412,64	317,19	485,262268
1542	222,00	672,96	2,474	474,2700	479,79	412,86	316,60	484,378571
1543	221,64	672,60	2,474	473,6678	478,96	413,18	315,68	483,265991
1544	221,89	669,34	2,474	473,0284	478,44	413,68	314,88	482,339264
1545	221,27	665,40	2,472	472,3042	477,22	414,22	313,91	481,397522
1546	220,98	662,98	2,474	471,6742	476,25	414,81	312,99	480,539032
1547	221,07	665,26	2,374	471,2069	475,47	415,45	312,34	479,683868
1548	220,86	668,35	2,374	470,2366	474,35	416,09	311,76	478,643799
1549	220,72	670,22	2,374	469,6783	473,38	416,67	310,91	477,654175
1550	220,61	671,53	2,374	468,6558	472,12	417,27	310,17	476,864349

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1551	220,20	668,62	2,374	468,1568	470,88	417,86	309,18	476,083771
1552	220,06	667,35	2,273	467,3818	470,07	418,48	308,38	475,211456
1553	219,59	668,58	2,273	466,6703	469,22	419,04	307,84	474,129059
1554	219,57	668,99	2,273	465,8689	468,32	419,62	307,08	473,543213
1555	219,70	667,87	2,273	464,9532	466,68	420,36	306,44	472,629181
1556	219,53	666,11	2,273	464,2644	465,81	421,12	305,57	471,480713
1557	218,92	665,93	2,173	463,5810	465,26	421,82	304,82	470,917938
1558	218,89	666,36	2,203	462,6870	464,42	422,50	304,24	470,126343
1559	218,98	666,84	2,173	461,9883	463,60	423,10	303,54	469,471619
1560	218,51	667,04	2,173	461,1600	463,12	423,65	302,71	468,58252
1561	218,37	667,34	2,173	460,2139	462,57	424,18	301,89	467,950958
1562	218,14	667,23	2,170	459,3134	461,75	424,74	301,53	467,360077
1563	217,78	667,48	2,170	458,6311	460,99	425,23	300,79	466,661926
1564	217,99	667,59	2,072	457,5630	460,34	425,71	299,92	466,035889
1565	218,34	668,42	2,072	456,7156	459,60	426,01	299,25	465,351715
1566	218,16	667,01	2,072	455,4226	459,10	426,20	298,49	464,774963
1567	217,90	666,71	2,047	454,8151	458,05	426,30	297,81	463,899384
1568	217,80	667,49	1,975	453,8445	457,13	426,45	297,17	463,394226
1569	218,07	665,80	1,975	453,2534	456,65	426,69	296,64	462,941406
1570	217,44	664,95	1,975	452,3955	456,40	426,86	296,01	461,771576
1571	217,39	667,04	1,975	451,3857	455,40	426,97	295,35	461,407318
1572	217,45	669,78	1,975	450,7487	454,85	427,12	294,86	460,812897
1573	217,65	671,80	1,875	449,7576	454,74	427,27	294,26	460,060425
1574	217,96	673,85	1,874	449,1134	453,61	427,48	293,56	459,351135
1575	217,97	675,56	1,875	448,3845	453,47	427,58	293,03	458,524078
1576	218,19	676,44	1,875	447,5262	452,20	427,66	292,29	457,838531
1577	218,26	678,21	1,875	446,7391	451,89	427,75	291,74	456,654266
1578	219,02	679,81	1,830	446,0290	451,34	427,81	290,87	455,764801
1579	219,27	680,39	1,774	445,4467	450,81	427,96	290,28	454,724243
1580	219,85	669,31	1,774	444,9678	450,16	429,09	289,87	453,82843
1581	218,39	656,76	1,774	443,7022	449,89	430,56	289,52	453,434082
1582	217,76	652,55	1,774	442,7748	448,96	432,06	288,90	452,480469
1583	216,82	653,45	1,774	442,1451	448,27	433,53	288,42	451,728333
1584	216,50	655,11	1,674	440,9020	447,40	434,89	287,94	451,138733
1585	215,78	655,68	1,674	440,4861	446,93	436,19	287,35	450,786713
1586	215,49	655,86	1,674	439,4858	445,87	437,28	286,96	450,494934
1587	215,29	656,35	1,674	438,3855	445,22	438,30	286,87	450,342224
1588	215,31	656,57	1,674	437,5659	444,11	439,32	286,59	449,867218
1589	215,22	656,48	1,674	436,4856	443,84	440,40	286,40	449,650391
1590	215,02	656,21	1,573	435,4156	442,54	441,46	285,82	449,280243
1591	214,96	656,38	1,573	434,6087	441,89	442,51	285,53	448,659332
1592	214,11	657,45	1,573	433,8359	440,68	443,63	285,38	448,470398
1593	213,91	657,69	1,573	433,1873	439,76	444,68	284,93	447,814392
1594	213,91	656,36	1,573	431,8109	439,01	445,12	284,73	447,44458
1595	213,63	649,00	1,473	431,3337	438,14	445,33	284,31	447,146667
1596	213,19	642,52	1,473	430,7968	437,25	445,78	284,41	446,856171
1597	212,72	637,34	1,473	430,1605	436,27	446,46	283,92	446,344696
1598	211,73	633,87	1,473	429,5074	435,60	447,30	283,57	445,755707
1599	211,40	632,46	1,377	429,0989	434,29	448,24	283,18	445,326447
1600	211,09	631,96	1,473	428,7264	433,50	449,14	282,74	445,072845
1601	210,71	631,71	1,372	428,2443	432,33	450,01	282,34	444,375366
1602	210,07	631,99	1,372	427,9946	431,02	450,95	282,04	444,017029
1603	209,99	632,92	1,372	427,6602	430,26	451,93	281,79	443,630554
1604	209,83	635,13	1,368	427,3763	429,44	452,94	281,46	443,13562
1605	209,64	637,86	1,333	426,9886	428,53	453,93	281,15	442,824707
1606	209,35	639,31	1,279	426,6815	427,22	454,95	280,83	442,28714
1607	209,26	640,13	1,275	426,2519	426,48	456,00	280,40	441,794159
1608	209,21	640,33	1,275	425,5399	425,72	457,01	280,27	441,268921
1609	209,24	641,21	1,275	425,2368	424,87	457,99	279,87	440,968353
1610	209,26	641,89	1,275	424,8586	423,94	458,91	279,62	440,316437
1611	209,62	642,22	1,174	424,5007	423,39	459,81	279,42	439,756042
1612	209,03	642,30	1,174	423,7722	422,70	460,58	278,96	439,346863
1613	209,14	642,67	1,174	423,1938	421,43	461,28	278,56	438,773254
1614	209,10	643,55	1,174	422,7705	420,85	461,80	278,31	438,10379
1615	209,06	644,45	1,174	422,3425	420,17	462,32	277,98	437,661377
1616	209,17	644,66	1,074	421,8999	419,45	462,71	277,55	437,204407
1617	208,75	645,68	1,174	421,2210	418,85	463,09	277,18	436,661865
1618	209,15	646,48	1,074	420,7556	417,95	463,39	277,17	436,466827
1619	208,91	646,39	1,074	420,2177	417,24	463,74	276,69	435,81308
1620	209,08	647,22	1,074	419,7050	416,57	463,99	276,42	435,381714
1621	209,09	648,65	1,074	419,1035	415,85	464,06	276,03	434,691986
1622	209,06	649,61	1,074	418,5003	415,58	463,86	275,84	434,566956
1623	209,25	649,57	0,973	418,2926	414,48	463,51	275,44	434,017639
1624	209,55	651,06	0,973	417,5843	413,65	463,28	275,21	433,54541

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1625	209,75	656,06	0,894	416,9938	412,83	463,14	274,91	432,82486
1626	210,35	659,93	0,973	416,4063	412,13	463,00	274,58	432,338257
1627	210,36	657,96	0,934	415,2724	411,74	462,67	274,26	431,980896
1628	210,05	655,95	0,873	414,8109	410,81	462,29	274,02	431,432983
1629	209,95	655,73	0,973	414,0040	409,96	461,93	273,70	431,075012
1630	210,19	658,45	0,873	413,3623	409,36	461,72	273,39	430,707306
1631	210,67	663,92	0,873	412,6966	408,79	461,59	273,25	430,306671
1632	211,27	664,47	0,873	411,9301	408,22	461,70	272,78	429,740997
1633	211,58	663,58	0,873	411,0503	407,43	461,72	272,41	429,410614
1634	211,86	665,49	0,772	410,4480	407,09	461,77	272,03	429,042084
1635	211,61	663,86	0,780	409,3621	406,33	461,96	271,60	428,537933
1636	211,75	662,84	0,772	408,6507	405,82	462,08	271,34	428,001465
1637	211,92	663,17	0,772	407,8330	405,10	462,17	271,04	427,556061
1638	212,16	661,60	0,772	406,6494	404,75	462,26	270,88	427,248596
1639	212,03	661,77	0,772	405,9475	403,71	462,34	270,43	426,501404
1640	211,65	663,69	0,683	405,0172	403,16	462,43	270,10	426,270782
1641	211,74	664,75	0,672	404,2124	402,58	462,48	269,71	425,70459
1642	211,90	661,58	0,672	403,3608	402,21	462,89	269,38	425,445801
1643	211,95	660,36	0,672	402,5272	401,36	463,33	269,05	424,834656
1644	212,03	658,74	0,672	401,5883	400,58	463,80	268,68	424,502167
1645	212,32	656,71	0,672	401,0139	400,24	464,22	268,25	424,059723
1646	212,24	656,75	0,586	399,9828	399,61	464,46	267,96	423,284088
1647	212,58	660,71	0,575	399,3705	398,57	464,58	267,59	422,962067
1648	212,57	664,66	0,575	398,5949	398,06	464,55	267,37	422,466309
1649	212,36	664,48	0,575	397,6371	397,36	464,54	267,00	421,702057
1650	212,16	659,44	0,575	396,9183	396,75	464,59	266,61	421,279419
1651	212,35	654,67	0,475	396,0162	395,81	464,62	266,26	420,882202
1652	212,22	654,74	0,474	395,2431	395,53	464,56	265,88	420,37149
1653	212,26	659,15	0,474	394,4715	394,98	464,47	265,46	419,846924
1654	211,99	658,33	0,474	393,6298	394,38	464,42	265,26	419,365723
1655	212,09	654,46	0,474	393,2487	394,15	464,35	264,85	418,75296
1656	211,58	654,80	0,474	392,1811	393,40	464,19	264,64	418,202087
1657	211,72	657,99	0,474	391,4440	392,95	463,87	264,13	418,124695
1658	211,75	656,28	0,421	390,8324	392,23	463,65	263,80	417,604492
1659	211,21	652,90	0,374	390,1918	391,96	463,53	263,58	417,258575
1660	211,19	653,93	0,374	389,1703	391,52	463,46	263,25	416,825653
1661	210,87	658,06	0,374	388,7780	390,75	463,33	262,94	416,369049
1662	210,91	657,45	0,374	387,9300	390,82	463,26	262,52	415,742187
1663	211,04	652,26	0,374	387,2172	390,01	463,05	262,30	415,282318
1664	210,96	648,51	0,354	386,6005	389,68	462,69	261,73	414,451019
1665	210,64	647,99	0,297	385,8731	389,25	462,33	261,46	414,195343
1666	210,44	646,81	0,273	385,1889	388,63	462,05	261,00	413,486938
1667	209,93	645,40	0,273	384,7716	388,34	462,01	260,63	412,919067
1668	209,42	645,64	0,273	383,7159	387,66	461,91	260,32	412,480621
1669	209,69	646,88	0,273	383,2303	387,34	461,80	260,05	411,782104
1670	209,43	647,94	0,257	382,2371	386,97	461,52	259,66	411,328766
1671	209,12	648,67	0,173	381,5054	386,20	461,34	259,31	410,602966
1672	209,14	649,24	0,172	380,4359	385,81	461,01	258,98	409,950348
1673	209,06	649,63	0,173	379,9493	384,97	460,66	258,50	409,127808
1674	208,85	649,73	0,173	379,1679	384,39	460,35	258,26	408,330231
1675	209,02	648,93	0,173	378,4042	383,39	459,86	257,78	407,918182
1676	208,61	648,18	0,173	377,8108	383,20	459,27	257,46	406,82724
1677	208,55	647,88	0,072	377,2640	382,75	458,76	257,06	406,056793
1678	208,55	646,13	0,173	376,4998	382,17	457,46	256,58	405,055145
1679	208,46	643,16	0,173	375,9262	381,53	455,62	256,21	404,197327
1680	208,16	637,11	0,072	375,0505	380,75	453,76	255,85	403,206848
1681	207,72	631,86	0,072	374,1651	380,49	452,13	255,53	402,89325
1682	207,16	628,92	0,072	373,5946	379,44	450,69	255,17	401,982758
1683	206,60	627,37	0,071	372,7446	378,93	449,37	254,77	401,266693
1684	206,10	627,09	0,071	372,2464	378,25	448,22	254,43	400,55072
1685	205,65	626,74	0,071	371,8043	377,48	447,15	254,04	399,698853
1686	205,21	626,42	0,071	371,3335	377,13	446,20	253,80	399,2052
1687	204,78	627,42	0,071	370,6457	376,38	445,43	253,46	398,419006
1688	204,75	631,73	0,071	370,2233	375,64	444,78	253,01	397,624054
1689	204,94	635,67	0,071	369,4971	375,35	444,21	252,75	397,181183
1690	204,99	638,80	0,071	368,9084	374,10	443,72	252,34	396,213684
1691	205,53	639,45	0,071	368,0988	374,04	443,23	251,87	395,804718
1692	205,02	639,02	0,000	367,3697	373,09	442,81	251,48	395,256348
1693	80,23	75,27	4,972	73,3698	73,44	74,24	73,73	73,5871353
1694	89,38	79,25	4,972	73,4053	73,50	79,71	73,72	73,6633072
1695	117,30	96,02	4,807	73,4937	73,79	97,16	73,78	73,95961
1696	148,50	129,85	4,674	73,7975	74,50	114,83	73,91	74,8434143
1697	207,30	201,30	4,473	74,4590	75,98	133,55	74,20	76,6548386
1698	283,50	353,46	4,272	76,3405	79,11	153,09	74,76	79,7668686

Aging Mansfeld

1699	349,81	452,36	3,873	81,1649	84,73	175,59	75,70	84,9326706
1700	389,80	499,76	3,598	89,7619	93,47	198,41	77,19	92,7846603
1701	457,50	568,08	3,173	101,7395	104,37	228,01	79,31	103,266136
1702	482,35	576,55	2,872	116,8243	117,74	258,14	82,18	116,568642
1703	486,43	577,35	2,474	134,8302	133,15	285,63	85,64	132,228806
1704	476,82	549,24	2,171	153,6883	150,31	323,38	89,33	149,233292
1705	425,37	495,48	2,071	173,4455	167,88	351,78	93,19	167,272675
1706	391,55	461,56	1,974	192,4104	183,37	369,67	97,40	184,713272
1707	369,62	439,96	3,812	208,6216	196,34	382,01	101,69	200,337845
1708	353,29	424,73	1,773	221,6330	207,00	392,67	105,75	213,729095
1709	336,96	409,56	1,773	232,3585	215,66	403,00	109,57	225,115677
1710	326,50	403,33	1,672	241,0433	222,85	413,87	113,04	234,7444
1711	321,29	402,38	1,672	248,3543	228,55	423,32	116,06	242,040558
1712	316,88	401,16	1,572	254,2400	233,22	431,00	119,04	248,298935
1713	309,32	394,95	1,572	259,4297	237,01	439,44	121,84	254,580933
1714	304,51	389,54	1,572	264,0434	240,03	450,71	124,50	259,166046
1715	299,73	385,49	1,471	268,3001	242,60	464,35	127,00	262,367615
1716	294,18	380,04	1,404	271,6208	245,17	478,91	129,31	267,178162
1717	288,26	374,19	1,371	274,9841	247,51	491,51	131,60	270,034882
1718	288,55	373,80	1,371	277,5500	249,73	499,14	133,76	273,103516
1719	290,77	377,86	1,274	279,8017	252,28	502,75	136,07	275,506073
1720	289,90	377,11	1,274	282,3731	255,23	503,29	137,76	276,66864
1721	287,59	375,24	1,174	284,7158	258,62	500,92	139,70	278,996613
1722	284,21	370,23	1,173	286,8550	262,08	497,75	141,67	280,355988
1723	281,43	368,41	1,073	288,9812	265,43	494,71	143,61	280,97522
1724	281,27	368,80	1,073	290,2825	268,76	492,88	145,56	283,240662
1725	280,11	367,66	1,073	291,9792	271,82	492,30	147,30	283,851013
1726	283,02	372,59	0,972	293,0360	274,76	492,12	148,97	284,851929
1727	288,91	379,13	5,399	294,7249	277,23	491,12	150,74	284,993347
1728	280,18	398,28	19,562	296,4268	279,75	498,65	152,62	286,429382
1729	286,25	390,65	19,881	298,3858	282,12	494,67	154,21	286,321014
1730	319,24	464,69	19,679	299,4415	284,03	487,10	155,40	286,210693
1731	366,27	607,15	19,479	299,7138	286,02	480,14	156,41	285,473297
1732	414,71	699,60	19,180	299,4337	288,22	474,04	157,41	284,701752
1733	418,25	645,27	18,879	298,8824	289,99	470,85	158,36	283,188263
1734	411,50	588,51	18,778	299,7224	290,96	472,21	160,15	282,000854
1735	435,52	567,73	18,480	301,4133	291,41	475,52	163,11	281,142029
1736	440,75	554,70	18,379	303,3028	291,79	479,24	167,78	281,089905
1737	456,14	554,91	18,178	307,3128	292,28	481,52	173,85	281,804565
1738	458,23	553,34	17,980	311,0407	292,85	483,50	180,50	284,416901
1739	465,86	563,90	17,679	314,4725	293,43	487,11	187,95	288,848389
1740	461,56	557,32	17,578	317,8854	293,94	490,56	195,09	293,074158
1741	463,66	553,05	17,378	321,5277	294,08	493,53	201,89	295,516571
1742	474,41	563,19	17,179	324,2552	294,45	496,08	208,60	299,101288
1743	497,85	603,17	16,878	327,5167	295,22	498,69	215,25	302,509003
1744	509,10	610,02	16,595	331,9924	296,88	501,08	221,79	308,363983
1745	515,23	611,54	16,378	338,2429	299,08	502,03	228,73	314,934875
1746	525,52	629,15	16,178	346,2716	301,52	502,53	236,09	320,584564
1747	535,96	642,28	15,879	354,2970	304,10	503,25	243,99	327,41684
1748	547,75	656,70	15,578	361,5000	306,86	504,46	251,42	334,898834
1749	555,01	668,75	15,377	369,7334	310,08	506,53	259,27	342,555481
1750	564,08	678,23	15,078	378,3125	313,66	509,15	267,19	350,445374
1751	579,04	705,48	14,777	386,3057	317,53	510,60	275,09	359,632996
1752	584,47	716,30	14,479	395,2514	321,60	512,07	283,16	366,641296
1753	593,28	722,63	14,177	403,2782	325,85	514,43	291,72	376,362305
1754	604,05	736,37	13,876	411,8079	330,23	517,10	300,60	384,013092
1755	614,46	750,54	13,577	420,3682	334,86	520,04	309,52	392,710114
1756	622,29	763,82	13,276	428,9869	339,80	523,48	318,69	402,643158
1757	625,75	772,81	12,978	437,6866	344,98	527,33	327,84	411,078827
1758	628,86	782,85	12,676	446,3786	350,19	531,67	336,81	419,996094
1759	629,94	784,02	12,432	454,6986	355,65	536,79	344,99	430,505402
1760	630,53	786,23	12,079	462,6902	361,21	542,37	352,87	440,239014
1761	631,17	794,89	11,875	471,7932	366,76	548,35	360,47	448,88092
1762	632,20	800,23	11,577	480,3426	372,45	555,08	368,14	459,028229
1763	631,41	800,46	11,276	488,5979	378,43	562,35	374,77	467,588135
1764	628,70	806,11	11,078	497,9983	384,47	569,35	381,65	474,794525
1765	626,92	805,11	10,776	507,4031	390,76	576,71	388,16	483,122833
1766	627,61	813,02	10,575	516,3306	397,21	585,12	394,00	491,559082
1767	626,19	813,94	10,378	525,5915	404,04	594,59	400,42	496,461578
1768	625,23	814,24	10,076	535,5235	411,20	605,56	405,73	506,125916
1769	623,89	814,65	9,875	544,2895	418,74	616,71	410,93	512,507996
1770	623,95	816,37	9,577	552,9611	426,60	627,01	416,41	520,356689
1771	623,98	820,83	9,276	561,6595	434,55	637,27	421,28	527,921997
1772	621,51	819,73	9,074	569,1325	442,65	646,68	426,92	536,121216

Aging Mansfeild

1773	550,30	815,82	8,880	577,2805	449,84	655,15	431,28	542,466187
1774	482,92	868,52	8,776	584,8356	457,16	652,06	436,25	548,10083
1775	448,65	857,52	8,676	592,0988	463,50	641,23	439,86	555,54718
1776	423,19	817,13	8,575	596,9296	470,27	628,57	442,28	562,083496
1777	402,11	783,70	8,475	601,2077	475,16	616,27	444,39	564,784912
1778	384,76	764,36	8,374	602,6545	478,45	605,27	445,57	571,073608
1779	370,54	752,98	8,277	603,4793	481,15	595,41	445,06	573,824768
1780	358,47	748,96	8,277	602,0833	483,18	586,81	445,85	573,957825
1781	348,52	757,07	8,177	600,7979	484,68	579,38	445,46	573,441833
1782	340,56	770,70	8,114	597,9531	485,04	573,17	445,24	575,011841
1783	334,22	781,71	8,076	595,1638	485,03	568,21	443,81	575,867126
1784	329,25	790,59	7,976	591,4957	483,97	565,08	442,32	574,69989
1785	326,19	796,42	7,875	587,5078	483,69	563,46	441,35	572,401245
1786	321,54	776,21	7,875	583,8931	482,47	563,00	439,77	571,079651
1787	316,46	753,24	7,775	581,0264	482,28	561,81	439,04	566,950867
1788	311,37	739,19	7,775	577,7016	481,06	559,45	437,01	563,500366
1789	307,38	742,24	7,674	574,5617	480,49	557,18	435,56	562,541504
1790	305,34	768,37	7,674	570,9623	479,27	555,78	434,02	559,31012
1791	303,20	768,61	7,577	567,2767	478,02	554,80	431,61	556,942932
1792	301,87	762,86	7,483	563,7852	476,58	554,09	430,52	553,872253
1793	300,36	756,44	7,477	561,1193	475,38	553,47	428,94	550,384033
1794	298,59	766,47	7,376	558,3760	474,36	552,99	427,35	547,361084
1795	299,15	781,01	7,374	556,1729	472,18	552,75	425,14	545,658569
1796	297,37	780,17	7,276	552,6792	470,88	552,30	423,70	545,968628
1797	295,42	757,06	7,178	550,6854	469,48	551,58	422,15	543,473755
1798	293,73	746,77	7,175	549,0422	468,42	550,80	420,54	540,571777
1799	292,65	743,76	7,074	548,7203	467,58	549,92	418,36	539,525208
1800	377,97	746,41	7,737	547,1218	467,33	549,14	417,11	538,020386
1801	480,85	852,37	6,676	545,7622	467,52	546,61	416,01	536,061279
1802	393,46	806,99	6,575	545,1637	467,76	541,39	415,00	534,895325
1803	362,85	768,83	6,374	545,2266	468,89	534,86	414,33	534,397461
1804	349,69	753,55	6,255	546,1061	469,84	527,74	414,29	533,514648
1805	340,29	752,84	6,076	546,4550	470,94	520,52	414,56	533,757507
1806	334,07	765,11	5,975	546,7755	472,03	513,41	414,32	535,195496
1807	328,90	780,75	5,875	547,4384	473,64	506,62	414,95	536,409851
1808	324,64	789,93	5,775	547,0157	474,98	500,26	415,23	537,313721
1809	321,31	796,45	5,674	546,6980	476,21	494,48	415,39	538,622742
1810	318,93	801,27	5,574	547,5707	478,34	489,13	415,21	538,546021
1811	316,32	803,93	5,476	547,5118	480,25	484,40	414,10	540,754761
1812	314,32	804,90	5,275	547,0410	482,13	480,12	413,41	542,451416
1813	312,29	804,61	5,275	547,7504	483,88	476,18	413,69	542,261047
1814	309,74	801,81	5,078	547,6890	485,92	472,56	413,63	542,963745
1815	306,55	802,27	5,074	547,3644	487,58	469,17	412,46	546,014648
1816	304,59	809,48	4,974	547,1821	489,00	465,96	411,21	547,082092
1817	303,05	808,31	4,880	547,8970	490,76	462,92	411,21	546,43573
1818	299,38	802,78	4,873	547,7825	492,23	460,04	410,26	547,382507
1819	295,00	816,09	4,776	548,3561	493,70	457,42	409,84	547,890869
1820	291,58	793,63	4,676	548,0779	495,11	455,19	409,10	547,923767
1821	287,00	747,61	4,676	548,0555	495,79	453,20	408,22	547,289124
1822	281,70	707,12	4,676	547,4692	496,47	451,50	407,31	544,929443
1823	276,79	683,62	4,575	546,1973	495,98	450,16	406,00	545,144531
1824	271,71	673,45	4,575	544,9025	495,96	448,98	404,77	545,642578
1825	267,66	669,24	4,565	543,8709	495,27	447,93	403,17	542,707031
1826	264,08	668,32	4,475	542,1240	495,00	446,95	402,79	541,118347
1827	260,40	671,76	4,475	539,3179	493,66	445,89	402,02	539,831604
1828	258,37	702,59	4,475	536,6309	491,80	445,03	400,43	537,574707
1829	257,36	734,72	4,374	534,3339	489,72	444,49	398,96	534,112122
1830	256,71	744,52	4,374	531,2908	487,79	444,26	397,13	532,278076
1831	255,73	744,19	4,374	527,6391	485,48	444,33	395,16	529,863037
1832	254,60	739,95	4,274	524,5183	483,39	444,53	394,78	526,265015
1833	253,67	733,51	4,274	520,5845	480,76	445,01	391,97	524,94165
1834	252,55	725,83	4,274	516,4435	477,97	445,64	390,63	524,115845
1835	251,18	718,33	4,274	513,0839	475,53	446,22	388,26	520,943848
1836	249,29	712,66	4,274	509,3702	472,86	446,70	386,84	518,832886
1837	247,81	708,75	4,173	505,2698	470,98	447,27	385,24	518,223694
1838	246,93	709,53	4,173	502,4769	467,94	448,18	382,94	514,391907
1839	245,65	710,46	4,173	498,9522	465,19	449,44	380,90	511,845245
1840	244,49	710,52	4,173	495,0079	462,90	451,08	379,17	509,379639
1841	243,62	709,77	4,173	491,9150	460,39	452,75	377,80	506,265076
1842	242,58	708,71	4,172	488,4495	458,48	454,32	375,47	502,486816
1843	241,69	709,32	4,076	485,5395	456,38	455,89	372,93	501,515411
1844	240,98	709,44	4,076	481,3533	453,84	457,41	371,25	499,475739
1845	239,92	707,07	4,076	478,5798	451,71	459,08	370,03	496,759796
1846	238,90	701,80	4,076	476,1433	449,35	460,09	367,60	494,610443

Aging Mansfeld

1847	237,52	695,01	3,992	472,8496	447,28	459,98	366,29	492,809723
1848	236,22	692,81	4,075	469,6420	445,12	459,46	364,49	490,575439
1849	235,59	691,21	3,975	466,8215	443,05	458,86	362,32	487,881531
1850	294,69	672,45	3,975	463,9996	441,06	461,31	360,51	486,496765
1851	292,49	535,08	18,080	461,5394	439,21	462,87	358,17	484,403412
1852	301,88	504,28	17,680	459,0340	436,75	462,70	355,98	480,341919
1853	323,30	571,10	17,680	455,6260	432,72	461,54	354,33	477,446259
1854	337,63	603,33	17,579	451,9258	428,52	459,43	352,24	473,0159
1855	341,54	644,76	17,479	447,3227	424,07	456,91	349,73	469,261871
1856	297,83	653,43	17,378	442,1363	419,65	454,29	348,17	465,294434
1857	277,83	627,41	17,379	438,2443	415,12	451,57	346,69	460,012054
1858	265,01	599,08	17,378	433,7198	410,88	448,77	346,03	454,933289
1859	256,17	584,23	17,379	428,9665	406,36	445,82	344,47	450,067596
1860	249,17	575,40	17,281	424,3363	402,14	442,80	343,25	444,629791
1861	243,62	571,39	17,281	419,5529	397,38	439,74	340,89	440,466278
1862	239,21	569,53	17,280	415,1567	393,43	436,59	338,98	435,278351
1863	236,15	568,22	17,181	410,2328	388,60	433,45	337,38	430,018219
1864	233,53	566,42	17,181	405,8684	385,35	430,36	335,24	425,729553
1865	230,94	562,90	17,080	401,7916	381,12	427,35	332,55	420,692535
1866	229,02	557,12	17,080	396,9651	377,02	424,38	330,91	415,403656
1867	226,86	551,78	17,080	392,8580	372,84	421,47	328,18	411,11618
1868	225,08	546,80	17,080	388,4326	369,60	418,70	326,79	407,668457
1869	223,56	543,18	16,979	384,4707	365,68	416,05	324,34	402,510132
1870	222,58	542,43	16,980	380,6481	361,93	413,42	322,37	398,24057
1871	221,34	541,99	16,879	376,8409	358,66	410,80	319,65	393,920349
1872	219,55	539,61	16,879	372,4531	355,55	408,25	317,93	389,963043
1873	218,19	536,29	16,879	369,2925	352,42	405,73	315,84	385,650269
1874	217,00	530,16	16,879	365,8571	349,39	403,18	313,76	382,243134
1875	215,19	524,10	16,779	362,7554	346,00	400,75	311,48	378,675507
1876	213,62	519,94	16,779	359,2470	343,06	398,38	309,50	374,947693
1877	212,14	519,41	16,778	355,6932	340,07	396,14	307,21	370,873077
1878	211,05	520,56	16,764	352,5142	336,95	393,90	305,14	367,116333
1879	210,09	520,09	16,678	348,4604	334,17	391,77	303,32	365,185059
1880	209,06	519,58	16,678	345,5873	331,14	389,71	301,40	361,022705
1881	208,26	520,13	16,618	342,7012	328,62	387,66	299,14	356,508057
1882	207,64	522,77	16,581	339,7203	326,26	385,70	297,22	353,694275
1883	206,99	526,57	16,581	336,8363	323,37	383,83	295,12	351,779907
1884	207,02	531,15	16,581	334,1262	321,09	382,03	293,09	347,894165
1885	207,13	535,35	16,480	331,4416	318,68	380,27	291,25	345,23407
1886	207,00	538,04	16,480	328,3906	315,71	378,60	289,26	342,225189
1887	207,40	542,79	16,480	325,6097	313,84	376,96	287,22	339,753723
1888	207,53	549,04	16,380	323,0382	311,38	375,33	285,36	337,418365
1889	208,69	544,96	16,380	320,6155	308,92	373,72	283,70	333,903015
1890	210,45	543,88	16,279	317,9902	306,81	372,28	281,57	332,646301
1891	213,84	560,95	16,179	316,0278	304,89	370,83	279,66	330,101471
1892	217,01	578,35	16,179	313,8875	303,44	369,54	278,27	328,113403
1893	220,04	589,13	16,078	312,5038	301,82	368,31	276,54	326,118195
1894	220,10	572,91	16,035	311,0842	300,51	367,11	275,02	325,783478
1895	220,13	568,79	15,978	309,3867	299,40	366,03	274,08	325,062592
1896	219,61	568,52	15,880	308,3601	298,25	364,96	273,21	324,165527
1897	220,02	555,25	15,880	306,8764	296,96	364,02	271,66	323,590698
1898	219,29	537,00	15,780	305,7965	295,63	363,07	270,78	322,308899
1899	218,97	542,20	15,780	304,5051	294,72	362,20	269,57	322,459625
1900	219,99	560,55	15,679	303,4108	293,82	361,37	268,72	323,072052
1901	222,00	577,31	15,579	302,4413	292,49	360,61	267,93	321,105255
1902	224,50	599,35	15,579	301,6709	291,67	359,79	267,62	320,451141
1903	227,70	618,24	15,478	301,0374	291,09	359,02	267,24	320,922424
1904	230,85	628,00	15,378	300,1036	290,26	358,24	266,84	321,350922
1905	234,71	629,24	15,277	299,3137	289,22	357,53	266,33	321,755463
1906	238,34	616,28	15,180	298,6817	289,04	356,77	266,08	321,518555
1907	243,42	650,18	15,080	298,6521	288,48	356,07	265,84	322,530365
1908	247,77	681,77	14,979	299,7389	288,33	355,37	266,06	322,76767
1909	248,37	667,23	14,979	301,3689	288,75	354,70	266,23	324,020782
1910	248,51	650,38	14,878	303,5356	288,81	354,10	266,35	323,824738
1911	248,92	651,12	14,778	306,0031	288,70	353,54	266,45	324,396332
1912	249,64	668,80	14,778	308,6765	288,35	352,96	265,70	325,946777
1913	251,19	697,66	14,677	310,6140	288,55	352,49	266,36	323,845184
1914	252,88	716,52	14,580	311,9327	288,44	352,02	266,09	321,849792
1915	253,71	724,37	14,577	312,4679	288,20	351,59	265,61	320,651642
1916	255,59	729,20	14,480	312,3365	287,71	351,16	264,93	320,142212
1917	256,44	733,04	14,479	312,0401	287,00	350,78	264,24	319,469543
1918	257,70	738,88	14,379	311,0255	286,55	350,38	263,57	317,502411
1919	258,86	746,29	14,379	310,0508	286,39	350,04	263,08	315,799438
1920	260,01	753,86	14,278	308,9480	285,85	349,67	262,35	314,601349

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1921	261,45	759,78	14,278	307,7917	285,59	349,34	261,86	315,16925
1922	263,18	765,80	14,178	306,0278	285,23	349,03	260,77	313,085114
1923	264,43	772,87	14,077	304,6821	284,96	348,69	260,17	310,627502
1924	266,57	781,82	14,077	303,4068	284,83	348,39	258,89	310,600677
1925	269,37	789,56	13,977	301,8289	284,69	348,12	257,74	309,287109
1926	271,83	796,42	13,921	300,2954	284,56	347,88	257,67	308,391113
1927	274,14	804,65	13,876	299,1642	284,48	347,68	256,59	306,104858
1928	276,75	815,38	13,876	297,7964	284,75	347,50	255,81	304,19989
1929	278,94	826,55	13,779	296,3263	284,71	347,38	254,73	304,690674
1930	282,13	839,48	13,679	294,8221	284,77	347,28	254,10	304,594421
1931	285,32	851,30	13,679	293,5779	284,83	347,29	253,28	303,945068
1932	289,04	862,89	13,578	292,5009	285,17	347,34	252,80	303,092804
1933	292,69	875,56	13,477	291,2406	285,67	347,44	252,07	302,407959
1934	296,11	890,09	13,435	289,9355	285,45	347,57	251,33	302,063324
1935	300,11	906,21	13,377	289,2031	286,36	347,75	250,48	301,304169
1936	305,04	919,84	13,276	288,3906	287,36	347,94	249,92	300,955078
1937	309,03	936,48	13,176	287,5883	288,15	348,21	249,19	300,503632
1938	314,48	952,26	13,079	286,7708	288,90	348,53	248,39	300,053802
1939	319,59	967,57	12,978	286,1862	290,20	348,90	248,42	299,794495
1940	324,08	981,38	12,978	285,5736	291,22	349,29	247,50	299,625885
1941	327,66	990,41	12,878	285,0472	292,74	349,72	247,31	299,505798
1942	337,03	992,24	12,777	284,5091	294,29	350,20	246,79	299,440765
1943	337,14	890,26	12,604	284,3532	296,26	350,71	246,63	299,496063
1944	333,38	805,36	12,576	284,5829	299,20	351,24	246,67	300,46344
1945	330,07	774,24	12,479	285,8514	303,19	351,74	246,71	302,829346
1946	332,73	820,83	12,278	288,3236	307,59	352,17	247,23	306,164368
1947	336,89	840,84	12,085	291,9760	313,13	352,49	248,32	310,563721
1948	339,26	836,39	11,976	296,6748	319,06	352,77	249,24	315,460876
1949	340,20	837,70	11,876	302,2415	325,04	352,89	250,31	321,182648
1950	341,11	838,29	11,678	308,6209	331,45	352,88	251,13	327,138153
1951	340,46	837,73	11,519	315,2282	337,82	352,73	252,19	333,65918
1952	339,91	832,61	11,377	322,2434	344,56	352,49	253,23	340,198944
1953	338,24	819,56	11,276	329,2333	350,85	352,18	254,50	347,032349
1954	335,67	820,07	11,078	336,5023	356,95	351,91	256,16	353,699066
1955	334,49	824,07	10,978	343,5465	362,89	351,56	257,30	360,225769
1956	333,71	832,55	10,877	350,5388	368,04	351,20	259,34	366,750214
1957	333,24	824,69	10,777	357,6048	373,79	350,86	260,93	373,144318
1958	332,97	818,40	10,575	364,1848	379,06	350,53	263,28	379,633636
1959	332,24	820,90	10,475	370,6211	383,77	350,24	265,37	385,680054
1960	332,73	825,56	10,378	377,1409	388,67	349,99	267,52	391,810638
1961	332,41	824,79	10,177	383,3562	393,48	349,71	269,87	397,778961
1962	332,27	819,34	10,076	389,3675	398,36	349,45	272,22	403,246646
1963	332,80	814,69	9,976	395,2577	402,85	349,24	274,32	408,825531
1964	333,46	809,47	9,775	401,0103	407,21	349,00	276,94	414,206055
1965	334,18	807,70	9,677	406,9039	412,07	348,84	279,28	419,487885
1966	335,42	808,36	9,477	412,4321	416,29	348,72	281,70	424,80014
1967	336,65	812,57	9,376	418,0456	420,78	348,59	283,96	430,122772
1968	338,23	820,61	9,276	423,7860	425,33	348,49	286,13	435,06192
1969	340,29	832,68	9,075	429,0873	429,89	348,37	288,53	440,010193
1970	340,91	837,99	8,877	434,1707	434,41	348,27	290,65	444,644073
1971	339,32	831,88	8,776	438,9614	438,94	348,17	292,80	449,373718
1972	337,41	814,98	8,575	443,8323	443,65	348,09	294,84	454,02121
1973	334,81	798,82	8,475	448,3190	447,95	347,93	296,64	458,424438
1974	331,88	773,46	8,277	452,6174	452,59	347,82	298,99	462,929535
1975	329,57	749,72	8,176	456,9030	456,67	347,72	300,78	467,11496
1976	326,23	737,21	8,076	461,1567	460,12	347,62	302,79	471,16571
1977	323,76	730,95	7,875	465,3463	463,70	347,57	304,81	475,139771
1978	321,99	729,05	7,775	469,4563	467,11	347,49	306,73	478,957977
1979	321,39	734,07	7,577	472,9729	469,84	347,48	309,00	482,994598
1980	320,51	739,24	7,476	476,8118	472,58	347,57	310,94	486,414581
1981	319,11	744,46	7,376	480,1276	475,07	347,89	312,84	490,104065
1982	317,54	753,90	7,240	483,6494	477,56	348,35	314,74	493,365784
1983	316,75	766,72	7,074	486,8480	479,82	348,86	316,87	496,700958
1984	316,15	775,45	7,015	489,9057	482,00	349,40	318,85	500,018005
1985	316,18	782,93	6,877	493,1269	484,19	349,82	320,61	503,168304
1986	316,85	789,54	6,776	495,9234	485,90	350,03	322,57	505,985504
1987	316,71	790,04	6,676	498,9326	488,04	350,05	324,49	508,750732
1988	317,24	791,42	6,575	501,5206	489,98	350,13	326,48	511,374695
1989	317,14	795,19	6,474	504,2705	491,99	350,17	328,41	514,091553
1990	317,62	798,34	6,374	506,9174	493,66	350,21	330,30	516,740051
1991	317,51	802,55	6,274	509,3376	495,91	350,30	331,95	519,143921
1992	317,16	806,22	6,176	511,8731	497,35	350,46	334,07	521,759583
1993	317,16	808,39	6,076	514,4382	498,91	350,59	335,83	524,065002
1994	316,73	809,34	5,975	516,7721	500,93	350,81	337,67	526,434082

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1995	316,86	813,01	5,866	519,0681	502,32	350,97	339,30	528,233765
1996	315,42	813,33	5,774	521,3179	503,87	351,11	341,36	530,197754
1997	314,26	813,98	5,674	523,2086	505,31	351,31	342,86	532,032898
1998	313,16	813,45	5,573	525,3528	507,02	351,54	344,45	534,132385
1999	311,24	812,21	5,476	526,8862	507,91	351,78	345,89	535,732361
2000	309,18	811,40	5,376	528,9807	509,57	352,06	347,41	537,15802
2001	307,41	808,15	5,306	530,4664	510,55	352,44	348,88	538,765991
2002	304,67	805,21	5,275	531,7367	511,46	352,86	350,34	539,68988
2003	302,24	804,66	5,175	533,2263	512,51	353,38	351,64	540,995972
2004	300,40	813,83	5,086	534,9160	513,59	353,92	353,13	541,752747
2005	298,36	820,96	4,974	536,1443	514,34	354,47	354,67	542,294617
2006	296,18	807,13	4,974	537,3397	515,36	355,01	356,00	542,632568
2007	293,69	790,17	4,873	538,4205	516,02	355,60	357,45	542,910522
2008	291,84	776,94	4,784	539,4731	516,67	356,24	358,75	543,250305
2009	289,83	772,32	4,776	540,2222	517,53	356,91	360,10	543,289062
2010	290,20	786,35	4,676	540,9291	518,26	357,60	361,32	543,479248
2011	290,25	794,00	4,575	541,6039	518,94	358,46	362,38	543,613403
2012	290,38	797,04	4,475	541,9188	519,73	359,36	363,68	543,603394
2013	291,57	799,29	4,474	542,2927	520,48	360,29	364,57	543,454773
2014	291,87	799,73	4,374	542,8840	521,53	361,31	365,51	543,500671
2015	291,27	798,60	4,276	543,2578	522,82	362,31	366,16	543,517151
2016	291,07	800,51	4,274	543,9027	524,20	363,32	367,14	543,135132
2017	290,37	805,33	4,173	544,4116	525,48	364,32	367,88	542,985291
2018	289,39	810,17	4,173	544,6111	526,57	365,47	368,44	542,908936
2019	289,12	809,57	4,076	544,8751	527,45	366,66	368,61	542,776855
2020	287,81	806,81	3,999	544,9308	528,74	367,88	368,98	542,593079
2021	286,32	805,73	3,975	544,7903	529,51	369,07	369,25	542,385925
2022	283,96	804,74	3,875	544,6750	530,35	370,21	369,55	542,450439
2023	282,27	804,15	3,875	544,6686	531,11	371,34	369,23	542,247375
2024	280,44	801,28	3,774	544,5673	531,98	372,42	369,78	542,127991
2025	278,89	797,98	3,774	544,7082	532,38	373,53	369,61	541,885803
2026	276,10	794,12	3,774	544,4491	532,45	374,67	369,47	541,820313
2027	273,85	786,32	3,674	544,5057	532,72	375,81	369,23	541,595947
2028	271,16	777,01	3,674	544,4290	533,00	376,94	368,97	541,365417
2029	268,95	771,70	3,587	544,3975	532,69	378,06	368,65	540,815552
2030	266,26	761,84	3,573	544,1895	532,59	379,15	368,45	540,102417
2031	263,72	745,72	3,573	544,0275	531,76	380,26	368,04	539,651184
2032	260,59	733,35	3,573	543,8014	531,90	381,30	367,83	538,8172
2033	258,56	725,01	3,473	543,3983	531,06	382,35	367,26	538,414673
2034	256,44	719,55	3,473	543,0804	530,67	383,37	366,72	537,804932
2035	254,32	715,81	3,473	542,6733	529,73	384,38	366,10	536,888733
2036	252,41	713,71	3,473	542,0010	529,10	385,42	365,47	536,348755
2037	250,40	711,48	3,376	541,3035	528,19	386,37	364,56	535,584412
2038	249,04	709,51	3,376	540,5843	527,28	387,36	363,81	534,543396
2039	247,23	707,59	3,376	539,5381	526,41	388,27	363,09	533,634949
2040	245,81	705,54	3,275	538,4358	525,70	389,15	362,38	532,716125
2041	244,76	703,94	3,275	537,3473	524,48	390,03	361,22	531,792419
2042	243,34	702,76	3,275	536,0511	523,38	390,87	360,68	530,822388
2043	242,19	701,10	3,275	534,8773	522,53	391,74	360,09	529,892456
2044	241,21	698,80	3,174	533,8632	521,69	392,58	359,01	528,927002
2045	239,84	696,75	3,175	532,6492	520,76	393,38	357,87	527,790161
2046	238,92	695,14	3,174	531,2233	519,46	394,20	357,37	526,910767
2047	238,16	693,66	3,174	530,1716	518,65	394,97	356,49	525,244446
2048	237,61	691,95	3,077	529,0444	517,73	395,71	355,54	524,532471
2049	236,44	689,35	3,173	527,5911	516,85	396,45	354,69	523,521912
2050	235,48	687,11	3,074	526,4667	516,06	397,15	353,77	522,593445
2051	234,94	685,60	3,074	525,2459	515,18	397,89	352,98	521,227905
2052	233,84	684,58	3,074	523,9850	514,02	398,48	352,01	520,379944
2053	232,95	683,50	3,028	522,4982	513,49	399,10	350,84	519,078308
2054	232,24	682,71	2,974	521,3030	512,53	399,73	349,87	518,274109
2055	231,15	681,63	3,009	520,1905	511,88	400,30	348,95	516,846985
2056	231,05	680,34	2,973	518,9442	511,14	400,90	348,13	516,023926
2057	230,36	679,17	2,973	517,7013	510,42	401,45	347,09	515,118469
2058	229,42	678,07	2,929	516,6499	509,87	402,05	346,01	513,68988
2059	228,96	676,90	2,873	515,2099	508,85	402,64	344,96	512,712585
2060	228,55	675,91	2,873	513,9928	508,11	403,17	343,99	511,681335
2061	227,57	675,28	2,873	512,6675	507,36	403,73	342,74	510,716614
2062	226,64	674,68	2,773	511,7173	506,77	404,33	341,78	509,297882
2063	226,41	673,88	2,873	510,4330	506,22	404,83	340,88	508,343964
2064	225,60	673,89	2,772	509,3197	505,65	405,36	339,94	507,438965
2065	225,26	674,30	2,772	508,0145	505,03	405,92	338,75	506,531586
2066	224,80	674,08	2,773	506,8325	504,51	406,43	337,68	505,430481
2067	224,70	673,99	2,772	505,7482	503,19	406,98	336,78	504,411133
2068	224,51	674,18	2,772	504,3962	503,27	407,50	335,77	503,273529

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2069	224,06	674,49	2,675	503,1651	502,50	408,04	334,54	502,476105
2070	223,82	674,60	2,675	501,8082	501,62	408,54	333,68	501,425629
2071	223,31	674,71	2,675	500,8585	500,89	409,05	332,69	500,521362
2072	223,11	674,74	2,675	499,8049	500,46	409,54	331,84	499,629425
2073	223,07	674,88	2,575	498,7096	499,86	410,00	330,83	498,636932
2074	222,88	675,30	2,577	497,5037	499,22	410,46	329,93	497,49765
2075	222,65	675,54	2,575	496,2976	498,56	410,91	329,06	496,825897
2076	222,42	675,82	2,575	495,1812	497,55	411,37	327,98	495,815918
2077	221,99	675,80	2,575	494,1935	496,88	411,82	327,12	494,602356
2078	222,15	676,07	2,575	492,9059	496,13	412,29	325,90	493,492096
2079	221,97	676,47	2,474	491,9550	495,35	412,75	325,29	492,855194
2080	221,88	676,19	2,474	491,0517	493,95	413,21	324,24	492,066223
2081	221,77	675,90	2,474	489,8232	493,96	413,65	323,59	490,819397
2082	221,71	676,03	2,474	488,5884	493,09	414,10	322,58	490,318146
2083	221,60	675,97	2,474	487,6245	492,18	414,49	321,43	489,192047
2084	220,80	675,76	2,474	486,4655	491,35	414,89	320,73	488,334473
2085	221,04	675,74	2,374	485,7805	490,78	415,26	319,67	487,414062
2086	221,37	676,25	2,374	484,5640	489,88	415,67	318,76	486,542969
2087	221,51	676,72	2,374	483,5431	489,26	416,09	317,77	485,437225
2088	221,26	676,23	2,374	482,5815	488,44	416,50	317,07	484,78949
2089	220,76	675,60	2,374	481,4530	487,67	416,88	316,15	483,695831
2090	220,25	675,34	2,273	480,6980	486,57	417,20	315,53	483,055908
2091	220,70	675,75	2,273	479,7885	486,23	417,53	314,66	482,296326
2092	220,34	675,88	2,273	478,9935	485,71	417,83	313,83	481,463318
2093	219,98	675,99	2,273	477,8917	485,22	418,17	312,97	480,732605
2094	220,38	676,34	2,173	477,1033	484,49	418,50	312,44	479,611633
2095	220,22	676,80	2,210	476,3883	483,42	418,83	311,56	478,833116
2096	219,74	677,02	2,192	475,6521	482,88	419,10	310,85	478,03891
2097	219,86	677,37	2,173	474,6615	481,70	419,45	309,86	477,388123
2098	220,03	677,33	2,173	473,9191	481,61	419,73	309,18	476,599884
2099	220,02	677,29	2,173	472,9261	480,94	420,06	308,49	475,775146
2100	220,07	677,00	2,173	472,4780	479,97	420,35	307,75	474,831146
2101	219,97	676,67	2,115	471,5117	479,39	420,67	307,02	474,092041
2102	219,64	676,84	2,072	470,8710	478,62	420,95	306,10	473,170166
2103	219,46	677,27	2,072	469,9445	477,71	421,28	305,44	472,56189
2104	219,47	677,37	2,072	469,3959	477,09	421,61	304,70	471,532928
2105	219,62	677,53	2,024	468,6364	476,34	421,95	304,24	470,869904
2106	219,32	677,55	1,975	467,8078	475,81	422,26	303,66	469,953125
2107	219,42	678,02	1,975	466,8098	474,85	422,56	302,91	469,225983
2108	219,07	677,79	1,975	466,2392	473,81	422,87	302,38	468,75238
2109	219,22	677,55	1,975	465,7982	473,33	423,19	301,74	468,06955
2110	219,26	678,52	1,958	465,0450	472,62	423,47	301,09	467,194702
2111	219,40	679,46	1,874	464,3177	471,94	423,74	300,32	466,436798
2112	219,47	679,27	1,971	463,4479	470,75	424,00	299,74	465,692963
2113	219,29	679,67	1,874	462,7309	470,12	424,23	299,11	464,5755
2114	219,14	681,11	1,874	461,8176	469,41	424,38	298,49	464,221954
2115	219,35	683,12	1,874	460,6133	468,85	424,46	297,99	463,522705
2116	219,27	683,96	1,835	460,1194	468,12	424,50	297,33	462,460083
2117	219,43	682,28	1,774	459,6003	467,11	424,57	296,75	461,609894
2118	219,24	680,70	1,774	458,7183	466,71	424,62	296,08	460,960266
2119	219,45	679,91	1,774	458,1564	465,78	424,64	295,65	460,129425
2120	219,07	680,08	1,774	457,4660	465,53	424,68	295,20	459,572479
2121	219,40	680,42	1,774	456,8741	464,37	424,68	294,74	458,741547
2122	219,48	681,94	1,774	456,2292	463,87	424,64	293,83	458,175568
2123	219,81	684,65	1,673	455,8128	462,94	424,55	293,40	457,601501
2124	220,37	686,10	1,673	454,9984	461,87	424,49	292,71	456,69812
2125	220,23	686,39	1,673	454,4055	461,54	424,46	292,17	455,868073
2126	220,17	686,30	1,673	453,8676	461,21	424,41	291,70	455,148163
2127	220,02	684,14	1,673	453,0805	460,14	424,42	290,97	454,627502
2128	220,11	685,37	1,573	452,6453	459,14	424,38	290,49	454,118652
2129	220,66	688,12	1,573	451,9187	458,76	424,30	289,93	453,124908
2130	220,45	689,29	1,573	450,7179	457,75	424,20	289,19	452,519745
2131	220,60	690,16	1,573	450,2506	457,44	424,06	288,56	451,603455
2132	221,06	688,47	1,573	449,7997	456,78	424,01	288,05	451,009094
2133	221,05	686,16	1,508	448,8931	455,71	423,89	287,60	450,33371
2134	221,01	685,66	1,472	448,3024	455,48	423,59	286,98	449,777008
2135	220,92	686,16	1,472	447,5428	454,79	423,03	286,61	448,695465
2136	221,45	687,65	1,472	446,8878	453,54	422,39	285,95	447,882263
2137	221,36	689,34	1,472	446,0857	452,56	421,70	285,59	446,899933
2138	221,98	691,48	1,472	444,9936	451,54	421,09	284,93	446,228302
2139	222,42	692,76	1,372	444,0817	450,15	420,49	284,61	445,574799
2140	222,17	694,77	1,372	443,1046	449,30	419,96	283,90	444,35257
2141	222,75	696,28	1,372	442,2688	447,91	419,42	283,34	443,6633
2142	223,26	696,92	1,372	441,1860	446,86	418,95	282,92	442,757263

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2143	223,70	698,16	1,372	440,4482	445,90	418,51	282,62	441,949738
2144	223,71	696,83	1,372	438,9360	444,76	418,05	282,03	441,141998
2145	223,85	693,68	1,367	438,2630	443,70	417,80	281,60	440,31546
2146	223,86	694,35	1,275	437,1132	442,73	417,77	281,12	439,575073
2147	223,95	696,43	1,275	436,0148	441,47	417,84	280,57	438,841034
2148	224,04	697,82	1,275	435,3731	440,25	417,92	280,12	438,037628
2149	224,68	698,52	1,275	434,3703	439,41	417,97	279,95	436,926788
2150	224,96	698,11	1,241	433,4786	438,37	417,99	279,46	436,459656
2151	225,22	698,09	1,174	432,9742	437,84	418,00	279,15	435,515442
2152	225,42	697,73	1,174	431,8832	436,83	417,90	278,85	435,059479
2153	225,01	697,34	1,174	431,1215	436,37	417,84	278,37	434,003662
2154	224,88	697,21	1,174	430,3563	434,66	417,73	277,89	433,225098
2155	225,15	696,08	1,075	429,3040	434,05	417,60	277,36	432,598999
2156	225,67	697,58	1,074	428,4403	432,86	417,39	276,98	432,430969
2157	225,20	705,37	1,074	427,7151	432,03	417,23	276,48	431,447754
2158	225,26	709,49	1,074	427,1614	431,07	416,98	276,06	430,821686
2159	225,58	711,23	1,074	425,8843	429,95	416,75	275,64	429,763855
2160	225,86	711,53	1,074	425,2469	428,52	416,45	275,53	429,250946
2161	225,88	711,37	1,074	424,3690	427,62	416,13	274,92	428,247101
2162	225,90	711,26	1,074	423,1826	426,60	415,84	274,46	427,39621
2163	226,36	710,65	0,973	422,4432	425,10	415,49	274,04	426,583923
2164	226,77	710,42	0,973	421,6165	424,65	415,11	273,55	425,505768
2165	227,02	710,30	0,973	420,7326	423,26	414,73	273,17	424,640442
2166	226,97	710,29	0,973	419,8105	422,26	414,39	272,78	423,814911
2167	226,95	710,02	0,973	418,8318	421,00	414,08	272,52	422,707489
2168	226,51	709,61	0,973	417,9132	420,07	413,73	272,26	421,531647
2169	226,88	709,01	0,973	417,0225	418,87	413,42	271,61	420,729065
2170	227,04	708,46	0,873	415,9797	418,57	413,12	271,32	419,953125
2171	226,96	707,97	0,873	415,3826	417,35	412,79	270,86	419,072174
2172	226,90	706,92	0,873	414,3009	416,04	412,40	270,48	418,372772
2173	226,73	705,08	0,873	413,7531	415,74	412,00	270,05	417,309235
2174	226,73	703,67	0,873	412,7173	414,72	411,65	269,73	416,524017
2175	226,69	703,22	0,772	412,1698	413,93	411,30	269,37	415,757782
2176	226,40	702,63	0,772	411,0973	413,57	410,95	269,13	414,919586
2177	226,56	702,78	0,772	410,2314	412,01	410,69	268,74	414,090912
2178	226,26	704,35	0,772	409,5758	411,50	410,59	268,22	413,368439
2179	226,32	705,48	0,772	408,7155	410,97	410,58	267,91	412,42926
2180	226,57	705,87	0,772	407,7596	409,87	410,74	267,55	411,775421
2181	226,59	707,78	0,672	407,1525	409,17	411,51	267,14	410,833313
2182	227,00	711,34	0,672	406,3216	408,51	412,66	266,80	410,261627
2183	227,48	714,12	0,672	405,9938	407,50	414,01	266,52	409,687805
2184	227,40	716,11	0,672	405,2964	406,60	415,22	266,21	409,106384
2185	227,82	717,22	0,672	404,5509	405,90	416,08	265,81	408,608337
2186	228,14	717,43	0,672	403,5262	405,12	416,80	265,50	408,057556
2187	227,92	717,41	0,574	403,3361	404,25	417,22	265,18	407,462006
2188	227,97	716,72	0,574	402,6755	403,94	417,48	264,90	406,355164
2189	228,02	714,80	0,574	402,2083	403,09	417,62	264,43	406,025574
2190	228,21	713,61	0,574	401,6562	402,02	417,69	264,15	405,442963
2191	228,18	714,44	0,574	401,0965	401,73	417,70	263,88	404,999664
2192	228,27	715,35	0,544	400,9631	400,90	417,67	263,70	404,387085
2193	228,39	715,39	0,474	400,4473	400,55	417,55	263,46	404,213104
2194	228,37	715,02	0,474	399,8210	400,17	417,44	263,10	403,619843
2195	228,18	714,41	0,474	399,4453	399,59	417,32	262,88	403,056152
2196	228,44	713,83	0,472	398,9268	398,87	417,19	262,47	402,552704
2197	228,01	713,33	0,410	398,9369	398,24	416,97	262,28	402,16095
2198	228,54	713,01	0,373	398,1737	398,08	417,01	261,95	401,568176
2199	228,38	700,27	0,373	398,3357	396,91	417,74	261,75	401,148163
2200	227,18	688,31	0,373	398,1128	397,13	418,67	261,70	400,41571
2201	226,55	683,48	0,373	398,0602	396,55	419,72	261,40	400,421387
2202	225,61	680,83	0,285	398,3393	396,23	420,70	261,14	399,781769
2203	225,16	678,67	0,372	398,3989	395,99	421,37	261,06	399,604584
2204	223,99	677,30	0,273	398,7648	395,69	421,81	260,82	399,358917
2205	223,31	675,40	0,273	399,0125	395,76	422,03	260,77	398,987854
2206	223,29	672,35	0,273	398,9950	394,44	422,01	260,43	398,889832
2207	222,79	669,73	0,273	399,3677	394,41	421,92	260,35	398,54425
2208	222,12	668,01	0,172	399,1391	394,43	421,76	260,23	398,037689
2209	221,63	667,27	0,172	399,1531	393,77	421,55	260,14	398,037628
2210	221,29	666,63	0,172	399,0091	393,36	421,23	260,08	397,63443
2211	221,00	665,96	0,172	399,0461	392,02	420,91	259,80	397,316986
2212	220,46	665,42	0,095	399,3311	391,98	420,47	259,83	396,963257
2213	220,15	665,25	0,116	398,9353	391,04	420,04	259,50	396,660339
2214	219,80	665,47	0,072	398,8033	390,68	419,64	259,34	396,296143
2215	219,46	666,05	0,072	398,4217	390,32	419,17	259,25	395,990326
2216	219,18	666,36	0,072	398,3034	389,64	418,69	259,01	395,52652

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2217	219,28	666,92	0,072	398,1807	389,10	418,17	258,89	394,915558
2218	219,31	667,51	0,072	397,7423	388,35	417,53	258,66	394,610687
2219	219,12	668,04	0,072	397,7843	387,96	416,87	258,71	394,300446
2220	219,43	667,63	0,072	397,1743	387,11	416,22	258,41	394,059814
2221	218,80	662,78	0,072	397,0011	386,33	415,66	258,09	393,764893
2222	218,43	656,18	0,072	396,7622	385,54	414,98	258,22	393,10202
2223	217,29	652,16	0,072	396,3030	385,67	414,33	257,98	392,867767
2224	216,60	651,02	0,072	396,2324	384,61	413,69	257,73	392,525055
2225	215,97	650,45	0,072	395,7167	384,03	413,14	257,48	392,298553
2226	215,82	654,02	0,072	395,6567	383,46	412,62	257,35	392,079071
2227	215,59	657,18	0,039	395,0417	383,12	412,15	257,21	392,021729
2228	77,84	78,15	5,073	78,5188	78,08	78,10	79,68	78,5748367
2229	84,38	80,61	4,973	78,5094	78,08	78,15	79,68	78,6007843
2230	122,27	91,44	4,872	78,5381	78,15	84,28	79,67	78,6342773
2231	140,53	118,47	4,872	78,8042	79,04	90,72	79,81	79,4229584
2232	157,91	130,32	4,775	79,4384	80,79	94,18	80,07	81,5795975
2233	180,40	153,12	4,674	80,3302	83,22	97,95	80,47	84,6878738
2234	197,12	163,73	4,574	81,5821	86,50	103,32	81,06	89,0072632
2235	223,70	185,62	4,373	83,2334	90,64	109,75	81,82	94,8055878
2236	257,26	218,97	4,172	85,4383	95,97	117,23	82,90	102,804642
2237	292,74	257,34	3,974	88,4915	102,43	125,09	84,29	113,444855
2238	305,59	275,68	3,773	92,6613	109,90	138,99	86,15	126,465591
2239	311,13	305,14	3,562	97,7445	118,30	156,75	88,32	140,859375
2240	309,83	347,00	3,374	103,8862	127,45	169,36	90,57	156,464645
2241	330,62	351,75	3,173	110,9296	136,82	184,31	92,83	171,495941
2242	342,72	352,10	2,972	118,4810	146,27	199,32	94,97	185,837555
2243	360,66	381,02	2,771	126,5276	156,00	212,79	97,06	199,561356
2244	401,96	461,48	2,473	135,0989	166,12	227,17	99,30	212,583557
2245	398,77	461,94	2,272	144,9718	176,76	241,36	101,70	225,13385
2246	399,77	457,85	2,071	156,4586	186,76	252,39	104,85	237,91391
2247	393,08	451,81	1,974	168,2717	195,32	262,50	108,94	250,204132
2248	382,34	445,34	1,873	180,0509	202,65	274,00	113,79	261,597198
2249	375,12	432,76	1,773	191,5741	209,10	286,62	118,62	271,725311
2250	365,25	428,20	1,672	202,6506	215,09	300,77	123,19	280,432007
2251	358,12	422,77	1,540	212,4940	220,80	317,15	127,33	287,698792
2252	353,69	418,42	1,471	221,5473	226,36	335,77	131,23	294,646118
2253	348,27	415,57	1,371	229,9304	231,65	355,52	135,23	300,840942
2254	340,88	410,06	1,371	238,0400	236,75	377,41	138,35	306,33963
2255	335,69	404,72	1,274	245,5941	241,41	399,26	141,74	311,317017
2256	335,57	411,15	1,173	252,6284	245,69	418,86	144,68	315,898285
2257	334,78	418,20	1,173	259,3521	249,80	437,95	147,48	319,548004
2258	330,62	418,46	1,073	265,2317	254,02	456,48	149,98	323,093292
2259	324,19	414,19	1,061	270,8543	258,18	473,56	152,78	325,523438
2260	323,02	414,68	0,972	276,0251	262,32	491,42	155,29	328,945618
2261	319,05	410,38	0,972	280,6585	266,44	513,35	157,79	331,438293
2262	324,42	414,87	4,505	284,6961	270,58	534,56	160,52	333,442963
2263	284,89	363,60	14,278	288,5073	274,90	538,09	162,79	335,478455
2264	261,51	314,49	19,680	291,2888	278,59	530,14	164,53	336,481934
2265	257,58	306,29	19,579	292,5258	281,70	522,95	165,98	336,725769
2266	258,80	319,69	19,479	292,9842	285,10	526,07	166,72	335,549072
2267	248,65	295,60	19,381	292,4014	288,58	536,09	167,61	334,126373
2268	244,34	274,45	19,281	291,4944	291,06	538,91	167,85	331,963104
2269	249,07	275,27	19,080	290,2565	292,54	545,44	168,26	329,423096
2270	275,19	318,33	18,879	288,5782	293,17	557,05	168,34	327,506348
2271	285,93	349,83	18,778	286,8466	293,05	575,17	168,30	325,87558
2272	270,46	335,48	18,681	285,6061	292,38	587,24	169,13	324,089111
2273	272,56	346,63	18,580	284,6658	291,37	593,41	170,03	322,545105
2274	287,59	362,89	18,480	283,7887	289,91	596,45	170,50	320,724457
2275	288,63	366,40	18,380	282,7423	288,19	599,34	171,51	319,150787
2276	284,87	366,20	18,279	282,3199	286,32	601,42	172,96	316,530396
2277	308,21	386,22	18,078	282,4101	284,38	596,87	174,06	314,651184
2278	327,90	398,97	17,886	282,5236	282,30	589,75	175,74	312,592834
2279	354,83	431,07	17,780	282,7043	280,32	584,02	178,25	309,984314
2280	372,24	457,10	17,579	283,5512	278,60	580,47	181,01	309,703308
2281	369,85	463,03	17,478	284,4671	277,00	581,87	184,80	309,557434
2282	371,57	462,15	17,378	285,0058	275,41	583,93	188,93	309,681152
2283	390,98	473,43	17,079	285,2763	273,99	582,94	193,25	309,534576
2284	435,00	526,67	16,878	285,4825	273,29	577,96	197,41	310,755432
2285	452,59	553,86	16,639	287,2939	273,68	572,67	202,34	313,543243
2286	460,78	554,72	16,379	291,1058	274,89	568,37	208,40	318,3862
2287	462,14	555,95	16,178	296,9598	276,33	565,82	214,45	324,218445
2288	467,57	563,65	15,977	302,9469	278,11	566,29	221,36	330,673157
2289	480,27	590,58	15,779	309,5427	280,16	565,76	227,33	336,681885
2290	493,04	619,41	15,477	315,8096	282,17	569,42	233,47	342,282837

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2291	504,77	646,49	15,255	321,8418	284,41	582,38	240,39	348,033051
2292	515,30	660,95	14,978	329,4572	286,85	596,59	246,68	353,286072
2293	521,40	671,82	14,775	336,8134	289,56	604,67	253,37	358,894444
2294	528,22	685,03	14,479	345,4891	292,61	608,93	260,48	363,297058
2295	543,80	709,70	14,178	354,3558	295,85	609,65	266,60	369,183319
2296	561,00	735,25	13,876	363,1201	299,95	609,49	274,15	375,269073
2297	572,42	747,11	13,578	371,5180	304,81	608,61	281,54	381,561005
2298	576,57	757,29	13,276	380,4173	310,26	608,47	288,75	388,078247
2299	582,59	768,02	12,979	389,4751	316,18	611,03	296,20	396,258362
2300	587,54	773,32	12,777	398,3901	322,37	613,70	303,68	404,378357
2301	586,24	775,85	12,478	407,2934	328,82	617,68	310,98	413,013763
2302	585,16	781,06	12,177	415,6620	335,47	622,20	319,28	421,733734
2303	584,67	787,52	11,976	424,2177	342,31	627,91	326,03	429,849335
2304	586,90	791,23	11,678	432,6619	349,31	633,91	331,84	438,133575
2305	591,05	796,90	11,376	441,2660	356,39	639,02	339,38	446,50766
2306	592,19	801,52	11,175	449,9983	363,56	643,59	344,57	453,323517
2307	594,98	804,92	10,877	458,7982	370,61	647,54	350,45	461,634918
2308	597,88	809,28	10,676	467,9282	377,65	651,46	357,14	469,766327
2309	599,67	811,48	10,475	477,5780	384,49	656,02	361,83	477,380798
2310	605,84	818,72	10,177	486,7599	391,19	660,26	367,72	485,060913
2311	607,34	818,57	9,875	495,6151	397,80	665,31	373,20	492,437958
2312	607,53	814,55	9,677	504,1039	404,41	673,39	379,50	500,017853
2313	607,06	810,53	9,476	512,8286	411,31	683,68	386,17	506,358337
2314	607,39	811,11	9,275	521,0203	418,44	694,50	390,28	513,937988
2315	607,18	810,95	8,977	529,6712	425,84	706,59	396,35	521,300171
2316	606,32	810,82	8,776	537,6523	433,43	719,41	403,28	528,896118
2317	587,23	799,47	8,474	546,1198	440,30	731,22	408,36	535,406128
2318	492,04	815,97	8,374	554,6787	447,15	718,12	411,64	542,100342
2319	450,82	843,08	8,277	562,7119	453,25	698,60	415,27	548,949219
2320	424,70	840,65	8,176	569,3586	459,36	680,66	419,30	554,99353
2321	403,41	799,28	8,076	574,3171	463,28	664,91	422,36	560,226257
2322	385,72	762,52	7,975	577,9028	467,39	652,45	423,74	564,15155
2323	370,88	741,58	7,875	580,3296	470,86	641,21	425,25	567,135803
2324	358,37	728,67	7,875	581,8176	473,30	631,41	424,74	569,07135
2325	347,29	719,29	7,774	581,6364	475,76	623,23	425,17	570,141968
2326	337,78	713,26	7,677	580,9387	477,52	615,79	425,66	570,638733
2327	329,50	708,04	7,674	579,2783	478,53	608,93	424,99	570,681274
2328	322,01	703,12	7,577	577,6731	479,63	602,50	424,34	569,502747
2329	315,42	699,64	7,577	574,9265	480,19	597,18	423,84	568,798035
2330	310,03	697,32	7,476	572,3480	480,11	592,49	423,04	567,336426
2331	304,81	695,77	7,376	569,2449	480,06	588,24	422,67	565,730957
2332	299,81	694,32	7,376	566,4751	480,07	584,37	421,46	563,648071
2333	295,51	693,41	7,376	563,3242	479,69	581,22	420,52	561,992249
2334	291,79	694,66	7,275	560,0726	479,05	578,56	418,75	559,685913
2335	288,87	695,23	7,275	556,0650	477,90	576,41	417,63	557,542419
2336	286,65	693,94	7,175	553,3329	477,69	574,23	416,42	554,930054
2337	283,90	691,40	7,074	550,1848	476,41	572,00	414,59	552,09552
2338	281,45	689,97	6,974	547,1655	475,84	569,86	413,04	549,095459
2339	279,00	687,55	6,974	543,4678	475,10	567,84	411,78	547,307983
2340	276,85	683,79	6,974	541,2265	474,59	565,72	410,31	544,293579
2341	274,55	686,51	6,877	538,0039	473,94	562,90	408,94	542,594604
2342	273,08	689,48	14,315	535,6758	473,27	559,93	407,62	540,001587
2343	503,56	825,15	6,575	532,7318	473,47	559,99	405,66	537,754944
2344	393,59	820,41	6,374	530,4220	473,77	554,91	403,95	535,837463
2345	354,98	751,84	6,273	528,4824	474,70	548,53	404,02	535,002808
2346	338,39	717,77	6,076	527,7417	476,17	541,80	403,71	534,610596
2347	329,54	716,37	5,975	527,8960	477,84	535,15	403,63	534,338562
2348	322,74	738,20	5,875	528,4045	479,48	528,88	404,29	534,767273
2349	318,19	757,44	5,774	529,2744	481,78	522,90	404,55	536,043701
2350	315,27	759,96	5,674	530,5035	483,67	517,31	404,28	537,277466
2351	312,62	762,10	5,483	531,8865	485,63	512,16	404,26	538,892029
2352	311,08	768,80	5,476	533,3725	488,14	507,41	403,95	540,599731
2353	308,95	776,10	5,375	535,1291	490,05	502,94	403,52	542,295654
2354	306,20	785,39	5,275	536,9260	491,81	498,75	403,05	543,288025
2355	302,51	790,55	5,175	538,6669	493,68	494,93	402,87	544,454834
2356	298,09	753,46	5,174	540,4417	495,74	491,38	402,66	545,403076
2357	292,19	708,70	5,074	541,8001	497,23	488,08	402,03	545,748779
2358	286,43	682,60	5,074	542,0107	498,55	485,26	401,94	546,222839
2359	281,09	666,76	4,973	541,9976	499,97	482,90	401,34	546,402222
2360	275,81	655,19	4,973	541,4915	501,22	480,78	400,25	546,455505
2361	270,72	648,03	4,873	540,2584	502,20	478,93	399,41	546,086731
2362	265,82	643,91	4,873	538,9368	502,51	477,29	398,91	545,473267
2363	261,45	641,55	4,873	537,0143	502,03	475,96	398,09	544,734985
2364	258,13	642,64	4,776	534,7807	501,36	475,27	396,79	543,410706

Aging Mansfeld

2365	254,95	646,79	4,776	531,9960	500,22	475,12	395,96	542,087524
2366	251,88	654,97	4,776	529,1452	498,83	475,39	394,65	539,993713
2367	251,26	695,85	4,776	526,4458	496,67	475,84	393,35	536,613464
2368	252,15	717,90	4,776	522,9982	493,56	476,39	391,86	533,167542
2369	253,10	746,18	4,776	519,7919	491,02	477,02	390,24	529,807129
2370	253,22	754,09	4,733	515,7346	487,41	477,79	388,32	526,794373
2371	253,54	749,16	4,675	511,5803	483,83	478,51	385,86	523,137939
2372	253,35	746,20	4,675	508,1718	479,98	479,22	384,21	519,246704
2373	253,22	743,30	4,675	504,8374	476,39	479,91	382,14	514,846313
2374	252,67	739,61	4,675	500,9442	473,22	480,75	380,04	511,54483
2375	252,23	735,73	4,575	497,1736	469,94	481,25	377,87	508,015289
2376	251,27	731,46	4,675	493,4531	466,82	481,47	376,04	504,828278
2377	250,21	726,58	4,575	489,8607	463,70	481,55	374,51	501,364655
2378	249,33	721,06	4,575	486,5914	460,37	481,53	372,28	498,147705
2379	248,13	715,13	4,575	483,6681	457,80	481,49	370,26	494,724152
2380	246,66	709,60	4,575	480,8243	455,07	481,55	368,22	490,836182
2381	245,22	704,17	4,575	477,5213	453,50	481,61	366,22	488,472443
2382	243,54	699,35	4,474	474,4058	450,87	481,82	364,02	484,416046
2383	241,67	694,76	4,474	471,2882	449,39	482,03	362,27	481,89035
2384	240,62	691,22	4,474	469,5147	447,77	482,22	359,57	477,632477
2385	238,85	686,41	4,474	467,2065	446,37	482,48	357,73	474,587341
2386	237,96	686,33	4,474	464,4517	444,32	482,82	356,31	472,84314
2387	236,87	690,53	4,374	462,4179	442,74	483,41	354,49	468,95752
2388	236,14	692,45	4,374	459,8284	441,15	484,06	352,47	466,799072
2389	287,82	613,62	4,374	457,3918	439,37	484,75	350,70	464,678925
2390	285,61	514,04	18,280	455,3039	437,53	483,39	348,81	463,130157
2391	287,73	461,90	18,079	451,9880	435,41	480,70	346,70	460,285919
2392	313,85	575,96	17,981	449,2380	431,10	477,24	344,80	457,170715
2393	328,46	606,21	17,982	445,6886	426,84	473,31	341,55	452,422119
2394	303,26	593,53	17,881	440,8053	421,46	469,18	340,00	447,16333
2395	273,00	584,90	17,881	436,0336	417,01	464,92	338,57	442,17453
2396	257,07	573,91	17,881	431,5810	412,49	460,80	336,42	437,440033
2397	246,55	559,94	17,881	426,6850	407,01	456,79	334,79	432,403198
2398	238,97	548,18	17,780	421,8687	402,04	452,89	332,99	428,128693
2399	233,23	538,49	17,780	416,7928	396,90	449,10	331,06	423,477692
2400	228,07	529,92	17,780	412,0312	391,93	445,37	328,98	418,836731
2401	223,63	522,53	17,780	407,1108	387,47	441,69	327,03	413,23172
2402	219,97	515,99	17,680	402,3308	383,04	438,15	324,70	408,432068
2403	216,57	508,95	17,680	397,2312	377,96	434,76	323,11	404,330353
2404	213,66	501,81	17,680	393,4926	374,00	431,37	320,97	399,583496
2405	211,19	495,97	17,680	389,1371	369,64	428,12	319,05	395,248535
2406	208,81	490,87	17,680	384,7943	365,72	424,96	316,85	390,601196
2407	206,51	486,29	17,668	380,7905	361,56	421,89	314,86	386,452271
2408	204,41	481,66	17,579	376,7022	357,67	418,95	312,75	382,300049
2409	202,20	477,37	17,579	373,2754	353,74	416,01	310,58	377,462799
2410	200,45	473,35	17,579	368,7917	350,53	413,23	308,49	374,193878
2411	198,58	468,92	17,579	365,2504	346,81	410,53	306,49	370,056671
2412	196,85	464,49	17,562	361,2458	343,11	407,95	304,12	366,43219
2413	195,13	460,01	17,566	357,7459	339,35	405,43	302,09	362,647888
2414	193,72	456,41	17,479	354,3302	336,07	403,02	300,24	359,093567
2415	192,39	452,99	17,479	350,8047	332,70	400,68	298,09	355,503357
2416	190,74	449,29	17,479	347,3778	329,04	398,42	296,36	352,38446
2417	189,29	447,36	17,385	344,0469	326,49	396,15	294,29	348,846985
2418	188,22	446,13	17,378	340,9417	323,54	394,02	292,21	345,72641
2419	186,91	445,07	17,378	337,8112	320,34	391,92	290,31	342,344299
2420	184,67	435,23	17,378	334,6331	317,61	389,86	288,35	339,224243
2421	182,59	411,92	17,375	331,7363	315,18	387,90	286,43	336,298187
2422	180,32	393,22	17,281	328,7989	312,02	385,96	284,44	333,319427
2423	178,00	380,47	17,281	325,6821	309,15	384,11	282,42	330,448303
2424	175,90	371,89	17,281	322,8882	306,75	382,29	280,64	327,589905
2425	173,87	365,78	17,281	320,1226	303,87	380,53	278,92	324,935944
2426	171,95	360,89	17,281	317,6456	301,35	378,81	276,83	322,158813
2427	170,25	356,67	17,181	315,0205	298,72	377,14	275,03	319,604401
2428	168,67	352,97	17,180	312,3816	296,25	375,51	273,20	317,050598
2429	167,14	349,60	17,181	310,1714	294,12	373,92	271,30	314,155151
2430	165,59	346,48	17,180	307,3819	291,87	372,37	269,61	311,618378
2431	164,06	343,62	17,181	305,0733	289,50	370,82	268,00	309,527344
2432	162,63	341,04	17,181	302,8595	286,91	369,37	266,18	306,68692
2433	161,31	338,65	17,080	300,6283	285,18	367,89	264,61	304,41922
2434	159,89	336,60	17,080	298,4057	282,75	366,49	262,99	302,452026
2435	158,81	334,71	17,080	295,9760	280,72	365,13	261,11	300,383606
2436	157,75	332,97	17,080	294,1525	278,46	363,85	259,55	297,136627
2437	156,56	331,14	16,979	291,8526	276,58	362,55	257,95	295,700043
2438	155,74	329,39	16,979	289,9379	274,52	361,32	256,34	293,429565

Aging Mansfeild

2439	154,80	327,78	16,979	287,9184	272,11	360,16	254,77	291,794495
2440	153,80	326,44	16,979	285,8771	270,34	359,04	253,17	289,767944
2441	152,73	324,99	16,979	283,8335	268,58	357,92	251,55	287,619934
2442	151,96	323,28	16,879	281,9261	266,54	356,82	250,05	285,962585
2443	151,26	321,40	16,879	280,5339	265,01	355,64	248,57	283,898834
2444	150,51	319,65	16,879	278,5559	262,97	354,55	247,26	282,473938
2445	149,87	317,93	16,879	276,8783	261,21	353,42	245,67	279,944733
2446	149,01	316,29	16,848	275,1091	259,41	352,35	244,20	278,907166
2447	148,20	314,67	16,778	273,0930	257,76	351,31	242,97	277,341919
2448	147,54	312,80	16,778	271,7995	256,18	350,27	241,42	274,99231
2449	146,93	311,00	16,779	270,1249	254,65	349,27	240,17	274,110809
2450	146,29	309,23	16,778	268,6257	252,97	348,24	238,84	271,976166
2451	145,57	307,62	16,778	267,0414	251,50	347,30	237,49	270,712463
2452	144,91	306,22	16,679	265,0886	249,91	346,37	236,30	269,062866
2453	144,27	304,95	16,678	263,5508	248,24	345,47	234,79	267,973785
2454	143,85	304,05	16,678	262,3029	246,92	344,54	233,62	265,803223
2455	144,99	306,08	16,581	260,9272	245,52	343,71	232,18	264,088287
2456	147,09	319,29	16,580	259,2191	244,35	342,93	231,11	263,358856
2457	149,94	336,61	16,480	258,3253	242,96	342,08	230,12	262,389252
2458	152,29	349,70	16,480	257,2342	241,75	341,27	229,43	261,722198
2459	154,57	355,97	16,453	256,5655	240,82	340,27	229,04	260,936523
2460	155,42	352,17	16,380	255,7797	239,77	339,39	228,73	260,575989
2461	155,83	345,81	16,279	255,0592	239,04	338,51	228,38	259,914764
2462	156,54	341,41	16,279	254,7959	237,90	337,77	227,99	259,855927
2463	157,10	339,58	16,279	254,5378	237,59	337,10	227,61	259,42569
2464	157,63	338,88	16,179	254,3695	237,21	336,46	226,99	259,183197
2465	157,89	336,98	16,078	254,7363	237,09	335,77	226,49	258,606384
2466	157,62	333,71	16,078	254,6822	236,71	335,06	225,68	258,443756
2467	157,07	329,63	16,078	255,0284	236,60	334,37	225,13	258,26123
2468	155,79	325,83	15,978	255,0476	236,30	333,68	224,33	258,229004
2469	154,46	322,72	15,977	254,7196	235,96	333,03	223,62	258,407806
2470	152,91	320,12	15,978	254,4057	235,47	332,45	222,67	258,282349
2471	151,49	318,04	15,880	253,9619	234,88	331,94	221,87	258,423645
2472	150,25	316,06	15,880	253,1845	234,28	331,47	221,16	258,099548
2473	149,06	314,24	15,880	252,3441	233,60	331,05	220,26	257,641235
2474	147,93	312,50	15,779	251,3283	232,75	330,69	219,42	257,419312
2475	146,84	310,72	15,780	250,4486	232,00	330,36	218,56	256,789734
2476	145,81	308,78	15,779	249,6520	231,19	330,01	217,76	256,151611
2477	144,95	306,71	15,780	248,6121	230,26	329,65	216,84	255,523636
2478	144,02	304,85	15,679	247,6234	229,44	329,33	215,91	254,521896
2479	143,22	302,92	15,679	246,6072	228,53	329,00	215,10	253,495712
2480	142,42	301,05	15,679	245,6702	227,76	328,72	214,21	252,688095
2481	141,49	299,36	15,679	244,8475	226,89	328,44	213,39	251,600159
2482	140,81	297,71	15,612	243,6310	225,84	328,16	212,34	250,36348
2483	140,08	296,09	15,651	242,5655	225,16	327,92	211,56	249,193375
2484	139,42	294,65	15,578	241,5865	224,32	327,70	210,70	248,216461
2485	138,68	293,23	15,578	240,6279	223,46	327,48	209,87	247,029587
2486	138,02	291,87	15,578	239,6049	222,66	327,26	208,98	245,923416
2487	137,46	290,51	15,555	238,7721	221,77	327,08	208,06	245,139191
2488	136,96	289,22	15,478	237,8721	221,08	326,89	207,30	243,96344
2489	136,55	288,28	15,478	236,9740	220,16	326,75	206,16	242,933182
2490	136,08	287,62	15,406	236,0144	219,42	326,54	205,45	241,82312
2491	135,64	287,04	15,377	235,1572	218,72	326,30	204,61	240,999039
2492	135,37	286,56	15,377	234,3772	218,03	326,10	203,77	240,193924
2493	134,90	286,06	15,377	233,4127	217,29	325,90	202,95	239,201706
2494	134,40	285,79	15,377	232,7428	216,60	325,79	202,21	238,272522
2495	134,14	285,45	15,277	231,8279	215,90	325,70	201,30	237,120316
2496	133,94	285,08	15,277	231,0635	215,28	325,69	200,64	236,383591
2497	133,71	284,68	15,277	230,4049	214,62	325,63	199,79	235,503235
2498	133,48	284,34	15,277	229,6485	214,03	325,65	199,04	234,76326
2499	133,41	284,01	15,180	229,0492	213,48	325,64	198,30	233,975342
2500	133,32	284,08	15,180	228,4591	212,75	325,64	197,64	233,420105
2501	134,06	284,83	15,180	227,6902	212,31	325,63	196,89	232,619888
2502	135,33	286,98	15,079	227,3114	211,84	325,60	196,11	232,200699
2503	137,33	292,18	15,079	226,9073	211,63	325,38	195,64	231,923569
2504	139,79	299,59	14,979	226,7967	211,47	324,94	195,05	232,062073
2505	142,31	307,82	14,978	226,9900	211,62	324,37	194,54	232,184845
2506	144,97	315,53	14,878	227,5895	211,81	323,69	194,05	232,461014
2507	147,78	323,33	14,878	228,4329	212,40	322,85	193,78	233,106674
2508	149,92	332,77	14,778	229,7693	213,29	321,92	193,40	233,643967
2509	151,28	340,08	14,777	231,7290	214,38	320,86	193,18	234,328354
2510	151,39	343,42	14,677	234,2137	215,36	319,69	192,96	235,108643
2511	151,15	344,81	14,677	236,7497	216,20	318,55	192,68	236,052032
2512	150,62	345,34	14,576	239,5675	216,86	317,40	192,60	236,614365

Aging Mansfeld

2513	149,92	346,06	14,576	242,1791	217,50	316,29	192,41	237,234253
2514	149,52	346,51	14,479	244,8379	218,13	315,31	192,26	238,048355
2515	148,89	346,81	14,479	247,0896	218,59	314,39	192,21	238,536041
2516	148,36	347,11	14,473	249,0291	219,06	313,60	192,15	239,03627
2517	147,80	346,93	14,378	250,6840	219,48	312,95	191,96	239,542938
2518	147,12	345,80	14,298	252,2426	219,74	312,49	191,94	240,083176
2519	146,71	344,50	14,278	253,1694	220,01	312,18	191,74	240,698914
2520	146,22	343,61	14,278	253,9471	220,06	312,03	191,57	241,261795
2521	145,44	342,19	14,177	254,2411	219,97	312,04	191,44	241,507568
2522	144,59	339,85	14,178	254,3662	219,87	312,28	191,34	241,804398
2523	144,04	337,34	14,177	254,3062	219,70	312,72	191,10	241,764297
2524	143,68	334,89	14,077	254,0567	219,52	313,31	190,92	241,465469
2525	143,54	332,87	14,077	253,6837	219,25	314,03	190,74	241,628006
2526	143,19	330,60	13,977	253,1879	218,89	314,81	190,49	241,01825
2527	143,09	328,65	13,976	252,5538	218,60	315,56	190,29	240,905319
2528	142,89	326,71	13,876	251,9460	218,33	316,33	190,14	240,624985
2529	142,91	324,14	13,876	251,5364	218,03	317,06	189,86	240,502563
2530	143,03	321,93	13,876	250,8313	217,79	317,69	189,71	239,863678
2531	143,05	319,77	13,876	250,1561	217,62	318,31	189,36	239,849564
2532	143,06	317,99	13,778	249,5205	217,47	318,84	189,11	239,706589
2533	142,91	316,65	13,678	248,9016	217,27	319,29	188,85	239,553223
2534	143,02	315,65	13,678	248,3458	217,11	319,67	188,64	239,800293
2535	142,91	314,45	13,678	247,8117	217,06	319,97	188,35	239,627182
2536	143,16	313,56	13,577	247,1976	216,99	320,22	188,11	239,53334
2537	143,22	312,52	13,578	246,6534	216,91	320,43	187,86	239,771896
2538	143,29	311,24	13,477	246,1570	216,88	320,63	187,52	239,837875
2539	143,58	310,19	13,376	245,5596	216,93	320,80	187,34	239,753616
2540	143,73	309,23	13,377	245,0490	216,92	321,00	187,12	239,891891
2541	143,83	308,16	13,332	244,5963	217,07	321,16	186,92	239,96936
2542	143,92	307,34	13,276	244,2213	217,12	321,33	186,65	240,044617
2543	143,93	306,51	13,232	243,7515	217,31	321,52	186,30	240,199188
2544	144,16	305,62	13,176	243,3738	217,56	321,76	186,14	240,42868
2545	144,25	305,01	13,078	243,1058	217,89	321,95	185,95	240,602615
2546	144,45	304,62	13,078	242,8145	218,17	322,19	185,69	240,771378
2547	144,57	304,65	12,978	242,5467	218,44	322,40	185,55	240,866653
2548	144,78	304,43	12,978	242,3041	218,80	322,65	185,34	241,264587
2549	145,10	304,24	12,877	242,0854	219,18	322,89	185,13	241,160843
2550	145,20	304,55	12,826	241,8808	219,73	323,12	184,97	241,658798
2551	145,67	304,77	12,777	241,8104	220,25	323,36	184,65	241,955643
2552	145,60	304,88	12,676	241,7058	220,81	323,54	184,51	241,807358
2553	145,66	304,87	12,676	241,5824	221,31	323,69	184,34	242,622299
2554	145,88	305,01	12,576	241,4153	221,97	323,85	184,20	242,766632
2555	146,16	305,28	12,571	241,3012	222,64	323,95	184,06	243,040024
2556	146,50	305,07	12,478	241,2415	223,34	324,08	183,91	243,310471
2557	146,81	305,76	12,386	241,0765	223,97	324,17	183,80	243,728653
2558	146,98	306,25	12,378	241,0856	224,63	324,27	183,67	244,277161
2559	147,07	306,87	12,277	241,0784	225,52	324,36	183,57	244,923843
2560	147,15	307,24	12,278	240,9651	226,31	324,43	183,32	245,391846
2561	147,24	307,54	12,177	240,9712	227,04	324,49	183,30	246,03241
2562	147,43	308,04	12,161	240,9142	227,92	324,56	183,18	246,755325
2563	147,76	309,13	12,076	240,8804	228,69	324,63	182,99	246,929321
2564	147,95	310,31	11,994	240,8516	229,49	324,70	182,98	247,377563
2565	148,22	311,84	11,976	240,8145	230,36	324,74	182,92	248,410522
2566	148,28	312,45	11,875	240,8746	231,03	324,81	182,79	248,643127
2567	148,26	313,86	11,778	240,8794	231,93	324,80	182,69	249,432327
2568	148,65	315,01	11,778	240,8667	232,69	324,79	182,61	249,929153
2569	148,70	315,92	11,677	240,9350	233,56	324,73	182,66	250,823517
2570	148,90	316,79	11,577	241,0425	234,28	324,72	182,69	251,186127
2571	149,25	317,82	11,577	241,1038	235,12	324,69	182,67	252,056946
2572	149,43	318,39	11,477	241,1075	236,00	324,66	182,56	252,884201
2573	149,71	318,78	11,376	241,3617	236,65	324,64	182,65	253,521881
2574	149,94	319,34	11,376	241,4964	237,64	324,66	182,55	254,162994
2575	150,24	320,20	11,276	241,8101	238,48	324,68	182,48	255,079941
2576	150,54	320,91	11,175	242,0496	239,24	324,75	182,44	255,392776
2577	150,99	321,38	11,175	242,3836	240,25	324,76	182,47	256,515228
2578	151,23	321,66	11,078	242,6677	241,25	324,77	182,55	257,118378
2579	151,55	322,14	10,977	243,0572	242,15	324,78	182,54	257,718597
2580	151,74	323,06	10,876	243,2918	243,21	324,78	182,54	258,913422
2581	152,13	323,35	10,777	243,7663	244,15	324,77	182,56	259,728149
2582	152,53	323,91	10,776	244,1297	245,30	324,75	182,52	260,829102
2583	152,93	324,52	10,676	244,4446	246,35	324,75	182,73	261,58548
2584	153,03	325,25	10,675	245,0586	247,52	324,74	182,88	262,732025
2585	153,37	325,83	10,575	245,4182	248,65	324,73	183,01	263,623322
2586	153,44	326,45	10,475	245,8327	249,74	324,73	183,12	264,519196

Aging Mansfeild

2587	153,52	327,01	10,377	246,2168	250,99	324,72	183,18	265,692749
2588	153,70	327,56	10,368	246,7838	252,11	324,73	183,37	266,301453
2589	153,78	328,58	10,277	247,1682	253,20	324,76	183,36	267,262268
2590	153,80	329,71	10,176	247,6529	254,34	324,79	183,51	267,987122
2591	153,91	330,60	10,176	248,1594	255,54	324,83	183,69	269,248596
2592	153,85	331,55	10,076	248,6997	256,66	324,86	183,91	269,859955
2593	153,88	331,98	9,975	249,1052	257,72	324,91	184,07	271,254412
2594	153,80	332,64	9,875	249,6985	259,03	324,99	184,36	271,804413
2595	153,75	333,67	9,774	250,1283	259,99	325,04	184,38	272,676941
2596	153,63	334,20	9,677	250,7285	261,10	325,13	184,56	273,895233
2597	153,68	334,63	9,677	251,3694	262,08	325,22	184,79	274,69519
2598	153,69	335,27	9,577	252,0652	263,23	325,31	184,91	275,639008
2599	153,53	335,66	9,476	252,5826	264,32	325,42	185,14	276,555267
2600	153,60	336,71	9,476	253,2334	265,47	325,56	185,29	277,759827
2601	153,44	337,65	9,376	253,9047	266,53	325,70	185,65	278,357147
2602	153,51	338,01	9,275	254,6088	267,59	325,87	185,92	279,393433
2603	153,44	338,38	9,275	255,2818	268,65	326,00	186,10	280,105194
2604	153,29	338,64	9,175	255,9447	269,80	326,16	186,25	280,9534
2605	153,22	339,60	9,074	256,6932	270,92	326,31	186,60	281,462585
2606	153,14	340,21	9,013	257,3515	271,98	326,46	186,71	282,79892
2607	152,93	341,04	8,977	258,0251	273,08	326,62	187,04	283,692108
2608	152,80	342,10	8,876	258,8433	274,15	326,77	187,20	284,274353
2609	152,66	343,13	8,876	259,5315	275,13	326,90	187,41	285,250305
2610	152,37	343,83	8,776	260,3169	276,36	327,02	187,64	286,136292
2611	152,81	353,61	8,675	260,9494	277,57	327,16	187,96	287,207764
2612	153,04	362,61	8,575	261,8259	278,71	327,18	188,14	287,512695
2613	153,10	358,48	8,575	262,6727	279,86	327,19	188,44	288,323364
2614	152,81	354,24	8,475	263,4410	281,08	327,24	188,67	289,226257
2615	152,49	352,24	8,474	264,2085	282,18	327,35	188,96	290,372955
2616	152,05	351,64	8,374	265,1051	283,40	327,50	189,17	290,889557
2617	151,68	351,02	8,333	265,8923	284,61	327,68	189,42	291,77298
2618	151,46	350,96	8,277	266,5626	285,80	327,87	189,67	292,698853
2619	151,18	350,82	8,262	267,3630	287,03	328,09	189,66	293,49234
2620	151,09	350,43	8,158	268,1496	288,09	328,31	190,14	294,44339
2621	151,08	350,71	8,076	269,1476	289,40	328,52	190,30	294,815857
2622	150,87	351,49	7,975	269,9481	290,66	328,76	190,63	296,184601
2623	150,73	351,87	7,975	270,9981	291,75	329,01	190,79	296,499969
2624	150,67	352,51	7,874	271,8311	292,89	329,27	191,01	297,237854
2625	150,68	353,64	7,779	272,4000	294,09	329,54	191,08	298,574982
2626	150,51	354,24	7,774	273,3049	295,45	329,83	191,39	299,319641
2627	150,53	355,12	7,674	274,3643	296,40	330,15	191,80	299,442535
2628	150,75	355,34	7,673	275,1162	297,64	330,48	191,89	300,834808
2629	150,83	355,84	7,576	276,3831	298,79	330,82	192,11	301,136169
2630	150,93	356,51	7,476	277,1782	300,06	331,16	192,40	301,955048
2631	151,00	357,53	7,476	277,8867	301,13	331,53	192,67	303,166748
2632	151,07	357,70	7,375	279,2812	302,32	331,90	193,09	303,286255
2633	151,14	357,81	7,375	280,2661	303,31	332,29	193,26	304,634399
2634	150,99	358,37	7,275	281,0915	304,34	332,64	193,37	305,870667
2635	151,04	359,19	7,174	282,3318	305,27	333,00	193,80	306,510773
2636	151,13	360,04	7,174	283,2000	306,21	333,35	193,83	307,388123
2637	151,08	361,03	7,074	284,4286	307,21	333,69	194,20	307,880768
2638	150,77	362,21	7,074	285,3410	308,14	333,98	194,54	308,963226
2639	150,90	363,26	6,973	286,2129	309,27	334,26	194,64	310,224487
2640	150,74	364,07	6,876	287,6044	310,19	334,52	194,84	310,839264
2641	150,71	365,27	6,876	288,6471	310,90	334,69	195,41	311,828705
2642	150,36	366,10	6,776	289,8122	312,11	334,92	195,45	312,888092
2643	150,03	366,89	6,776	290,6851	312,99	335,18	195,64	313,730927
2644	149,70	366,72	6,675	292,1020	313,76	335,39	195,84	314,136688
2645	149,61	366,80	6,675	293,1584	314,52	335,62	196,04	315,007782
2646	149,13	367,32	6,575	294,1436	315,30	335,84	196,39	316,206894
2647	148,75	367,25	6,575	295,1830	316,24	336,08	196,69	317,307373
2648	148,17	366,95	6,474	296,3246	316,91	336,32	196,95	318,162201
2649	147,71	367,94	6,474	297,3230	317,79	336,53	197,31	319,286102
2650	147,45	368,27	6,374	298,2758	318,54	336,76	197,59	319,929047
2651	146,98	368,63	6,374	299,4607	319,29	336,98	197,80	320,615662
2652	146,67	368,85	6,273	300,8094	320,07	337,22	198,24	321,114438
2653	146,44	369,03	6,273	301,6844	320,82	337,46	198,39	322,264038
2654	146,33	369,33	6,182	302,7796	321,48	337,72	198,35	323,135315
2655	146,03	370,20	6,176	303,8993	322,10	337,97	198,69	323,923737
2656	145,66	370,83	6,075	304,8130	322,85	338,19	198,86	324,724396
2657	145,52	371,78	6,075	305,9302	323,40	338,38	199,04	325,204559
2658	145,12	372,62	5,975	306,5661	324,14	338,58	199,36	326,3396
2659	145,05	373,21	5,975	307,9552	324,74	338,75	199,44	326,69339
2660	144,94	373,54	5,975	308,8792	325,44	338,92	199,72	327,604797

Aging Mansfeild

2661	144,74	374,21	5,874	310,0883	325,80	339,10	199,87	328,346497
2662	144,54	374,93	5,874	311,0164	326,87	339,24	200,02	329,044556
2663	144,20	375,35	5,874	311,7410	327,22	339,38	200,19	329,577026
2664	144,10	375,85	5,774	312,8936	327,97	339,52	200,38	330,343842
2665	144,05	376,54	5,774	313,5504	328,52	339,61	200,76	330,967407
2666	143,99	377,28	5,774	314,6889	329,02	339,71	200,99	330,97464
2667	144,02	377,69	5,673	315,2558	329,73	339,83	201,04	332,049713
2668	143,72	378,01	5,668	316,4016	330,33	339,94	201,14	332,245483
2669	143,63	378,05	5,573	317,4029	330,84	340,01	201,22	332,919525
2670	143,39	377,72	5,573	317,7686	331,61	340,08	201,48	333,414154
2671	143,25	377,16	5,476	318,5917	331,88	340,19	201,79	334,288544
2672	143,18	376,74	5,476	319,6884	332,51	340,32	201,86	334,604004
2673	143,12	375,97	5,476	320,0967	333,18	340,48	202,00	335,292572
2674	142,95	375,87	5,375	320,9300	333,66	340,62	202,00	335,822845
2675	142,73	376,08	5,375	321,8818	333,82	340,80	202,09	335,897919
2676	142,66	376,35	5,375	322,3166	334,48	340,99	202,40	336,792328
2677	142,50	376,94	5,275	323,1454	335,15	341,15	202,53	336,888519
2678	142,67	376,90	5,275	324,1339	335,42	341,27	202,56	337,205048
2679	142,43	376,92	5,275	324,3570	335,90	341,38	202,73	338,117981
2680	142,13	377,25	5,246	325,3324	336,35	341,51	202,89	338,566956
2681	142,04	377,90	5,174	326,1833	336,68	341,56	202,95	338,634277
2682	141,84	378,11	5,074	326,1902	336,91	341,62	203,01	339,722198
2683	141,84	378,42	5,074	326,9530	337,48	341,67	203,21	339,864166
2684	141,99	378,39	5,074	327,9614	337,72	341,68	203,49	340,07312
2685	141,64	378,59	5,074	328,0629	338,07	341,67	203,55	340,909058
2686	141,58	378,11	4,973	328,8909	338,40	341,68	203,78	341,136749
2687	141,31	378,26	4,973	329,6831	338,65	341,63	203,87	341,308899
2688	141,19	378,25	4,917	330,0599	338,79	341,63	203,88	341,674438
2689	141,05	378,51	4,873	330,5438	339,10	341,61	203,99	342,144989
2690	140,96	378,79	4,873	331,1682	339,19	341,59	204,13	342,43396
2691	140,78	378,83	4,776	331,6441	339,39	341,56	204,15	342,460846
2692	140,72	378,89	4,872	332,0432	339,64	341,55	204,38	342,974213
2693	140,36	378,67	4,775	332,7729	339,94	341,49	204,60	343,568024
2694	140,19	378,75	4,675	333,1225	340,36	341,44	204,56	343,814545
2695	140,19	378,57	4,675	333,9037	340,50	341,40	204,68	343,723206
2696	140,08	378,67	4,675	334,1089	340,50	341,39	204,67	344,5401
2697	139,81	378,99	4,642	334,7865	340,63	341,37	204,67	344,832153
2698	139,62	378,70	4,574	334,8337	340,93	341,35	204,72	344,893524
2699	139,40	378,20	4,574	335,4494	341,25	341,34	204,83	344,966034
2700	139,01	378,01	4,574	336,2219	341,30	341,35	204,93	345,321899
2701	138,87	377,77	4,574	336,2466	341,46	341,32	204,98	345,678833
2702	138,78	377,71	4,474	336,4819	341,79	341,30	205,09	346,149597
2703	138,62	377,47	4,474	337,1711	341,70	341,26	205,22	345,733978
2704	138,26	377,14	4,474	337,3832	341,72	341,20	205,37	346,10141
2705	138,14	376,58	4,474	338,1172	341,75	341,12	205,46	346,353241
2706	137,76	376,16	4,373	338,2157	342,18	341,06	205,55	346,730072
2707	137,51	376,00	4,373	338,7102	341,93	340,99	205,70	346,801086
2708	137,49	375,72	4,373	338,7596	341,95	340,93	205,81	347,172211
2709	137,19	375,27	4,276	339,2536	342,18	340,86	205,80	347,035797
2710	136,86	374,82	4,273	339,6402	342,16	340,79	205,94	347,134674
2711	136,65	374,50	4,273	339,5699	342,20	340,73	205,93	347,403229
2712	136,51	374,25	4,273	339,9502	342,28	340,67	205,97	347,084656
2713	136,26	373,89	4,273	340,0947	342,38	340,64	206,05	347,654541
2714	136,03	373,61	4,172	340,5936	342,56	340,50	206,25	347,510315
2715	135,81	373,08	4,172	340,8099	342,38	340,30	206,30	347,646851
2716	135,60	371,89	4,172	341,1368	342,49	340,04	206,25	347,677643
2717	135,47	370,81	4,172	341,1793	342,40	339,77	206,33	347,675598
2718	135,13	369,90	4,172	341,7435	342,54	339,52	206,44	347,350616
2719	134,99	369,22	4,075	341,5478	342,74	339,25	206,40	347,601227
2720	134,82	368,68	4,075	341,4976	342,81	339,06	206,42	347,808075
2721	134,62	368,38	4,075	341,8482	342,90	338,85	206,42	347,733673
2722	134,39	368,01	4,075	341,4979	342,91	338,65	206,41	347,982178
2723	134,25	367,76	3,992	341,7527	343,27	338,47	206,53	347,76947
2724	134,00	367,64	4,074	341,9068	343,09	338,28	206,56	348,038788
2725	133,78	367,24	3,975	342,2811	343,36	338,07	206,53	347,407776
2726	133,67	367,02	3,975	342,0221	343,36	337,86	206,51	347,67926
2727	133,49	366,80	3,975	342,1374	343,70	337,67	206,53	347,606354
2728	133,34	366,58	3,874	342,0364	343,52	337,49	206,52	347,399628
2729	133,38	366,35	3,874	342,4819	343,75	337,33	206,46	347,235138
2730	133,45	366,15	3,874	342,6837	343,78	337,17	206,48	347,300354
2731	133,28	365,71	3,874	342,5776	343,85	337,04	206,48	346,867615
2732	133,21	365,25	3,874	342,5197	343,78	336,92	206,39	347,03186
2733	133,21	364,74	3,874	342,5313	343,94	336,76	206,31	346,699127
2734	133,23	364,32	3,774	342,5990	344,03	336,68	206,41	346,622498

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2735	133,11	363,98	3,774	342,7801	343,89	336,56	206,50	346,117981
2736	133,07	363,82	3,774	342,6195	343,99	336,45	206,30	346,456085
2737	133,18	363,60	3,774	342,7778	343,92	336,37	206,23	345,959198
2738	133,26	363,41	3,774	342,4377	344,07	336,30	206,22	345,815948
2739	133,13	363,12	3,682	342,5018	344,02	336,16	206,17	345,476444
2740	132,95	362,62	3,673	342,3381	343,85	336,05	206,09	345,327911
2741	133,14	362,24	3,673	342,0623	343,75	335,95	206,03	345,618652
2742	133,14	361,68	3,673	342,1320	343,70	335,83	205,96	344,972473
2743	75,58	73,84	4,872	64,7413	64,40	74,39	65,31	64,7459564
2744	109,53	98,16	4,775	64,9917	64,58	78,08	65,33	64,8503723
2745	220,08	259,23	4,473	65,8873	65,12	87,64	65,52	65,1484146
2746	294,77	697,52	4,172	68,8972	66,71	99,85	66,15	66,2554398
2747	342,95	783,27	3,974	74,7066	69,72	112,06	67,40	69,3531647
2748	363,97	620,34	3,673	82,1544	73,88	128,05	69,16	75,2845001
2749	382,86	553,29	3,472	90,5391	78,98	155,73	71,31	83,4301071
2750	425,37	559,80	3,073	99,7455	84,92	169,58	73,83	93,7192612
2751	471,58	578,34	2,771	109,8212	91,90	176,47	76,78	105,992935
2752	498,84	601,98	2,373	121,4475	101,22	185,62	80,34	119,792229
2753	466,91	564,93	2,172	135,0493	112,27	197,97	84,58	135,740402
2754	461,45	543,58	1,974	149,7543	123,72	212,12	90,05	153,238739
2755	462,11	540,93	1,773	165,0820	135,36	224,76	96,83	171,863174
2756	461,04	540,28	1,572	180,6909	147,17	239,47	104,37	190,863647
2757	453,47	534,63	1,472	196,1373	158,96	259,44	112,18	209,341324
2758	446,76	527,51	1,282	210,9655	170,75	283,14	119,80	227,368713
2759	438,82	524,10	1,173	224,6840	182,44	306,49	127,21	244,715866
2760	433,03	520,85	1,073	237,6113	194,12	329,40	134,01	260,656708
2761	421,42	498,77	10,317	249,6200	205,84	351,25	140,38	275,386932
2762	356,20	382,30	19,780	260,3436	217,10	362,14	145,44	288,553345
2763	335,30	371,07	19,679	268,5184	225,11	368,84	149,36	298,799835
2764	333,26	372,28	19,478	273,5981	230,23	370,01	152,55	305,785767
2765	318,92	369,58	19,381	276,1688	233,22	369,19	154,75	310,192413
2766	307,74	366,17	19,381	277,1536	234,75	368,67	156,90	312,820618
2767	293,88	358,14	19,281	277,3628	235,29	366,25	158,69	313,985168
2768	283,58	353,67	19,281	276,8517	235,28	363,63	160,46	314,514008
2769	272,27	345,36	19,180	275,9870	234,73	362,46	161,86	314,13266
2770	264,91	338,20	19,180	274,7084	233,98	362,93	163,40	313,189209
2771	262,87	336,49	19,079	273,3772	233,03	365,53	164,40	311,649933
2772	267,64	340,97	19,079	271,7371	231,99	368,76	165,26	309,722226
2773	271,52	341,09	18,979	269,7803	230,95	371,28	166,57	307,722931
2774	265,30	339,37	18,979	267,9066	229,89	375,64	167,96	305,37265
2775	302,85	351,57	18,778	266,1908	228,77	387,05	168,87	303,295349
2776	307,01	364,84	23,354	264,2911	227,73	394,47	169,63	300,64209
2777	275,83	350,50	18,580	262,5581	226,73	397,97	170,51	298,001282
2778	255,40	334,89	18,580	260,9300	225,77	406,17	171,51	295,135895
2779	245,17	323,66	18,580	259,0801	224,90	414,79	172,35	292,959137
2780	239,20	315,35	18,480	256,9059	223,98	424,13	173,08	290,452576
2781	235,88	310,23	18,379	254,8819	223,02	433,75	174,14	287,900726
2782	233,67	306,67	18,379	252,8626	222,14	444,76	174,57	285,719543
2783	233,02	305,03	18,363	251,0808	221,15	455,55	174,73	283,182526
2784	241,33	314,75	18,279	249,0538	220,21	460,80	175,39	281,648254
2785	251,98	324,00	18,178	247,0037	219,17	461,29	175,91	280,391479
2786	252,55	321,81	18,078	245,3518	218,22	465,92	176,13	279,697266
2787	276,02	339,26	17,980	243,9092	217,42	477,25	176,50	281,063782
2788	326,13	384,54	17,779	242,4995	217,01	485,68	177,18	282,8349
2789	368,20	448,46	17,578	241,5827	217,56	483,12	178,90	285,548218
2790	370,77	456,04	17,377	242,1410	218,96	478,76	181,50	289,95636
2791	364,63	454,82	17,180	243,6325	220,42	478,60	184,10	295,75177
2792	361,35	456,70	17,079	246,0530	221,69	486,44	186,93	301,986938
2793	356,36	451,29	16,890	248,3295	222,83	497,04	189,47	308,419006
2794	367,67	459,93	16,777	250,3818	223,78	508,64	192,07	314,726379
2795	413,09	500,93	16,479	251,8771	225,03	519,58	194,61	320,37793
2796	465,46	567,56	16,177	253,9625	227,42	521,79	197,57	326,932983
2797	491,54	610,81	15,879	258,0010	231,37	517,80	201,63	334,005951
2798	502,49	626,80	15,578	264,5528	236,54	516,73	207,65	341,852509
2799	508,22	641,52	15,276	272,5819	242,75	520,11	215,05	350,448853
2800	514,70	658,61	15,049	282,2698	249,50	523,18	222,43	358,694122
2801	522,48	662,58	14,777	292,4474	256,60	525,12	229,74	366,997437
2802	540,91	681,28	14,479	302,5910	263,71	529,23	237,69	376,392944
2803	550,67	689,32	14,177	312,6529	270,87	535,58	245,96	385,377533
2804	558,69	705,71	13,779	322,7341	278,02	543,98	254,85	394,769318
2805	563,12	714,13	13,504	332,9826	285,37	553,04	263,58	404,024231
2806	569,38	720,16	13,276	343,0563	292,63	561,42	271,91	412,871033
2807	574,68	729,07	12,978	352,9955	300,22	568,55	281,60	421,570221
2808	580,10	737,14	12,676	363,5455	307,89	574,88	289,97	429,912048

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2809	585,30	748,54	12,297	374,1043	315,76	578,94	297,14	438,019531
2810	590,45	760,16	12,076	384,6147	323,82	581,05	304,65	445,748779
2811	595,25	771,13	11,778	394,9761	332,11	583,47	314,01	455,395111
2812	601,83	780,47	11,476	406,2833	340,63	587,11	321,47	463,353638
2813	609,92	793,14	11,175	417,8296	349,36	591,23	329,14	473,834808
2814	615,67	801,84	10,877	429,7077	358,38	596,23	336,28	483,633789
2815	619,43	810,59	10,575	441,7593	367,67	600,85	345,06	492,250671
2816	619,71	814,52	10,277	453,4648	377,22	604,95	353,75	502,678894
2817	618,93	818,22	9,976	465,8706	386,99	609,79	360,71	512,945068
2818	617,72	821,60	9,677	477,8315	396,76	615,98	368,95	523,817078
2819	618,91	821,24	9,376	489,7758	406,59	623,12	375,55	533,192444
2820	619,36	821,22	9,175	501,0960	416,52	630,72	382,61	542,656128
2821	621,67	822,83	8,876	512,0307	426,41	640,15	389,26	552,021118
2822	622,63	824,14	8,575	523,2951	436,63	650,27	395,80	559,991089
2823	626,57	830,12	8,374	533,1058	446,76	662,07	402,53	569,445923
2824	579,76	817,69	8,076	542,5441	456,12	672,89	409,04	577,239563
2825	499,24	851,19	7,975	552,1248	464,58	664,65	415,87	585,648804
2826	461,92	875,73	7,774	560,6179	473,20	650,74	420,20	593,494507
2827	438,26	888,83	7,774	567,7685	479,53	636,71	423,59	599,661133
2828	417,17	853,61	7,674	573,8493	484,21	623,95	426,16	603,442383
2829	398,92	815,69	7,577	578,8276	488,87	612,74	427,29	605,83606
2830	383,24	783,95	7,476	581,9786	492,30	603,03	428,54	607,952698
2831	369,28	763,51	7,376	583,8483	495,25	594,56	430,17	608,875427
2832	357,83	749,67	7,376	584,9714	496,69	587,38	429,80	608,184448
2833	347,38	739,50	7,275	584,3442	497,72	580,96	429,95	606,949341
2834	338,03	730,44	7,175	584,3425	498,12	575,02	429,46	604,198853
2835	330,10	722,00	7,175	583,7346	498,00	569,68	427,88	601,181824
2836	323,46	714,64	7,074	582,0983	498,37	564,71	427,93	597,613586
2837	317,00	709,04	7,060	580,4938	498,50	560,43	426,51	593,494324
2838	311,55	705,96	6,974	578,2178	497,74	556,85	425,82	587,986145
2839	307,26	701,80	6,973	575,6522	497,02	553,52	424,53	585,457397
2840	303,13	699,51	6,877	573,5012	496,72	550,59	423,29	579,749878
2841	300,49	700,67	6,776	571,1965	494,75	547,19	422,11	576,630554
2842	297,02	699,27	6,776	570,0517	494,40	543,66	421,20	571,356323
2843	293,62	696,56	6,676	567,8128	493,66	540,08	419,57	568,752258
2844	290,04	692,63	6,674	566,3682	492,22	536,17	417,98	564,57959
2845	287,03	684,72	6,575	565,2064	491,67	532,35	417,02	558,885681
2846	283,77	679,38	6,475	563,0773	490,43	529,14	416,17	557,452454
2847	280,94	676,48	6,374	561,8552	490,45	526,01	414,23	554,075439
2848	278,65	672,52	6,374	560,8433	489,07	523,25	413,03	549,344116
2849	276,45	668,29	8,348	559,9285	488,64	520,93	410,89	546,741211
2850	461,20	697,92	6,076	559,1136	487,61	523,02	410,53	544,633606
2851	374,64	774,75	5,933	557,1568	488,00	525,30	408,84	542,335266
2852	345,38	788,72	5,775	556,8475	488,35	522,89	407,82	539,970154
2853	330,99	788,10	5,674	556,6071	489,10	519,63	407,10	536,861145
2854	321,97	787,38	5,573	556,3234	490,24	516,39	405,83	537,289917
2855	315,13	754,87	5,476	555,6576	491,80	513,27	405,89	539,056274
2856	307,95	717,10	5,376	555,3158	493,44	510,47	405,87	539,747192
2857	301,38	693,27	5,376	555,5732	495,08	507,85	404,90	539,736145
2858	295,59	677,47	5,275	555,7328	495,92	505,44	403,40	540,375
2859	291,07	668,97	5,175	555,3140	497,22	503,13	403,45	541,013306
2860	286,39	665,32	5,074	555,2267	497,91	501,11	402,62	541,5401
2861	282,13	661,10	5,074	554,4828	498,77	499,21	401,87	542,505432
2862	278,48	664,24	4,974	553,1677	499,45	497,24	401,54	543,016846
2863	275,28	672,25	4,974	552,5568	500,21	495,24	400,76	542,707642
2864	271,86	658,97	4,873	551,3456	500,25	493,36	399,43	542,571228
2865	267,76	647,60	4,776	549,8799	500,27	491,55	398,40	541,900635
2866	263,56	639,86	4,776	548,4192	500,32	489,84	397,80	542,124451
2867	260,20	634,73	4,776	546,4481	500,02	488,12	396,65	542,194824
2868	256,01	632,71	4,676	544,7168	499,76	486,25	395,36	540,797485
2869	252,49	634,25	4,676	542,0316	498,41	484,36	394,08	539,777954
2870	250,06	641,94	4,676	539,5961	496,97	483,00	392,96	538,838989
2871	248,28	652,50	4,676	535,2961	495,21	482,17	391,39	537,643494
2872	247,00	658,91	4,575	532,4329	492,69	481,61	389,97	534,330444
2873	245,70	661,90	4,575	528,4256	490,31	481,19	388,24	531,918945
2874	244,34	663,01	4,575	524,0287	487,44	480,60	386,45	529,074707
2875	244,41	680,70	4,575	519,5234	485,35	480,12	383,94	524,80249
2876	246,74	722,39	4,562	515,1342	481,59	479,84	382,35	522,109558
2877	249,21	747,28	4,575	510,7212	478,25	479,69	380,25	518,520813
2878	251,66	756,71	4,475	504,3142	474,29	479,69	378,27	515,299072
2879	254,16	760,42	4,474	501,3263	470,27	479,69	376,27	510,684265
2880	255,66	761,28	4,474	497,0110	466,34	479,83	374,55	506,854523
2881	256,98	759,26	4,374	492,5847	461,65	479,96	372,18	502,746094
2882	257,84	756,47	4,374	487,9138	457,90	480,01	370,84	500,428955

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2883	257,39	751,16	4,374	484,1487	455,27	480,02	368,57	495,814056
2884	323,19	717,24	4,274	480,5946	451,44	482,90	366,36	492,52475
2885	284,26	594,88	4,273	476,5743	448,07	486,69	364,20	488,704559
2886	264,47	596,27	4,274	473,1773	446,29	487,53	362,03	486,101074
2887	295,14	580,08	18,460	469,7668	444,11	486,08	359,88	483,654907
2888	301,51	494,44	18,280	466,9293	442,65	483,82	358,08	481,568115
2889	338,35	623,80	18,178	463,1458	438,71	481,39	355,56	479,407532
2890	357,36	650,35	18,079	458,5027	433,90	478,90	353,46	476,045837
2891	371,18	671,90	17,881	454,0439	428,81	476,91	351,57	472,345093
2892	324,28	668,01	17,881	448,7672	424,63	476,22	350,16	467,119446
2893	297,77	666,43	17,881	444,5669	419,22	475,24	349,02	462,053925
2894	282,19	646,33	17,780	439,5588	415,60	473,50	348,41	458,561432
2895	271,97	630,78	17,780	434,5789	410,88	471,10	347,60	453,569366
2896	264,51	618,93	17,680	429,5767	406,20	468,29	346,06	449,026428
2897	257,97	607,59	17,680	424,6237	401,34	465,25	344,13	444,085937
2898	252,68	597,24	17,680	419,7125	396,35	462,10	342,18	439,475464
2899	247,75	588,03	17,579	415,1967	392,30	458,85	340,14	433,115936
2900	243,70	580,53	17,579	410,0656	387,91	455,67	337,87	428,408844
2901	240,15	574,03	17,579	405,3496	383,90	452,61	336,05	423,604889
2902	237,04	568,23	17,579	400,9831	379,36	449,62	334,08	418,185944
2903	233,82	563,46	17,479	396,1171	375,36	446,78	332,14	414,221863
2904	231,24	559,72	17,479	391,6579	370,63	444,01	329,80	409,388367
2905	229,09	555,73	17,479	387,5479	367,16	441,37	327,44	404,079651
2906	226,67	551,24	17,378	383,4777	363,49	438,82	324,92	398,956268
2907	224,95	546,32	17,378	379,3235	359,96	436,31	322,80	395,863342
2908	223,30	543,11	17,378	375,3725	355,85	433,94	321,12	391,848389
2909	221,67	541,45	17,367	371,8827	352,69	431,73	318,64	386,777161
2910	220,05	540,15	17,281	367,9357	348,89	429,58	316,87	383,762238
2911	218,71	539,37	17,257	364,5083	346,01	427,44	314,43	379,802795
2912	217,69	539,51	17,181	360,6994	342,94	425,45	312,14	375,883057
2913	216,90	538,06	17,180	357,4968	339,36	423,55	310,57	372,878448
2914	215,59	536,20	17,080	353,8630	336,15	421,67	308,90	369,127472
2915	214,66	535,60	17,080	351,2709	333,38	419,88	306,61	365,398041
2916	214,23	537,41	17,080	348,3324	331,12	418,09	305,02	362,124939
2917	213,36	539,13	16,980	345,2681	328,04	416,33	302,75	358,567383
2918	212,83	541,97	16,980	341,9174	325,32	414,59	300,99	355,950897
2919	212,64	545,99	16,945	338,9270	322,75	412,96	298,94	353,332825
2920	213,09	549,97	16,879	336,2624	320,08	411,43	297,01	349,780823
2921	213,18	554,49	16,879	333,3981	317,14	409,86	295,30	346,825104
2922	213,61	559,32	16,778	330,9765	314,37	408,34	293,45	343,845367
2923	214,28	565,00	16,779	328,5886	312,34	406,85	291,74	340,960358
2924	215,27	572,30	16,778	326,5522	310,08	405,40	290,04	338,501116
2925	217,14	581,34	16,678	324,0460	307,91	404,02	288,17	335,866577
2926	221,71	591,89	16,581	321,7468	305,63	402,68	286,88	333,663849
2927	226,80	612,44	16,480	319,4127	303,71	401,39	285,33	332,062439
2928	234,46	636,96	16,379	317,7456	302,23	400,14	284,05	329,943542
2929	239,64	648,66	16,279	316,9296	301,07	398,93	282,88	328,993011
2930	241,46	644,49	16,179	316,3563	300,05	397,68	282,11	328,087158
2931	240,95	641,79	16,178	316,2100	299,20	396,50	281,55	327,713654
2932	241,27	654,68	16,078	316,0256	298,24	395,36	281,62	327,60202
2933	241,02	657,17	15,978	315,9965	297,18	394,31	281,28	327,226471
2934	243,12	658,23	15,978	315,1763	296,16	393,31	279,90	327,43045
2935	245,90	671,47	15,880	314,3156	295,10	392,48	279,39	327,113525
2936	248,41	686,53	15,780	313,8610	294,18	391,80	278,62	326,194702
2937	252,27	687,33	15,780	313,2504	293,41	391,25	278,40	325,30658
2938	256,48	702,66	15,579	312,8774	292,70	390,64	277,87	324,785217
2939	259,92	719,79	15,478	313,1964	291,87	389,95	277,52	323,709137
2940	262,67	731,09	15,478	313,8423	292,03	389,22	277,20	323,543121
2941	265,15	737,34	15,378	314,8418	291,98	388,49	276,95	323,131439
2942	267,39	742,06	15,277	316,4831	292,08	387,84	276,36	322,884277
2943	270,08	747,86	15,180	317,7329	292,46	387,17	276,22	322,928741
2944	272,57	751,96	15,079	319,2350	292,52	386,47	275,82	323,636261
2945	276,08	757,65	14,979	320,5666	293,11	385,80	275,37	324,331177
2946	278,71	764,86	14,878	321,9660	293,69	385,24	274,73	325,657013
2947	282,10	770,32	14,778	322,9743	293,98	384,85	274,40	326,602051
2948	286,73	779,45	14,677	324,3106	294,61	384,50	273,68	328,14505
2949	288,89	776,64	14,577	325,7730	295,56	384,21	273,67	329,356598
2950	289,86	763,73	14,479	327,0865	296,15	383,94	273,42	331,351959
2951	290,72	760,04	14,279	328,8983	297,14	383,57	274,05	333,338074
2952	292,21	754,48	14,178	330,6234	298,15	383,16	274,85	336,084778
2953	293,28	754,96	13,977	332,9030	299,61	382,69	276,61	339,154114
2954	295,92	764,16	13,895	335,6953	301,01	382,16	278,57	342,433716
2955	296,89	757,56	13,779	338,7425	302,21	381,59	281,24	346,370667
2956	297,65	745,87	13,678	342,1676	303,87	380,92	284,26	350,670959

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2957	297,44	811,73	13,518	345,6350	305,23	380,05	287,14	354,671417
2958	307,86	964,85	13,478	348,8151	306,93	379,03	290,04	358,200592
2959	318,33	934,06	13,276	350,9487	307,69	378,11	292,07	360,718231
2960	318,37	835,40	13,266	352,2280	309,45	377,34	293,18	362,099335
2961	315,34	772,53	13,079	353,3211	310,65	376,70	294,04	363,75589
2962	314,31	751,67	12,978	354,1917	312,92	376,06	294,92	366,026642
2963	316,78	779,46	12,777	355,6169	315,42	375,37	296,35	368,334991
2964	320,16	804,16	12,677	358,2447	319,08	374,49	297,82	371,218323
2965	320,72	794,83	12,479	361,9487	323,12	373,51	298,83	373,972046
2966	320,86	785,42	12,353	365,8461	327,62	372,39	300,54	377,68158
2967	321,49	783,46	12,177	370,4073	331,94	371,27	302,39	381,395874
2968	321,44	787,93	11,977	375,5372	337,24	370,16	303,41	385,591888
2969	321,71	789,89	11,876	380,2094	341,91	369,14	305,49	389,668488
2970	323,04	790,97	11,779	385,5823	346,85	368,12	307,06	393,774017
2971	323,85	797,84	11,579	390,0344	351,75	367,19	308,53	398,73941
2972	324,62	805,04	11,477	395,4653	356,68	366,33	310,66	403,592163
2973	324,37	806,59	11,276	401,2988	361,19	365,53	312,29	408,30127
2974	326,12	813,41	11,176	406,0891	365,41	364,87	313,97	412,184784
2975	328,11	822,99	11,078	411,3900	370,33	364,23	315,81	416,744934
2976	331,07	837,75	10,877	416,2681	374,52	363,56	317,25	420,641571
2977	333,41	850,04	10,777	421,5603	378,88	362,91	319,14	425,532043
2978	335,82	859,74	10,576	426,5124	383,16	362,27	320,53	429,510406
2979	337,95	866,73	10,475	431,4600	387,86	361,66	322,08	433,858215
2980	339,45	868,12	10,278	436,4657	392,23	361,09	323,15	438,366028
2981	340,58	866,26	10,177	441,5526	396,90	360,51	324,47	441,673889
2982	341,58	865,91	9,976	445,9650	401,23	360,01	325,78	446,278107
2983	342,77	866,97	9,875	450,6577	405,92	359,52	326,96	449,614624
2984	344,08	864,50	9,710	454,9688	410,85	359,08	327,97	453,468445
2985	343,79	860,37	9,577	458,9003	415,30	358,68	329,12	457,651154
2986	343,79	858,10	9,477	463,6587	420,02	358,29	330,08	461,397888
2987	344,37	858,74	9,276	467,9556	425,04	357,90	331,77	465,760712
2988	344,71	857,99	9,175	472,2367	429,51	357,63	333,12	468,485474
2989	346,03	856,85	8,977	476,0766	434,01	357,36	334,61	473,632202
2990	346,31	854,20	8,877	480,4248	438,30	357,20	335,49	476,299896
2991	346,87	853,60	8,676	484,3316	443,22	356,99	336,71	479,421478
2992	348,07	853,26	8,475	487,7575	447,65	356,86	337,90	482,923676
2993	348,22	851,11	8,375	491,6942	452,38	356,81	338,92	486,541138
2994	348,62	847,89	8,177	495,0283	456,91	356,87	339,89	489,930237
2995	348,27	844,58	8,076	498,8546	461,52	357,00	341,00	492,595703
2996	347,11	840,18	7,875	501,9829	466,09	357,11	342,11	496,348755
2997	346,26	837,17	7,775	505,5357	470,54	357,09	342,95	499,237335
2998	344,30	831,99	7,577	508,8831	474,61	357,04	343,76	502,562012
2999	341,79	826,72	7,443	511,8240	478,51	357,03	345,09	505,461853
3000	341,19	828,05	7,276	515,0104	481,95	356,98	345,81	508,307312
3001	340,52	827,35	7,175	518,1845	485,56	356,92	347,53	510,681122
3002	339,32	826,28	6,984	521,0594	489,20	357,01	348,49	513,040466
3003	338,58	828,55	6,877	523,5804	491,94	357,04	349,75	515,659363
3004	336,78	827,83	6,774	525,8845	494,88	356,74	351,05	518,126953
3005	335,21	825,71	6,576	527,8519	497,28	356,36	351,74	520,663818
3006	333,19	820,19	6,475	530,5746	499,91	355,96	352,76	522,872742
3007	331,71	816,88	6,374	533,1938	502,59	355,60	353,94	524,991943
3008	329,92	817,54	6,274	535,3607	505,02	355,29	354,79	527,160583
3009	328,25	819,88	6,177	537,7356	508,02	355,05	355,43	530,091309
3010	327,63	824,60	6,076	539,6597	510,27	354,81	357,05	531,99408
3011	326,88	829,26	5,976	541,3478	511,77	354,63	358,42	533,682007
3012	326,82	840,69	5,875	542,9298	512,69	354,55	359,84	535,537903
3013	326,57	845,27	5,774	544,7108	514,03	354,50	361,09	537,697876
3014	326,34	847,39	5,666	546,5895	515,61	354,54	362,75	539,23468
3015	325,60	848,26	5,574	548,3472	516,93	354,66	363,33	540,781738
3016	325,71	849,64	5,377	549,0236	517,43	354,89	363,90	543,325989
3017	325,34	852,65	5,376	550,2875	518,85	355,30	365,60	545,54657
3018	325,00	852,05	5,175	550,7716	519,53	355,76	367,21	547,573669
3019	324,66	845,43	5,075	552,4385	520,03	356,37	368,15	548,157288
3020	323,17	837,75	4,974	553,6880	521,17	357,02	369,76	549,977051
3021	322,42	826,67	4,874	554,2412	521,79	357,73	370,91	551,400818
3022	320,67	821,23	4,791	554,4577	521,70	358,54	372,50	552,847534
3023	319,89	816,44	4,776	555,2644	522,77	359,38	373,64	553,908264
3024	317,76	812,36	4,676	555,9478	523,46	360,31	374,49	555,055054
3025	315,93	809,13	4,575	556,4773	523,29	361,36	376,31	555,896423
3026	313,42	804,55	4,475	557,0381	523,43	362,40	377,44	556,799011
3027	310,86	800,80	4,374	557,6000	523,37	363,49	378,81	557,57666
3028	308,97	806,74	4,375	558,2737	523,87	364,60	380,00	558,264526
3029	307,38	811,94	4,274	558,5507	523,98	365,79	381,37	559,269348
3030	305,32	814,42	4,173	559,4384	524,19	367,01	382,44	559,463013

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3031	302,99	817,19	4,173	559,4910	524,12	368,19	383,12	559,909729
3032	301,10	815,68	4,076	560,0537	524,70	369,36	383,78	559,991516
3033	298,27	805,61	4,037	559,8858	525,36	370,53	384,55	560,03949
3034	295,32	796,85	3,976	559,7144	525,91	371,67	385,44	560,186035
3035	292,34	785,96	3,876	560,2951	525,44	372,76	386,56	560,755371
3036	289,16	776,15	3,875	560,5680	526,14	373,78	387,15	560,360229
3037	286,22	767,13	3,875	560,6842	526,34	374,73	388,02	560,29541
3038	283,17	755,66	3,874	560,1798	526,17	375,59	388,71	560,397278
3039	279,76	732,13	3,775	560,7448	526,30	376,45	388,38	560,618225
3040	276,08	714,69	3,775	560,5762	525,94	377,20	388,86	560,437561
3041	272,31	705,62	3,674	559,9901	525,99	377,93	388,84	560,289734
3042	269,11	700,10	3,674	559,9259	525,52	378,60	388,85	559,677246
3043	266,05	696,06	3,674	559,6404	525,51	379,21	388,50	558,515076
3044	263,92	694,04	3,574	558,9487	524,94	379,80	387,76	557,603271
3045	261,45	690,58	3,574	558,2650	524,52	380,40	388,28	557,324951
3046	259,30	686,97	3,574	557,9446	524,22	381,01	387,89	556,006958
3047	256,90	684,61	3,574	557,5116	523,56	381,66	387,25	555,398315
3048	254,78	682,76	3,473	556,5778	523,17	382,29	386,29	553,984314
3049	252,59	681,68	3,473	555,7412	522,66	382,94	385,83	552,679077
3050	251,17	680,72	3,473	554,8969	522,39	383,60	384,79	551,761353
3051	249,39	679,41	3,376	553,9044	521,60	384,26	384,26	550,364746
3052	248,07	677,80	3,376	552,7173	520,86	384,94	383,90	549,159607
3053	246,76	676,21	3,376	551,9229	520,09	385,61	382,92	548,243835
3054	245,29	673,56	3,376	550,8159	519,60	386,30	382,08	547,083984
3055	243,96	671,89	3,275	549,4849	518,68	386,96	381,38	546,133118
3056	243,04	670,74	3,370	548,8586	517,74	387,61	380,71	545,142578
3057	241,87	669,35	3,276	547,8088	517,29	388,24	379,34	544,146118
3058	240,54	667,78	3,276	546,0758	516,52	388,84	378,04	543,710205
3059	239,69	666,33	3,275	545,8023	516,28	389,42	376,88	542,142395
3060	238,88	665,07	3,220	544,3863	514,96	390,01	376,22	540,557739
3061	238,04	663,87	3,175	543,6425	514,73	390,58	375,00	539,449463
3062	237,05	662,79	3,175	542,2473	513,94	391,15	373,40	538,948853
3063	236,19	661,85	3,075	540,9476	512,96	391,67	372,86	537,522034
3064	235,43	660,65	3,074	540,1721	512,62	392,23	371,42	536,5177
3065	234,36	659,19	3,075	538,9592	511,57	392,81	370,21	535,074158
3066	233,74	657,82	3,075	537,4143	511,46	393,34	369,58	533,796631
3067	232,75	656,48	3,074	536,3880	510,57	393,87	368,56	532,65564
3068	231,99	655,22	3,075	535,7330	509,59	394,35	367,04	531,379089
3069	231,46	654,30	2,974	534,4056	508,91	394,88	366,04	530,833862
3070	230,06	653,13	2,974	532,5762	508,08	395,34	365,40	529,745239
3071	229,47	652,30	2,974	532,3242	507,68	395,79	364,68	528,231934
3072	228,91	651,83	2,974	531,1283	506,95	396,24	363,27	527,191284
3073	228,30	652,46	2,874	529,8828	505,87	396,66	361,91	525,985962
3074	227,82	654,40	2,874	528,7272	505,38	397,07	360,73	525,025879
3075	227,77	655,07	2,874	527,8700	505,37	397,42	359,55	524,186157
3076	227,36	655,64	2,873	526,8470	504,12	397,82	358,94	522,710693
3077	226,94	656,21	2,873	525,7072	504,28	398,13	357,48	522,134033
3078	226,82	656,62	2,824	524,4188	502,98	398,37	355,92	520,555115
3079	226,37	656,20	2,773	523,6310	502,50	398,65	354,79	519,042236
3080	226,45	655,36	2,773	522,6430	501,77	399,04	353,80	517,554443
3081	226,23	654,60	2,773	521,1811	501,14	399,45	353,23	517,016785
3082	225,87	654,36	2,759	520,4711	499,82	399,85	352,07	515,277588
3083	225,41	654,38	2,676	519,6620	498,99	400,25	350,89	514,307922
3084	225,47	654,01	2,676	517,9527	498,73	400,60	349,29	512,950195
3085	224,85	653,30	2,676	516,6086	498,45	400,95	348,16	512,576721
3086	224,81	652,37	2,676	515,2418	497,37	401,30	346,99	511,689789
3087	224,88	651,97	2,675	512,7333	496,92	401,67	346,00	511,380127
3088	224,13	651,09	2,575	511,5309	496,47	401,98	344,42	509,664825
3089	223,43	651,76	2,575	510,8213	495,44	402,40	343,60	508,114716
3090	223,08	652,94	2,575	509,2895	495,01	402,95	342,20	506,923584
3091	222,91	653,71	2,575	508,2756	494,81	403,46	340,11	505,653137
3092	222,87	653,73	2,575	508,2295	494,25	403,97	340,00	504,374542
3093	222,33	653,46	2,474	508,0762	493,68	404,47	339,06	502,498016
3094	222,09	653,26	2,575	505,8085	492,87	404,88	337,48	502,262634
3095	222,03	653,27	2,474	504,8901	492,00	405,26	336,46	501,02948
3096	222,15	653,68	2,474	504,1331	491,50	405,67	335,25	500,289429
3097	221,83	653,88	2,474	502,4754	490,25	406,15	334,59	499,396637
3098	221,85	651,71	2,374	501,1836	489,69	406,62	333,01	498,582153
3099	221,82	650,22	2,474	500,2900	488,58	407,11	332,28	497,255188
3100	221,46	649,17	2,374	499,6964	488,56	407,54	331,02	496,181763
3101	220,83	648,33	2,374	498,4414	487,30	408,13	330,14	495,447754
3102	220,42	647,47	2,374	497,5856	486,99	408,60	329,12	494,375214
3103	220,34	646,67	2,374	496,8801	486,06	409,06	327,86	491,921631
3104	219,88	645,96	2,347	496,7702	485,84	409,43	326,82	491,42984

Aging Mansfeild

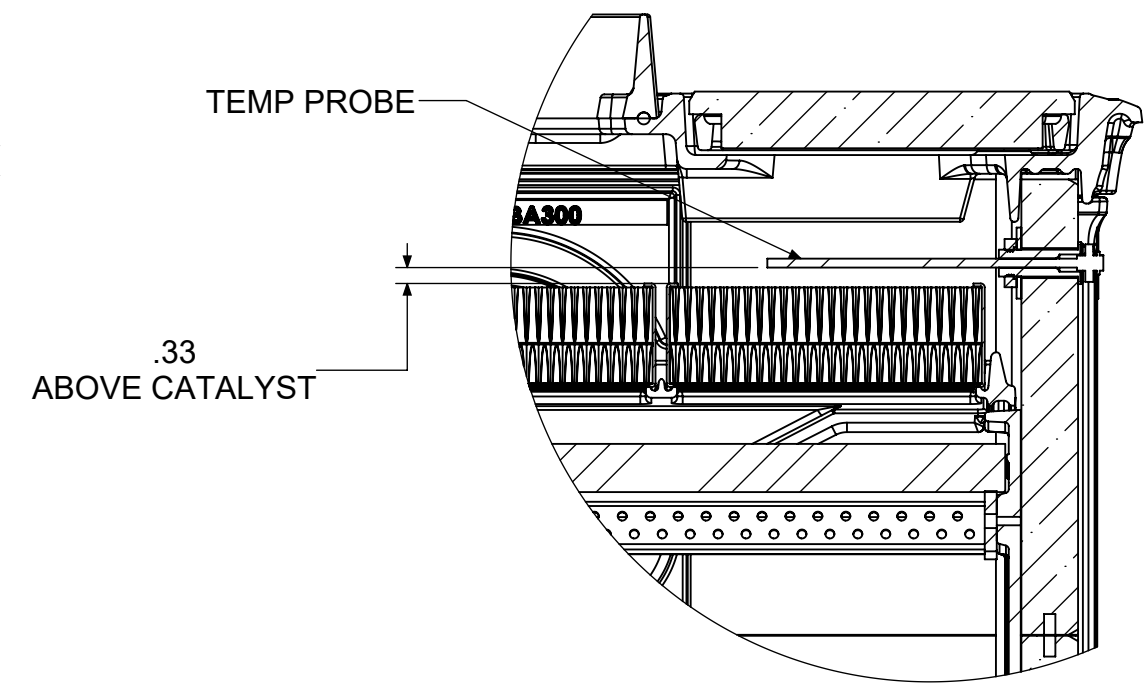
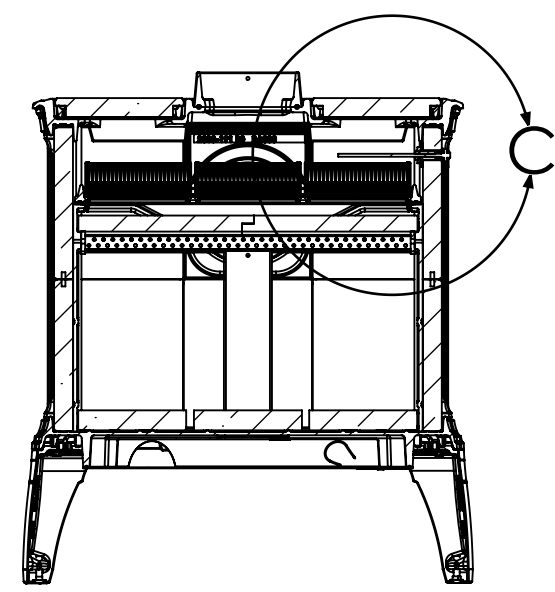
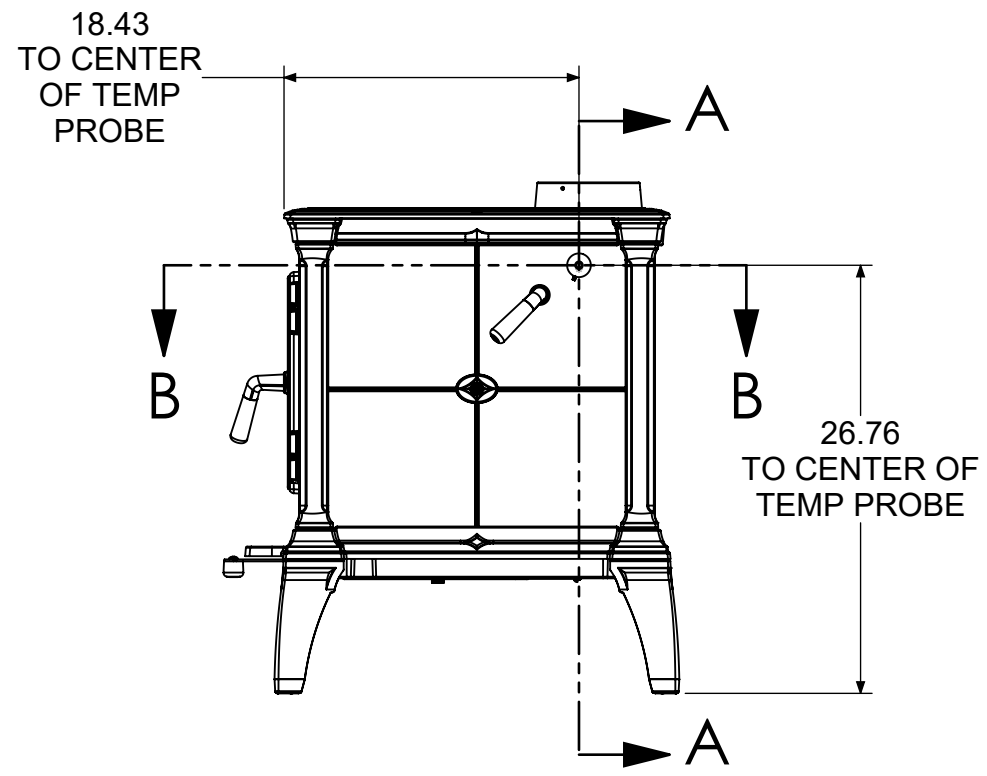
3105	219,66	645,34	2,273	496,6956	485,21	409,81	326,06	490,604523
3106	219,35	644,41	2,273	496,1941	485,18	410,15	325,57	489,230255
3107	219,17	643,07	2,273	494,9580	484,21	410,46	324,60	488,197998
3108	219,39	642,74	2,173	493,8578	483,37	410,75	323,64	487,744812
3109	219,10	641,87	2,173	493,0520	482,95	411,11	322,68	486,358398
3110	218,44	641,01	2,241	493,0107	482,05	411,40	321,73	483,649017
3111	218,11	640,54	2,173	492,2872	481,83	411,70	320,94	482,773865
3112	217,63	642,17	2,173	491,7416	480,99	412,01	320,05	482,622803
3113	217,91	643,62	2,073	490,5706	480,22	412,32	319,38	480,950256
3114	217,89	643,75	2,173	488,3562	478,67	412,66	318,67	481,636475
3115	217,99	643,50	2,072	487,8503	478,70	412,88	317,98	480,291504
3116	217,46	643,38	2,072	487,4640	478,13	413,23	316,93	479,159515
3117	217,09	643,35	2,072	487,2730	477,83	413,52	316,07	477,469971
3118	217,02	641,48	2,072	485,3859	476,65	414,28	315,30	477,811493
3119	216,57	638,11	2,004	484,4085	476,05	415,47	314,60	477,191406
3120	216,60	636,22	1,975	483,4350	475,89	416,79	313,51	476,088104
3121	216,16	635,04	1,975	482,9285	475,33	418,08	313,15	475,207123
3122	215,80	634,17	1,974	482,5797	475,16	419,30	312,32	474,632996
3123	215,20	633,23	1,975	482,2629	475,06	420,41	311,56	473,086487
3124	214,72	632,08	1,914	482,1040	474,81	421,43	311,00	472,927551
3125	214,46	631,25	1,874	481,0122	474,07	422,33	310,16	473,490417
3126	214,30	630,65	1,874	479,3816	473,86	423,23	309,19	473,117279
3127	213,83	630,53	1,874	478,1724	473,00	424,01	308,55	472,94809
3128	213,52	630,48	1,874	478,1115	472,75	424,73	308,03	472,421021
3129	213,34	630,29	1,874	477,9300	471,86	425,48	307,59	471,322906
3130	213,12	629,65	1,774	477,7170	471,34	426,14	306,95	470,591949
3131	212,77	628,97	1,774	477,0937	471,17	426,76	306,38	471,030212
3132	212,51	628,35	1,774	476,3906	470,75	427,36	305,72	469,964233
3133	212,09	628,39	1,774	475,9160	470,57	427,93	305,28	470,056641
3134	212,02	628,98	1,752	475,5425	470,10	428,53	304,66	469,430573
3135	211,83	629,26	1,715	474,5341	469,45	429,11	303,88	468,032532
3136	211,56	629,48	1,673	473,1043	468,91	429,59	303,01	468,942169
3137	211,13	630,17	1,673	473,0713	468,65	430,05	302,49	468,678131
3138	210,97	630,38	1,673	472,2341	468,25	430,53	301,72	468,263
3139	211,07	630,07	1,673	471,5736	467,57	430,82	301,31	468,325867
3140	210,87	629,25	1,573	470,7171	466,99	431,51	300,40	465,984131
3141	210,70	628,82	1,573	470,3283	466,64	432,37	299,54	466,120728
3142	210,70	629,70	1,573	469,9457	465,88	433,30	299,46	466,107422
3143	210,39	630,57	1,573	468,7870	464,73	433,87	298,73	465,645416
3144	210,34	631,34	1,573	467,9132	463,07	434,30	298,50	465,753143
3145	210,13	632,43	1,537	467,1537	463,19	434,65	298,17	466,40567
3146	210,34	633,80	1,473	466,0701	462,14	435,04	297,56	466,652618
3147	210,47	635,59	1,472	465,5575	461,68	435,42	296,87	466,126343
3148	210,45	637,18	1,473	465,1294	461,12	435,70	296,53	465,823151
3149	210,70	639,12	1,472	464,3097	460,07	436,06	296,15	465,821136
3150	210,98	639,49	1,372	463,6980	459,18	436,37	295,74	464,536591
3151	211,01	640,67	1,372	462,7707	458,86	436,64	295,21	465,326538
3152	211,00	642,67	1,372	462,1823	458,01	436,94	294,79	464,88501
3153	211,38	643,59	1,372	461,7013	457,55	437,26	294,74	463,711304
3154	211,57	645,17	1,372	460,4950	456,95	437,47	294,00	463,271454
3155	211,79	645,12	1,279	460,1187	456,45	437,73	293,77	463,638336

APPENDIX 5: Participants

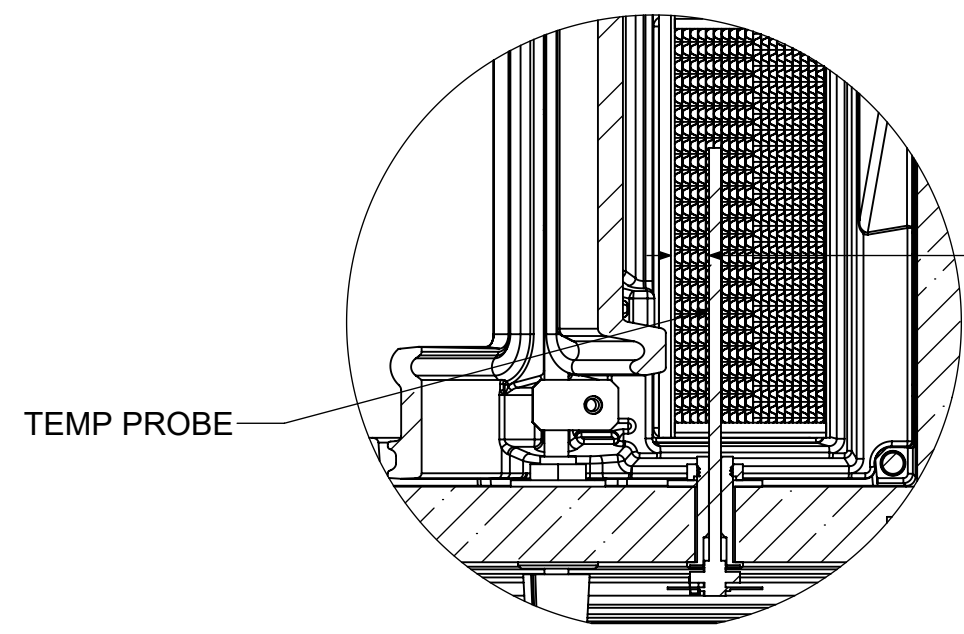
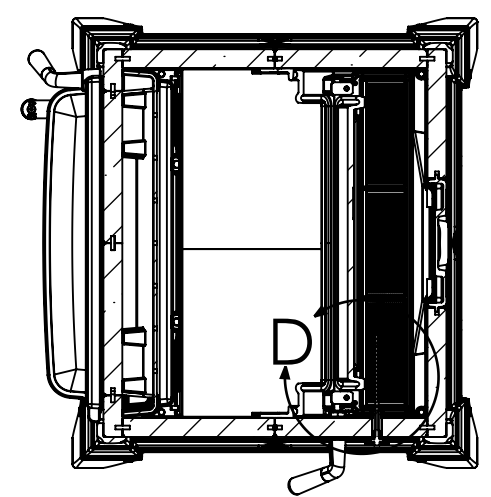
Danick Power ing.
v-p operation
Services Polytests inc.
450.741.3636
www.polytests.com

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

APPENDIX 6: Drawings and specifications



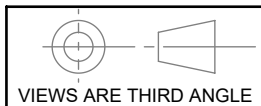
DETAIL C
SCALE 1 : 4



DETAIL D
SCALE 1 : 3

WEIGHT:

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED



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 DECIMALS ANGLES
 $\pm 1/64$.XX $\pm .015$ $\pm 1/4^\circ$
.XXX $\pm .005$

1.) DIMENSIONS ARE IN INCHES / MM
2.) ALL MACHINED SURFACES TO BE DE-BURRED AND SMOOTHED

MATERIAL: SEE NOTES

FINISH: FINISH

CAD GENERATED DRAWING, DO NOT MANUALLY UPDATE	
APPROVALS	DATE
DRAWN	2/19/2021
CHECKED	
RESP ENG	
MFG ENG	
QUAL ENG.	

8013 MANSFIELD

TEMPERATURE PROBE DIMS

SIZE	HEARTHSTONE	8013	REV.
B	DWG. NO.		
SCALE: 1:12	HERGOM DWG. NO.		SHEET 1 OF 1

APPENDIX 7: Operator's manual



Mansfield

(Model 8013)

Woodstove

OWNER'S MANUAL

Installation And Operating Instructions



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 Report FXX-XXX

**SAVE THIS OWNER'S MANUAL
FOR FUTURE REFERENCE**

**PLEASE READ THIS ENTIRE OWNER'S MANUAL BEFORE YOU INSTALL AND USE YOUR
NEW MANSFIELD 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. 1482-2011 (R2015)

Certified to ULC Std. S6270-00 (R2016)

**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

Mansfield (Model 8013)
Manual: 6400-41419
R: 02/8//2021

Notes on Stove Operation and Efficiency

Rating:

You have purchased a Hearthstone Mansfield 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 0.54 gr/hr. emission rate and under specific test conditions has been shown to deliver heat at rates ranging from 14,043 to 32,200 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 or render the heater ineffective and cause smoke.

Following the maintenance guidelines set forth in this manual will help ensure 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 potential 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 77.7% (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 in 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 Mansfield has the following CO emission rates by burn level: Category 1 (low) – 16.03 g/hr., Category 2 (med. low) – 24.7 g/hr., Category 3 (med. high) – 77.75 g/hr. and Category 4 – 64.51 g/hr. 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.

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INTRODUCTION

Thank you for purchasing a Mansfield 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 Mansfield 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 Mansfield woodstove burns very efficiently, and produces a large amount of heat. However, you should not consider your Mansfield the primary heat source for your home. The Mansfield'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 Mansfield Model 8013 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 Mansfield 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 Mansfield 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 26)
- **Never** put articles of clothing or candles on a hot stove.
- **Never** connect the stove to a flue used by another appliance.
- **Never** connect to or use in conjunction with any air distribution ductwork unless specifically approved for such installations

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 9)
- 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 31)
- 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 #96-53400

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 31)
- 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 32.)
- 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

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.

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.

SPECIFICATIONS

Maximum Heat Output:

32,200 BTUs per hour of cordwood (based on independent laboratory test results).

Floor Size of Heated Area:

Up to a maximum of 2,500 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:

2.88 cubic feet.

Maximum Log Length: Up To 21" (40.6cm).

Emissions: 0.54 g/hr.

Burn Time: Up to 30+ hrs. (*Heat Life™*: Up to 20 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: 32" (81.3cm)
Width: 28" (71.1cm)
Depth: 24 1/8" (61.3cm)
Weight: 650 lbs. (295 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-40" W-29" L-36" or 102x74x 92cm

Optional Equipment:

Outside Air Kit 90-53220
 Blower 90-57210
 Rear Heat Shield 90-68210

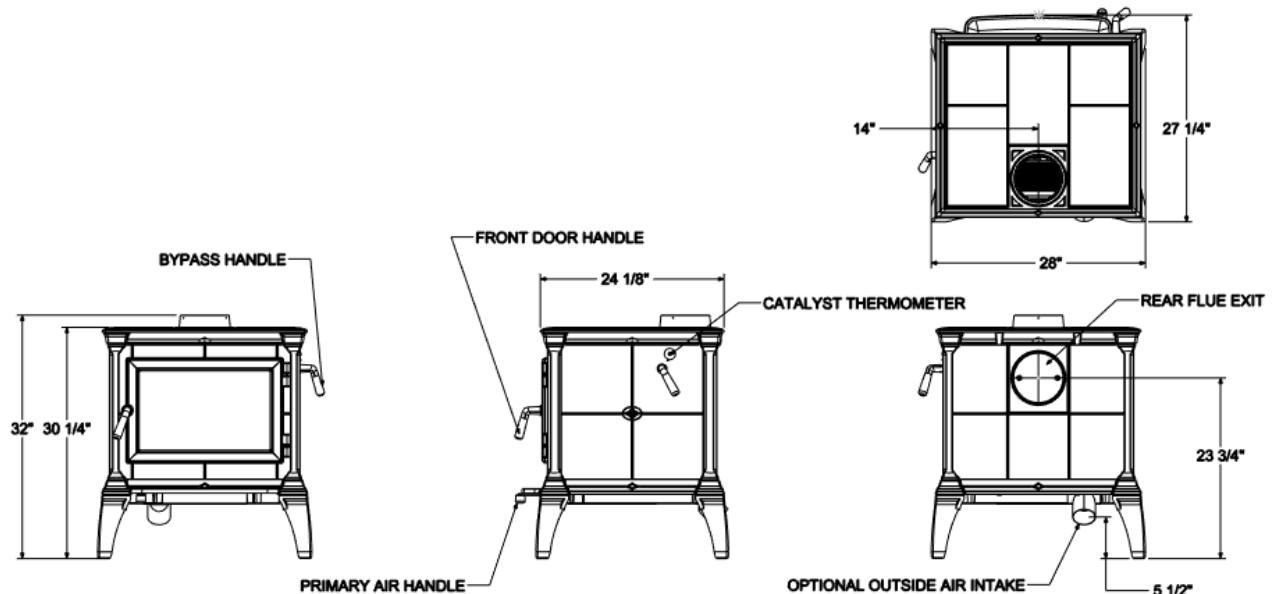


Figure 1 – Mansfield Dimensions

INSTALLATION

UNPACKING

Hearthstone packages your Mansfield 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 Mansfield, carefully unpack and inspect the stove and all accompanying parts. Ensure that all parts are included inside the stove. If any parts are damaged or missing, please contact your authorized Hearthstone dealer immediately.

Be sure to remove the packaging material in the flue collar and above the baffle before installing the chimney.

PACK LIST

Mansfield Model 8013 Woodstove
Owner's Manual

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.

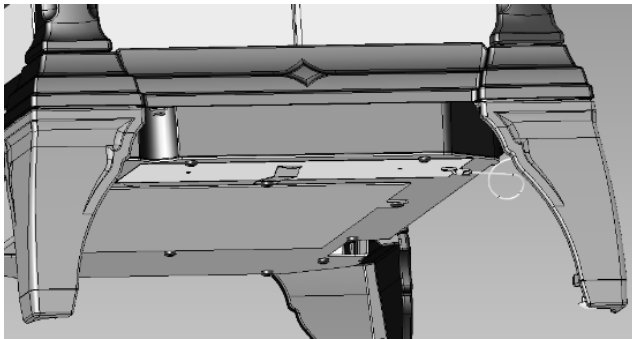


Figure 2 - Label Location

INSTALLING YOUR STOVE

Choose a place to install your Mansfield 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 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

HEARTH REQUIREMENTS & FLOOR PROTECTION

Ensure you protect combustible flooring with a covering of noncombustible material. The Mansfield 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 40in x 34in.
The minimum floor protection for installations in Canada is 49 1/2in x 41in.

Picture below needs to show rear exit ember protection

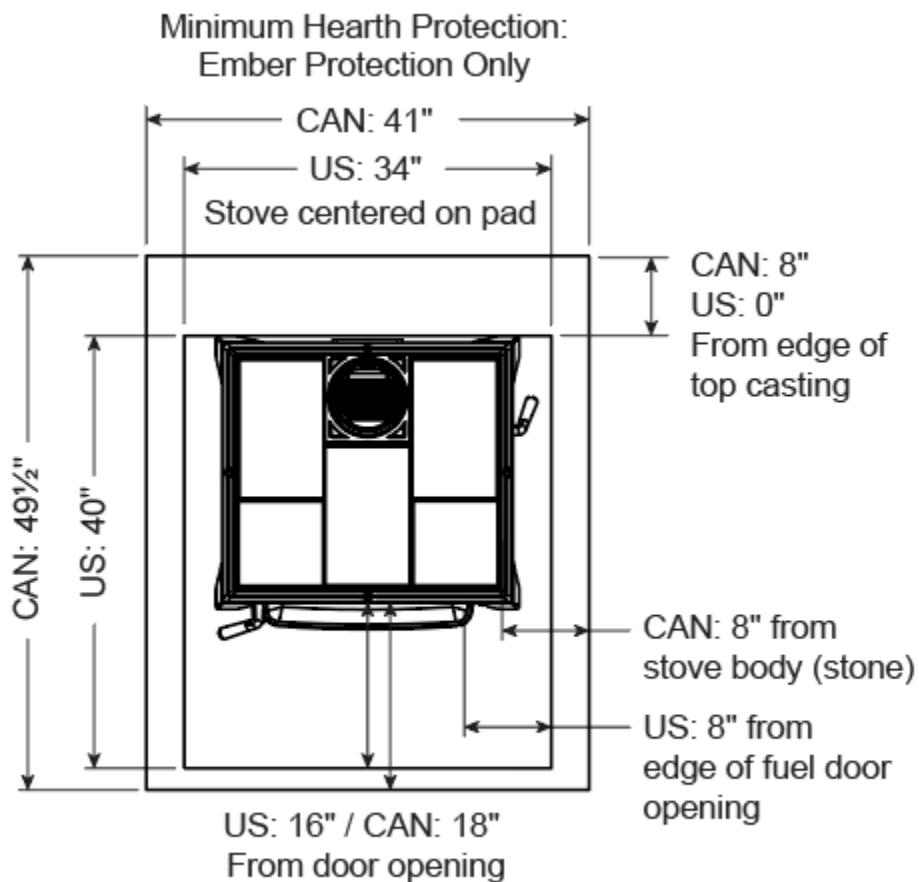


Figure 3 – Hearth Dimensions

COMBUSTIBLE SURFACE REQUIRED CLEARANCES

Note: Dimensions shown in the following figures are from the body 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.

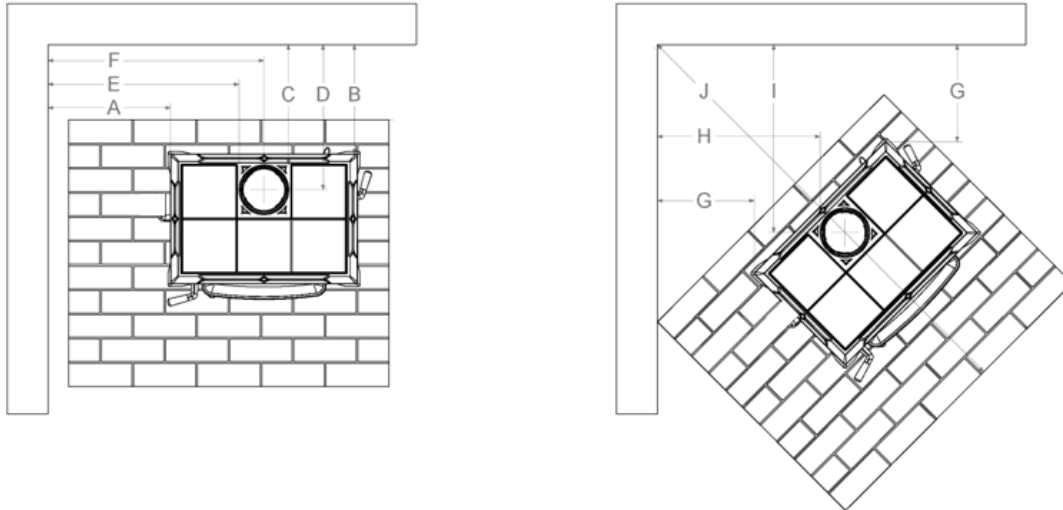


Figure 4 – Clearance to Combustibles

Different picture needed for Mansfield without side door, and with rear exit

Clearances (inches)	Parallel						Corner			
	A	B	C	D	E	F	G	H	I	J*
Single wall stove pipe without heat shield										
Single wall stove pipe with heat shield										
Double wall stove pipe with heat shield										
Minimum corner clearances for centered installation with hearth pad										

*In US. For Canadian installations, add 2"/5cm

Alcove Clearances (inches)	Unprotected Surfaces	Protected Surfaces (NFPA-211)
Minimum alcove width		See NFPA-211
Minimum alcove side clearance		See NFPA-211
Minimum alcove rear clearance		See NFPA-211
Alcove ceiling above stove top		See NFPA-211
Alcove ceiling above floor		See NFPA-211

Note: Dimensions shown in the following figures are from the top casting of the stove unless otherwise indicated.

If you use a rear heat shield to obtain reduced clearances, you must use the optional rear heat shield manufactured by Hearthstone available through your local dealer. Close clearance connector pipe must be tested to UL standards and listed. Check listings of your pipe for actual clearances. Shown are measurements typical only and specific to Simpson Dura Vent DVL brand. Clearances cannot be reduced without the use of the rear heat shield and/or with close clearance connector pipe and/or by protecting the surfaces per NFPA 211 standards.

FOR REAR HEAT SHIELD, USE KIT #90-68210

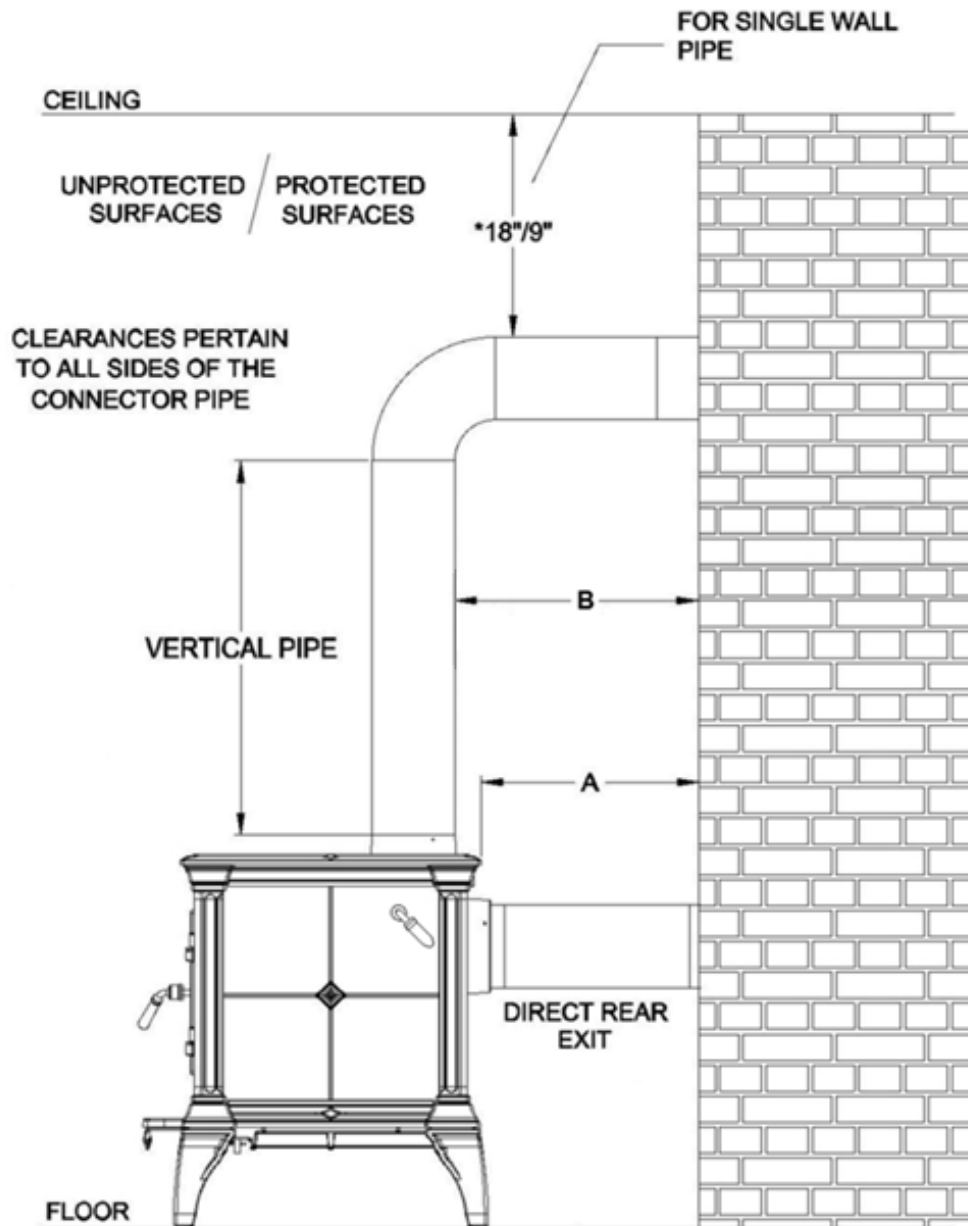


Figure 5 Chimney Connector Clearances

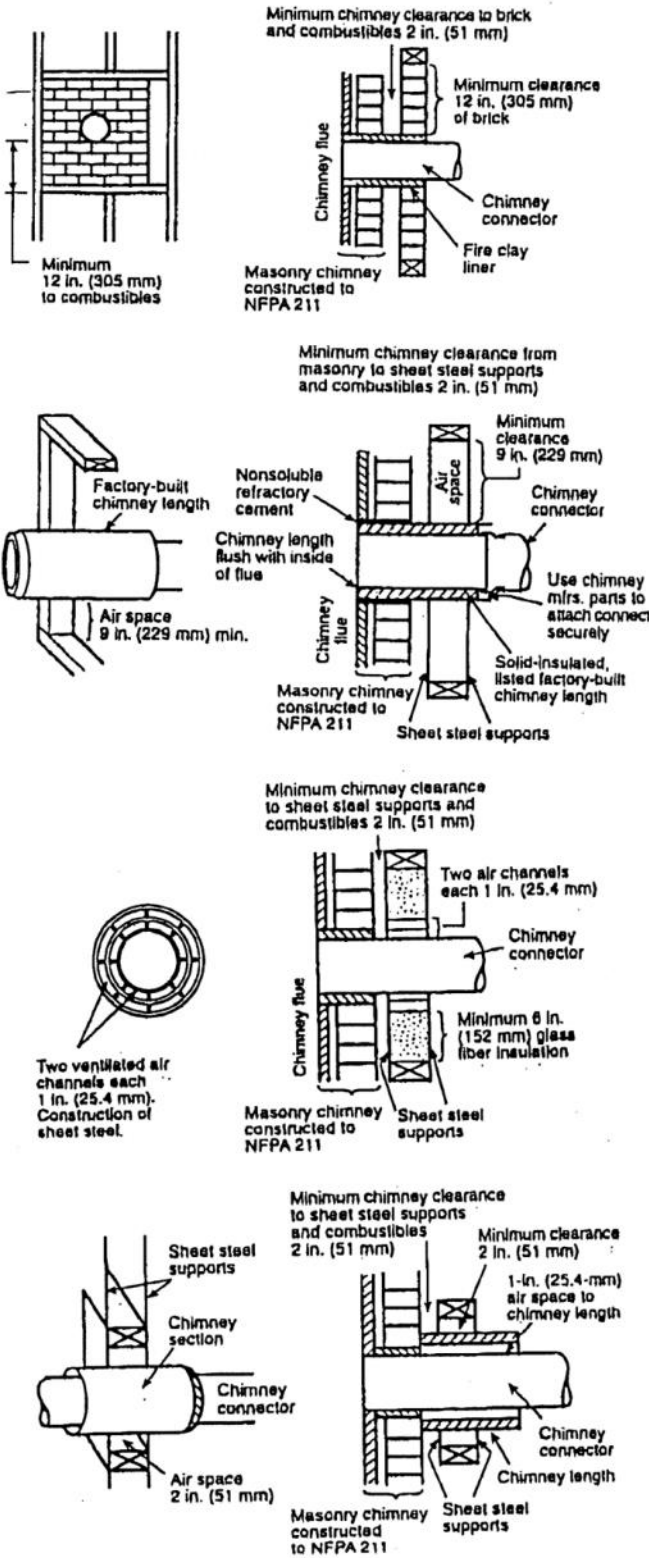
	Single Wall Pipe			Double Wall Pipe	
	With Blower Kit Shield**	Inc. Rear Heat Shield	No Rear Heat Shield	With Blower Kit Shield**	Inc. Rear Heat Shield
Through the wall top flue exit or direct rear exit					
A					
B					

*For double wall pipe clearance to ceiling, refer to pipe manufacturer specifications.

** Rear Heatshield, kit #90-68210

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 3.5 in thick brick masonry all framed into combustible wall with a minimum of 12 in. 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 1 in. or more of insulation with a minimum 9 in. 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 1 in. air channels, separated from combustibles by a minimum of 6 in 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 2 in. larger than the chimney connector and having 1 in. 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 2 in. air space between the outer wall of chimney section and combustibles. Minimum length of chimney section shall be 12 in. chimney section spaced 1 in. 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.

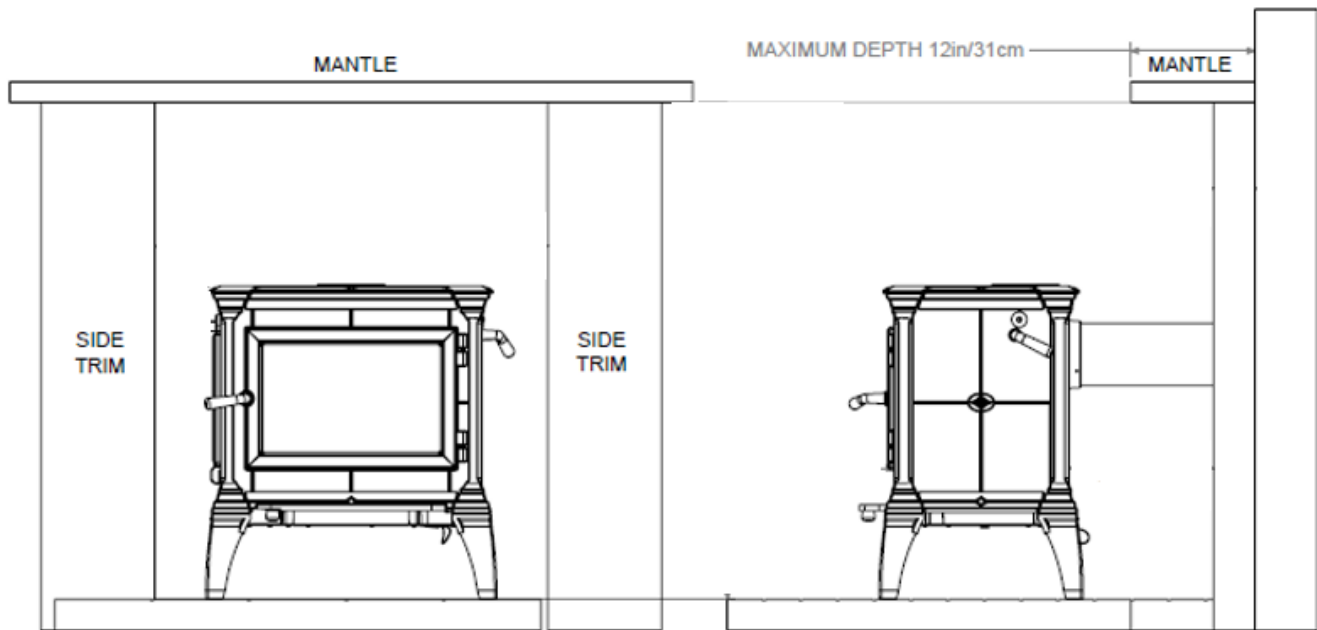


Figure 6 Trim and Mantle Clearances

OUTSIDE AIR SUPPLY

(Optional Kit #90-53220)

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

When using an outside air kit in Canada, the stove must be attached to your 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).

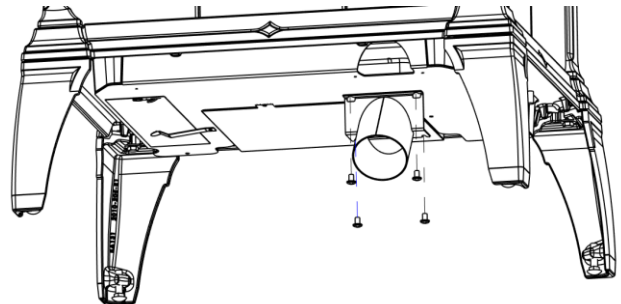


Figure 7 – Outside Air Kit Detail

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. When using an outside air kit in Canada, a damper allowing 100% closure shall be installed.

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.

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 recommended are Simpson Dura Vent DVL and Metalbestos DS. Security, GSW and Ameritec also manufacture 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.
- Be sure to follow the manufacturer's instructions to maintain an effective vapor barrier at the location where the chimney or other component penetrates the exterior of the structure
- 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.

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 and chimney connector and keep it clean.* Upon inspection, immediately replace rusted, cracked, or broken components. Failure to follow these instructions and specified components or using make-shift compromises can result in fire, property damage, bodily injury, and even death.

- 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 Mansfield. 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 Mansfield requires a draft between -0.06" and -0.1" WC. For drafts above -0.1" WC, install a stovepipe damper. To vent the Mansfield directly out the back flue exit, a minimum draft of -0.08" WC is required. 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.

REAR EXIT INSTALLATION

The Mansfield may be installed with a direct rear flue. In the rear exit configuration, a draft of -0.08" WC or more is necessary to ensure the proper function of stove. Do not install the stove in the rear exit configuration if you do not have sufficient draft. The minimum chimney height is 15' for rear exit configurations.

The Mansfield is shipped in the vertical flue configuration. To install the stove in the rear flue configuration, switch the positions of the flue collar and the flue plate following these steps:

1. Using a 5/32" hex key, remove the flue collar from the top of the stove by removing the two screws visible within the flue collar.
2. Remove the rear heat shield. Loosen the two screws and lift the heat shield to remove it.
3. Using a 5/32" hex key, remove the flue plate from the back of the stove by removing the two visible screws.
4. Install the flue collar on the back of the stove and the flue plate on the top of the stove using 2 screws each. Be sure to keep the 1/4" gasket in the channel on both the flue collar and the flue plate to ensure a sealed firebox.
5. Using metal snips, remove the section of the rear heat shield to allow the pipe to pass through it.
6. Re-install the rear heat shield. The two screws should fit in the keyhole features of the shield. Be sure the standoffs are correctly positioned behind the heat shield and tighten it in place.

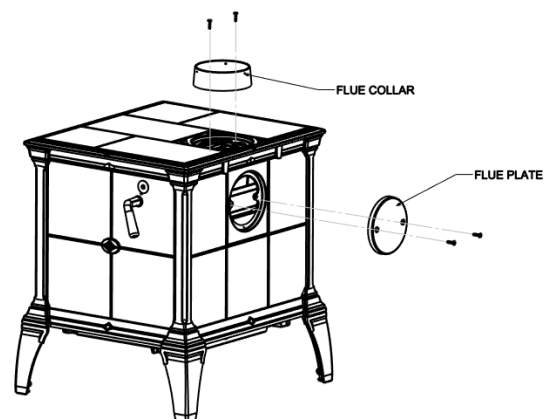


Figure 8 – Rear Exit

CONNECTING THE STOVE TO A CHIMNEY

You can install your Mansfield 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 Mansfield 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 Mansfield. The Mansfield 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 is 15 feet (4.5m) off the floor. The recommended maximum chimney height is 30 feet (9m). The Mansfield 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.

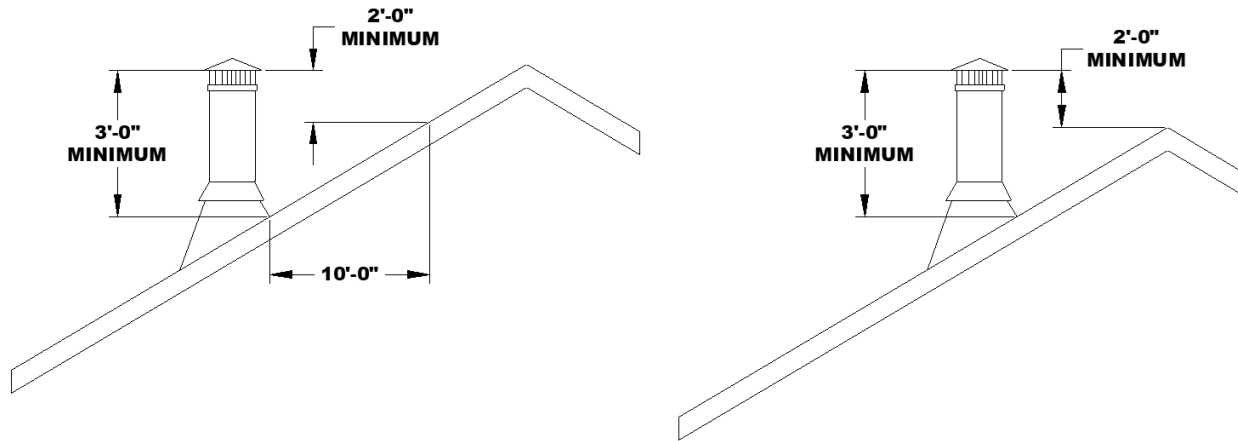
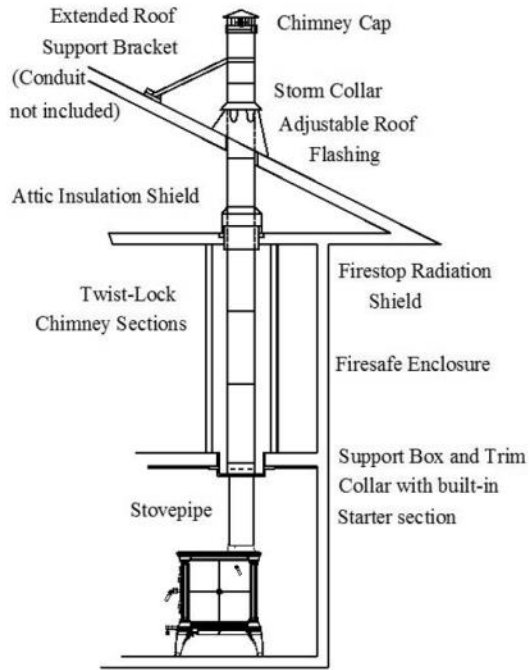
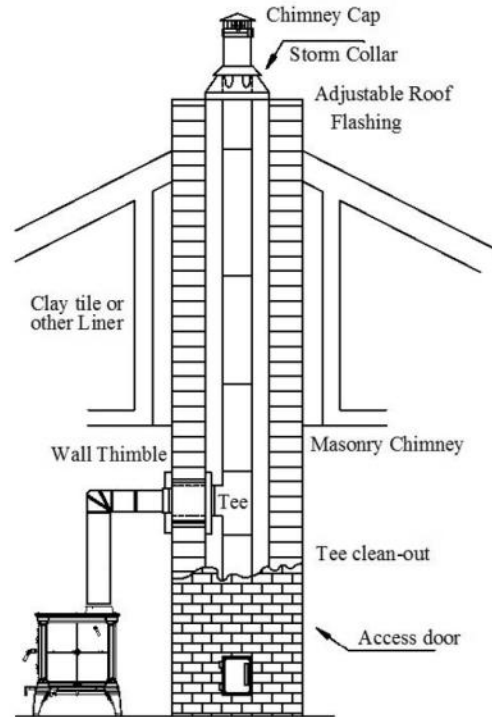


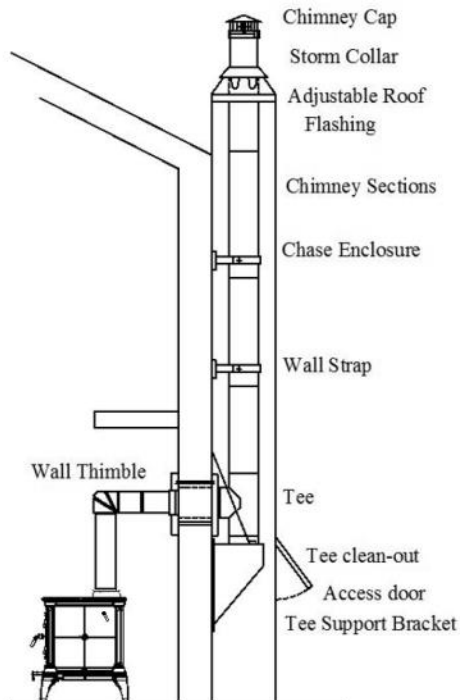
Figure 9 – Chimney Height Requirements



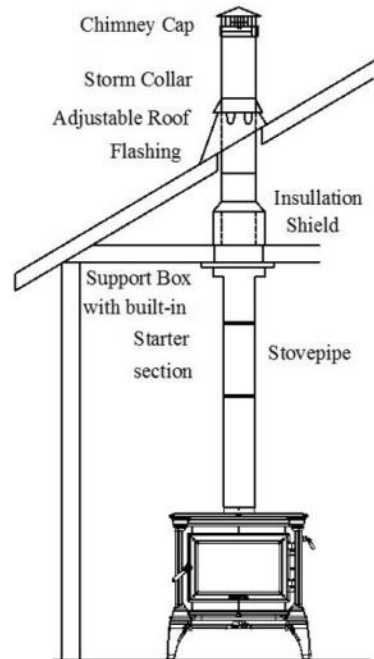
Two story house installation with attic.



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 10 – Typical Chimney Configurations

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).

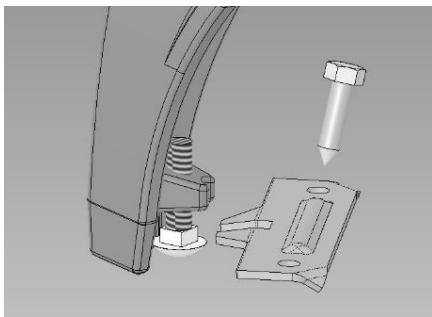


Figure 11 - Lock Down Detail

- Install a Mobile Home Chimney & Connector Kit*.

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.

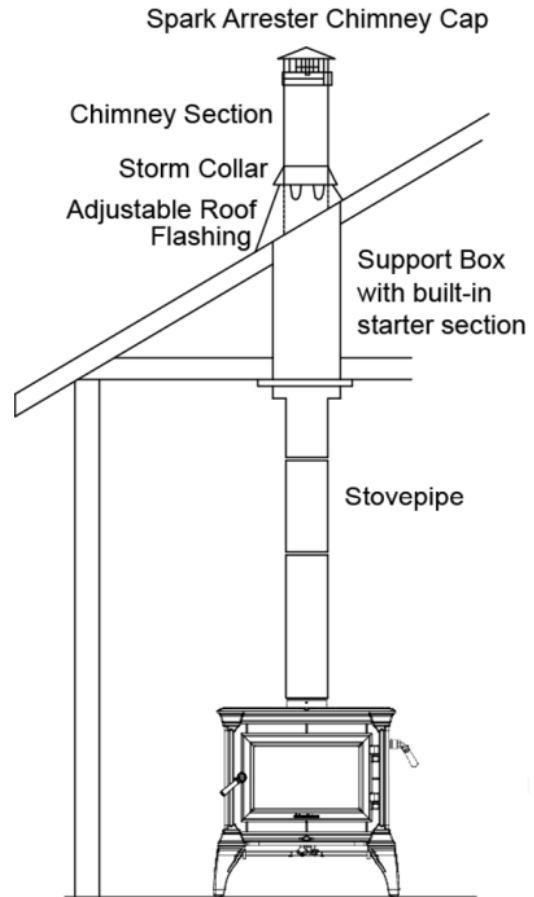
* Install a Mobile Home Chimney and Connector Kit conforming to US/UL103 or CAN/ULC-S629, Standard for Factory-Built Chimneys.

- **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.**
- **FAILURE TO FOLLOW THESE INSTRUCTIONS AND SPECIFIED COMPONENTS OR USING MAKE-SHIFT COMPROMISES CAN RESULT IN FIRE,**

PROPERTY DAMAGE, BODILY INJURY, AND EVEN DEATH.

- 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)
- The chimney should be attached directly to the stove and must extend at least 3 feet (.9 m) above the part of the roof through which it passes. The top of the chimney is to be at least 2 feet (.6 m) above the highest elevation of any part of the mobile home within 10 feet (3 m) of the chimney.
- All roof-chimney terminations should be able to be readily removed / re-installed at or below an elevation of 13-1/2 feet (4.1 m) above ground level without the use of special tools or instructions. The chimney assembly shall be provided with a mechanical securement means to secure the chimney to the ceiling support box.
- When a chimney exits the mobile home at a location other than through the roof, and exits at a point 7 feet (2.1 m) or less above the ground level on which the mobile home is positioned, a guard or method of enclosing the chimney shall be provided at the point of exit for a height up to 7 feet.
- The chimney guard shall not allow the passage of a $\frac{3}{4}$ inch (19.1 mm) diameter rod, and a $\frac{1}{2}$ " (12.7 mm) diameter rod shall not be able to touch the chimney when inserted through any part of the guard a distance of 4 inches (102 mm).

- The chimney shall be provided with a spark arrester secured to the chimney. The net free area of the arrester above the chimney outlet shall not be less than 4 times the net area of the chimney outlet, and the vertical height of the arrester above the chimney outlet shall not be less than $\frac{1}{2}$ the diameter of the chimney flue. Openings shall not permit the passage of a sphere having a diameter of $\frac{1}{2}$ inch (12.7 mm), and shall allow the passage of a sphere of $\frac{3}{8}$ " (9.6 mm).
- 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 or other component penetrates the exterior of the structure.



Mobile home installation.
One story house installation with attic.
Chimney is supported by Ceiling.

Figure 12 – Mobile Home Installation

OPERATION

Once your Mansfield 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 13). 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.

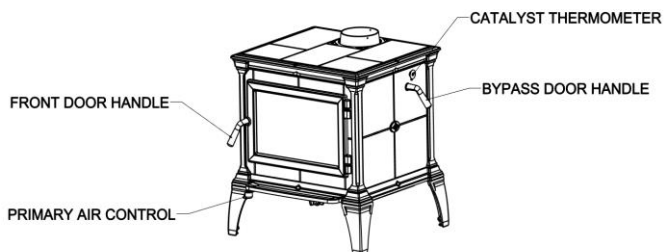


Figure 13 - Controls & Features

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, pull the lever out as far as possible; move the lever inwards as far as possible for minimum airflow (does not close completely).

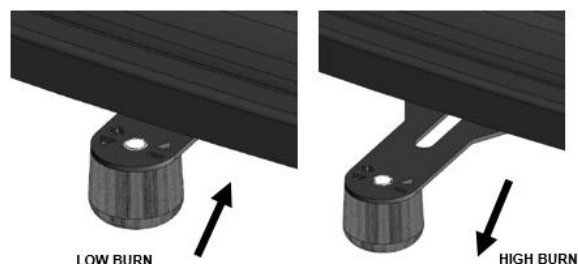


Figure 14 – Air Control

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 starting 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.

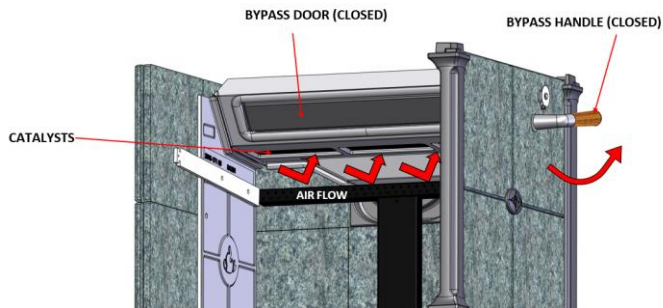


Figure 15 – Bypass Closed

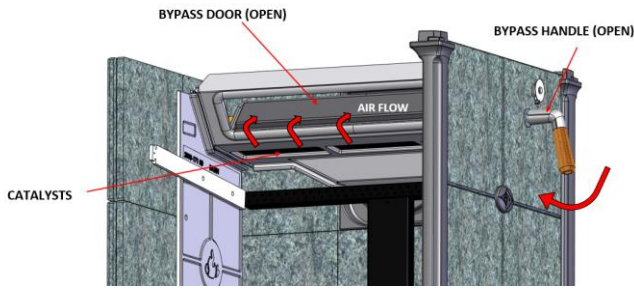


Figure 16 – Bypass Open

CATALYST THERMOMETER: The catalyst thermometer monitors the downstream temperature of the catalysts, and indicates when the stove is in the active range for the catalysts. The thermometer should be spaced approximately 3/8" from the side of the stove to the back of the thermometer. 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 thermometer is in the "Too Hot" range, keep the door closed, fully close the air control, and allow the stove to cool down until the thermometer falls into the "Active" Range. Once the catalyst thermometer has reached the active range, heat generated from burning smoke keeps the catalysts warm and active as long as fuel remains in the stove. The Mansfield typically operates in the 800 °F to 1300 °F range.



Figure 17 – Catalyst Thermometer

CHOOSING FIREWOOD

Burn only natural firewood (known as cordwood) in the Mansfield Model 8640 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.

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.

Burn untreated wood only. Other materials such as wood preservatives, metal foils, coal, plastic, garbage, Sulphur, or oil may damage the catalysts.

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.

PROTECT YOUR HEARTH

While your stove radiates heat slowly and evenly when in use, it also absorbs moisture condensations when not in use. Specifically, true with a brand-new stove, but also for stoves during the off season, your stove and chimney flue has moisture in it. During the early stages of use and during certain heating conditions, this condensation can turn to a liquid. This dark liquid can find a way through the bottom of your stove and onto your hearth. We recommend placing some pieces of aluminum foil or other non-combustible material in the area around each of the legs of the stove temporarily to catch this liquid until the moisture has been removed from the heating system. As the system becomes seasoned these can be removed for normal use.

A NOTE ABOUT MAJOLICA ENAMELS

The porcelain Majolica enamels Hearthstone uses are a natural glass-based product. The Majolica process consists of a neutral opaque color base, usually an off-white, with a translucent color applied over it. It is essentially molten-glass applied as a powder and each coat is fused to the iron in our ovens at nearly 2000 F. The darkness of the color is dependent upon the thickness of the translucent color over the base color, the thickness of the part and the oven temperatures. Details in the iron allow for the molten glass to pool darkly in low places and be thinner on edges of detail. Color variations are what makes it so beautiful. Please expect variations in color as this is a normal part of the process. Crazeing (minuscule lines in the glaze) is common with repeated heating and cooling. or

extreme use. Crazeing has no significant effects on the ceramics, it is cosmetic and in the top coat only. Majolica finishes are applied by artists; having been used on ceramic pottery for hundreds of years. Antique Majolica plates, saucers, cups and teapots are normally crazed to varying degrees and have color variations piece to piece.

Enjoy a lifetime of beauty with this classic finish we are proud to offer.

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 towards you, away from the firebox.
- 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 pulling the lever completely out, away from the firebox.
- 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.

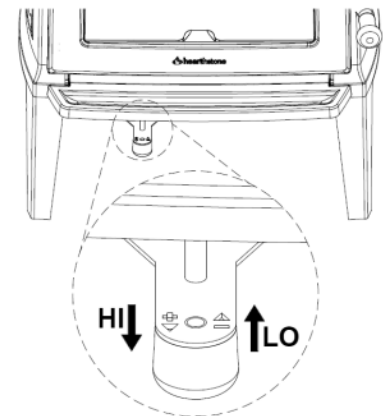
- 6) Once the fire is burning well, and the catalyst thermometer indicates that the stove is in the active range, close the bypass handle. Now the combustion products are passing through the catalytic combustor, and your stove will be burning at its optimal efficiency.
- 7) After closing the bypass door, 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 catalysts reach approximately 600 °F. Once the catalysts reach 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 Mansfield 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, catalysts, 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 catalysts warm and active as long as fuel remains in the stove. You stove will burn the cleanest and most efficiently when the catalysts are in the active range. There should be little to no visible smoke from your chimney when the catalysts are 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 inward toward the stove. (See figure 13). 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.

MEDIUM LOW BURN: With the primary air control in the low position, pull the air control forward (a little less than 1/4"). A medium-low burn rate is the typical setting and is preferable if the stove is unattended. At this burn rate, a little goes a long way.

MEDIUM HIGH BURN: With the primary air control in the low position, pull the air control forward (a little less than 3/8")

HIGH BURN: Completely open the primary air control by moving it all the way outward toward the operator. 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 cordwood 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:

Figure 8 – Air Control Position

- **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 fuels or combustibles, 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 A CATALYTIC COMBUSTOR, WHICH NEEDS PERIODIC INSPECTION AND REPLACEMENT FOR PROPER OPERATION. IT IS AGAINST FEDERAL REGULATIONS TO OPERATE THIS WOOD HEATER IN A MANNER INCONSISTENT WITH OPERATING INSTRUCTIONS IN THIS MANUAL, OR IF THE CATALYTIC ELEMENT IS DEACTIVATED OR REMOVED**

It is important to periodically monitor the operation of the catalytic combustor to ensure that it is functioning properly and to determine when it needs to be replaced. A non-functioning combustor will result in a loss of heating efficiency, and an increase 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 combustor 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 thermometer 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 the

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 catalysts light-off has been achieved, to the amount of smoke leaving the chimney when the smoke is not routed through the combustor (bypass mode).

1. Light stove in accordance with operator's instructions
2. With smoke routed through the catalysts, 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 CATALYSTS AND REMOVING/REPLACING THE BAFFLE

1. Allow the stove and ashes to fully cool.
2. Remove the metal baffle protector by sliding it right slightly, raising the protector and sliding the right opening through the right side support bracket tab and then pulling the bracket out.
3. Lift up on the right-side baffle, and gently pull the left side baffle down and out of the stove

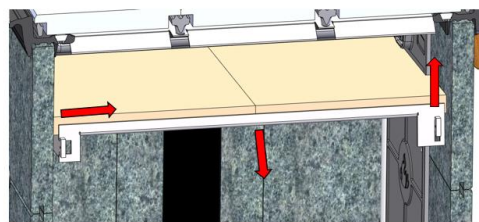


Figure 19a – Removing / Replacing the Baffle



Figure 19b – Removing / Replacing the Baffle

CAUTION - Do not force the baffle pieces. Gently adjust the baffle orientation until each side can be removed freely from the stove.

4. Use a small vacuum nozzle or soft bristled brush to remove any accumulated ash or soot on the face of the catalyst.
5. Inspect the catalyst for any unusual warping, corrosion, or plugged openings.
6. Use a small vacuum nozzle or soft bristled brush to remove any accumulated ash or soot on the face of the catalysts.
7. Inspect the catalysts for any unusual warping, corrosion, or plugged openings.
8. If any unusual conditions are found, remove the catalyst blocks – See replacing the catalysts.
9. Replace the baffles and baffle protector. Installation is the opposite of removal.
10. Ensure that the baffle pieces are pushed together at the center joint.

4. Inspect the catalysts for visible damage or fly ash. If fly ash exists, gently brush the catalysts off with a narrow soft-bristle brush, or vacuum with a crevice tool.
5. If fly ash exists, or if there are suspected catalyst performance issues, fully remove the catalysts by gently pulling upwards from the ribs in the cast iron, and then pulling outwards through the catalyst access opening.

REMOVING OR REPLACING THE CATALYSTS

Refer to the Catalytic combustor warranty on page 35 for catalyst replacement information. **DO NOT OPERATE UNIT WITHOUT CATALYSTS.** 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

1. Allow the stove and ashes to fully cool.
2. Loosen, but do not remove the screws securing the rear heatshield. (If stove is so equipped).
3. Remove the 2 bolts securing the cast iron catalyst access cover, and remove the cover.

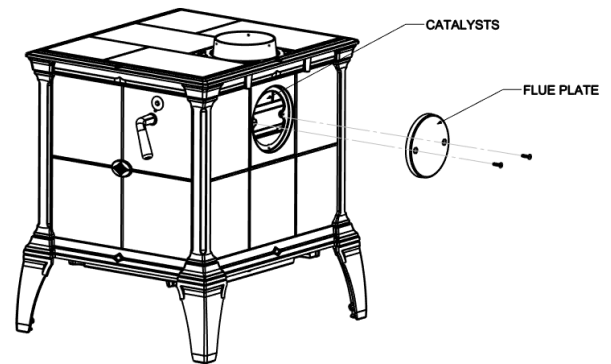


Figure 20 – Catalyst Access

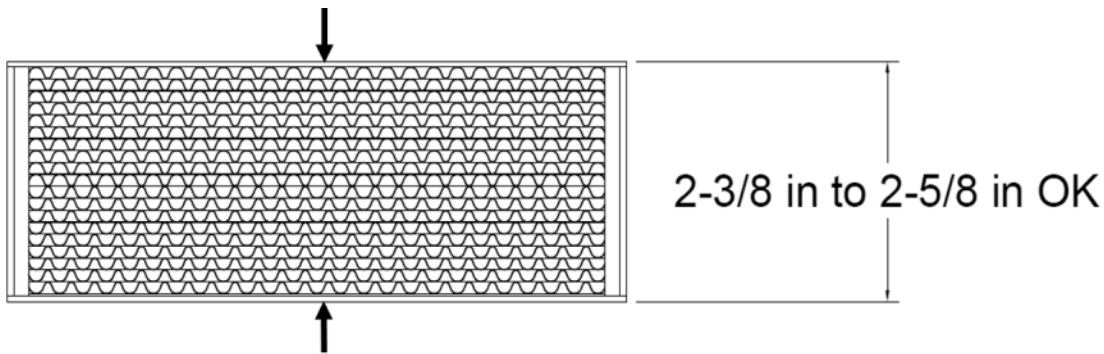


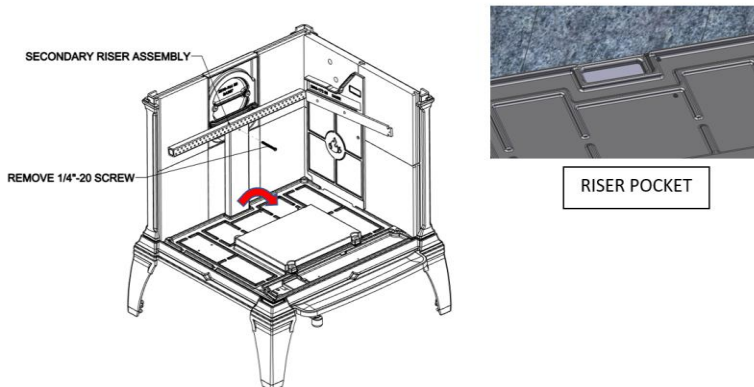
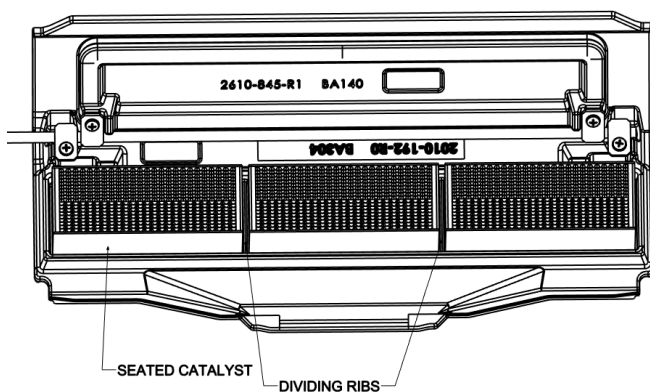
Figure 21 - Acceptable Catalytic Distortion

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.
 - No metal tools such as gun cleaners should be used.
 - No detergents or chemicals.
7. Some warping or bowing of the catalysts over time is acceptable. Measure the catalysts in the middle section – if the dimensions are outside the range shown in Figure 21, replace the catalysts.
8. To reinstall, gently push the catalysts into the catalyst opening until the catalysts hit against the back wall of the cavity. There will be ribs on the catalyst dam that separate the catalysts from each other. Make sure all three catalysts sit in their individual “wells” properly.

REPLACING THE SECONDARY RISER ASSEMBLY

1. Allow the stove and ashes to fully cool.
2. Open the front door of the stove and fully clean any ash in the firebox.
3. Remove the baffle following the instructions in “Inspecting the Catalysts and Removing/Replacing the baffle.”
4. Remove bottom refractory stones from stove.
5. With the baffle removed, unscrew 1x ¼”-20 screw holding the secondary riser assembly in place. Once unscrewed, assembly can be lifted up and out of the stove.
6. Installation is the reverse of disassembly. Make sure that the secondary riser tube is seated in the pocket at the rear of the bottom casting.

Figure 22 - Removing Riser (with Baffles already removed)



9. Replace Flue Plate.
10. Heat the stove slowly during your next fire to allow catalysts to fully expand and seal.

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 clips (use penetrating oil if necessary) – Set aside for reinstallation.
4. Carefully lift the damaged glass off 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. Install a new glass gasket in the glass gasket groove.
8. Place the new glass onto the door.
9. **Important! Center the glass** and ensure that the edges of the glass are parallel with the edges of the opening.
10. 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.

11. Apply a light film of anti-seize lubricant on the door's hinge pins if needed.
12. Install the door.
13. After 5 or 6 fires, check the glass retainer screws, and retighten if necessary.

Required Glass Kit: Part Number:90-58215. Use only Ceramic, or Neoceram glass. Contact your Hearthstone dealer.

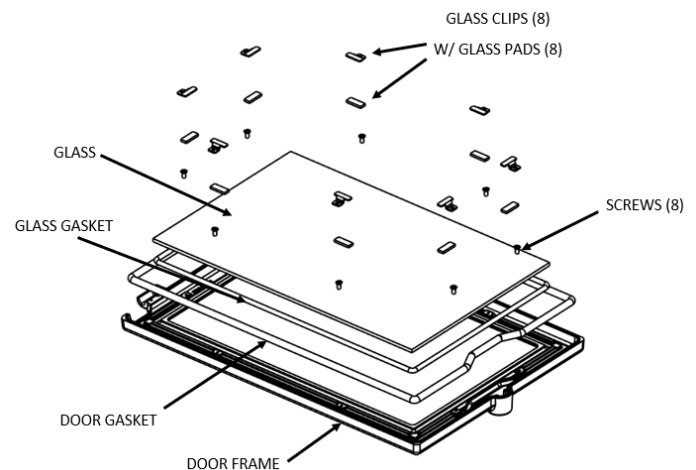


Figure 23: Front Door assembly

(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.

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 than 1/4"

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:

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 catalysts are in the active range.
	Catalysts not functioning	Inspect catalysts for damage, ash build-up, or plugging. Brush catalysts 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 <u>at least</u> 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.

CATALYST TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	SOLUTIONS
FLY ASH BUILD UP ON CATALYSTS	Catalysts have 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
CATALYSTS PLUGGING OR MASKING (SOOT/CRESOTE)	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 catalysts are well within the operating range before closing the bypass. Continue to run the stove at a high temperature for one hour, while ensuring the catalysts stay in the upper operating range, but not too hot.
WARPING OR BOWING OF THE CATALYSTS	Excessive catalyst temperatures for long periods of time.	Ensure that the catalysts remain in the operating zone, and does not get too 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
5013-101	SECONDARY AIR RISER ASSEMBLY
5013-201	BOTTOM HEAT SHIELD
5021-026	DOOR LATCH
5022-026	HINGE PLATE
5022-028	HINGE PIN
5030-045	HINGE BUSHING
5210-2330	TIE ROD
5640-018	BYPASS ROD RETAINER
7200-525	CATALYST THERMOMETER
	REPLACEMENT KITS AND ACCESSORIES
90-53220	OUTSIDE AIR KIT
90-58230	GASKET KIT
90-58215	GLASS KIT
90-71240	HANDLE KIT (MAKE ONE FOR JUST FRONT DOOR)
93-73920	FRONT DOOR LATCH KIT
3050-010	CATALYST REPLACEMENT (3 REQUIRED)
96-XXXXX	BAFFLE KIT
90-57210	BLOWER KIT
90-68210	REAR HEAT SHIELD

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



PFS
US
PFS Corporation
FILE FXX-XXX

Manufactured by:



hearthstone
317 Stafford Ave.
Morrisville VT 05661

MODEL NAME:
MANSFIELD 3 8013
SERIAL #

Conforms to UL Std. 1482-2011 (R2015)
Certified to ULC Std. S6270-00 (R2016)

WARNINGS

Do not use grate or elevate fire. Build wood fire directly on hearth.
Do not overfire. If the heater or chimney connector glows, you are overfiring.(See Manual)

OPERATE ONLY WITH DOORS CLOSED.
DO NOT OBSTRUCT SPACE UNDER HEATER.
TYPE OF FUEL: CORD WOOD ONLY

"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 5mm CERAMIC IR or NEOCERAM IR glass.
WARNING: (MOBILE HOME) An outside air inlet is necessary for combustion and must be unrestricted while unit is in use.
Inspect and Clean Chimney Frequently-Under Certain Conditions of Use, Creosote Buildup May Occur Rapidly.



CAUTION:
HOT WHILE IN OPERATION, DO NOT TOUCH. KEEP CHILDREN, CLOTHING, AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. SEE NAMEPLATE AND INSTRUCTIONS

Minimum Clearance to Combustible Materials*



When installed on a combustible floor, non-combustible floor protection is required to cover the area beneath the heater, and extend at least 16" to the front and 8" beyond each side of the fuel loading and ash removal openings, the floor protection must extend under the flue connector and extend 2" beyond each side of the pipe.

VENT REQUIREMENTS: 6" diameter, single wall, minimum 24 MSG blue steel connector with listed factory-built Type HT chimney or masonry chimney.

OPTIONAL COMPONENTS:

Outside Air Kit	Part #80-53220
Blower Kit	Part #80-57210
Rear Heat Shield	Part #80-68210

U.S. ENVIRONMENTAL PROTECTION AGENCY
Particulate Emissions: .54 g/hr. Tested to: EPA Method 28R
Certified to comply with 2020 crib wood particulate emission standards.

Date of Manufacture

2021	2022	2023	2024	2025
■	■	■	■	■

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
■	■	■	■	■	■	■	■	■	■	■	■

MADE IN USA. DO NOT REMOVE OR COVER THIS LABEL. 3300-756



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 catalysts, 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.

THE WARRANTIES CONTAINED IN THIS DOCUMENT ARE EXCLUSIVE AND ARE GIVEN BY HEARTHSTONE AND ACCEPTED BY THE ORIGINAL PURCHASER IN LIEU OF ALL OTHER EXPRESS WARRANTIES AND ANY OBLIGATIONS, LIABILITIES, RIGHTS, CLAIMS, OR REMEDIES IN CONTRACT OR TORT, WHETHER OR NOT ARISING FROM HEARTHSTONE'S NEGLIGENCE, ACTUAL OR IMPUTED. ALL IMPLIED WARRANTIES, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE GIVEN ONLY TO THE EXTENT REQUIRED BY FEDERAL OR STATE LAW. EXCEPT AS OTHERWISE REQUIRED BY STATE LAW, UPON THE EXPIRATION OF THE EXPRESS LIMITED WARRANTIES CONTAINED HEREIN, NO IMPLIED WARRANTIES, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY TO THE SUBJECT APPLIANCE. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

THE WARRANTIES CONTAINED IN THIS DOCUMENT EXTEND ONLY TO THE ORIGINAL PURCHASER OF THE APPLIANCE WARRANTED HEREUNDER. THEY ARE NOT TRANSFERRABLE AND DO NOT EXTEND TO ANY SUBSEQUENT OWNERS.

UNDER NO CIRCUMSTANCES SHALL HEARTHSTONE BE LIABLE TO THE ORIGINAL PURCHASER OR ANY OTHER PERSON FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO DAMAGE TO PROPERTY OR PERSONAL INJURIES, WHETHER ARISING OUT OF LOSS OF USE, BREACH OF WARRANTY, TORT, OR OTHERWISE, EVEN IF HEARTHSTONE HAS BEEN APPRAISED OF THE POSSIBILITY OF SUCH DAMAGES. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

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,

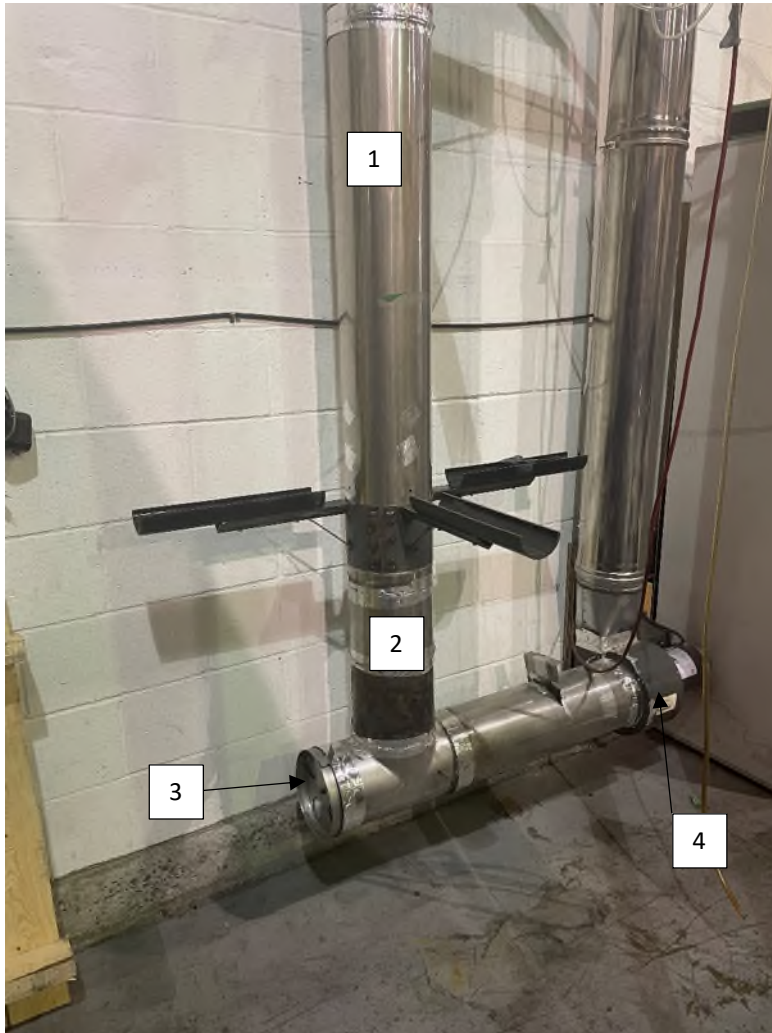
Hearthstone Quality Home Heating Products, Inc.
Warranty Department
317 Stafford Avenue
Morrisville, VT 05661

NOTE: SENDING IN THE SIGNED WARRANTY REGISTRATION FORM IS *NOT REQUIRED* AS A CONDITION OF WARRANTY COVERAGE OR HEARTHSTONE'S PERFORMANCE.

APPENDIX 8: Photographs of test set up

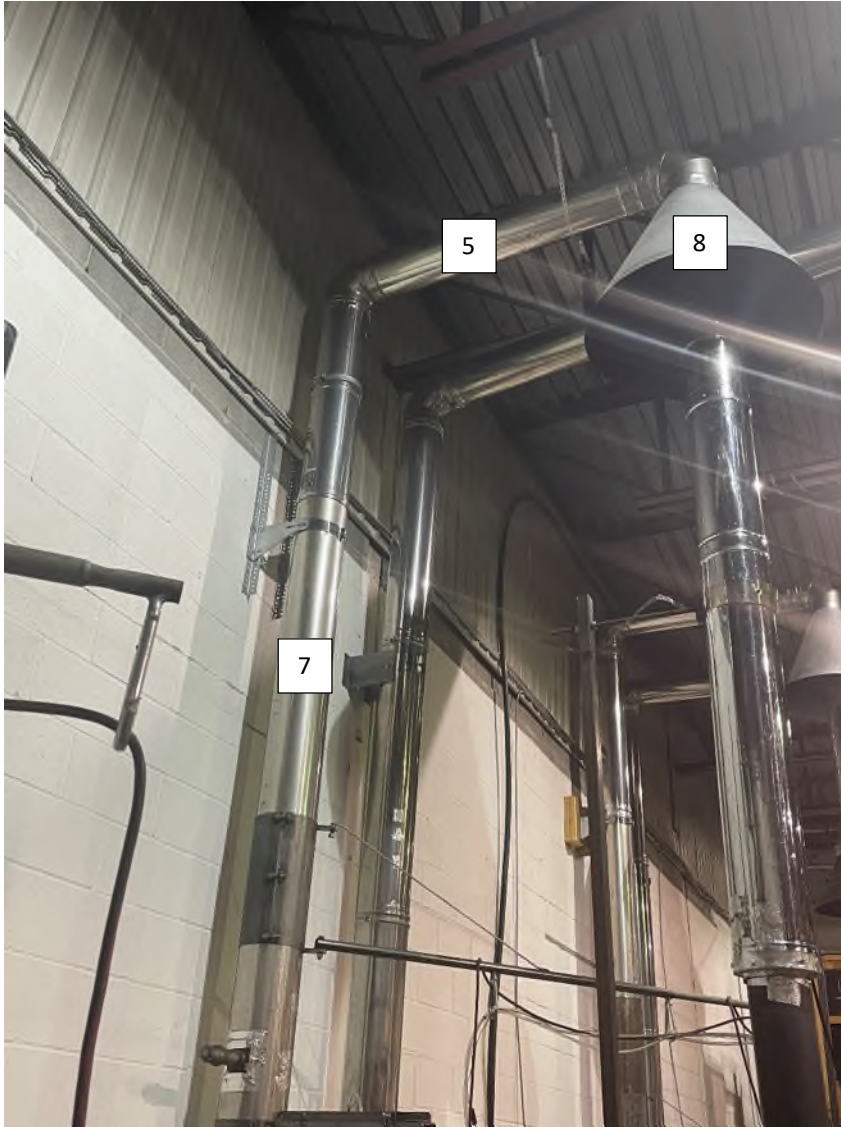
Dilution picture Dia 8

Picture 1: Sampling system



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

Picture 2: Hood



5 : 8 in. dia. Stainless steel pipe

6 : na

7 : 10 feet long between velocity port and upper elbow

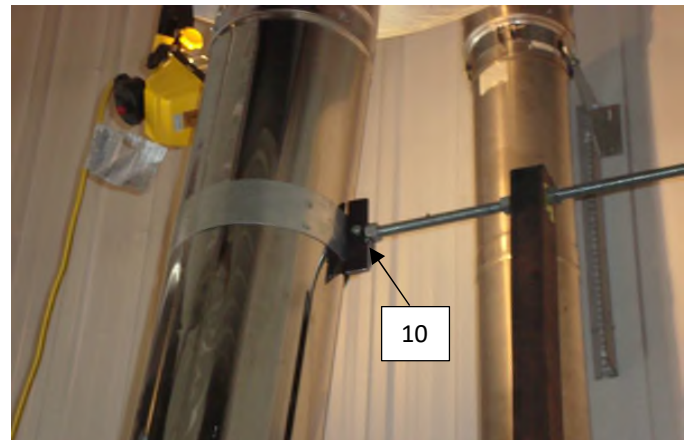
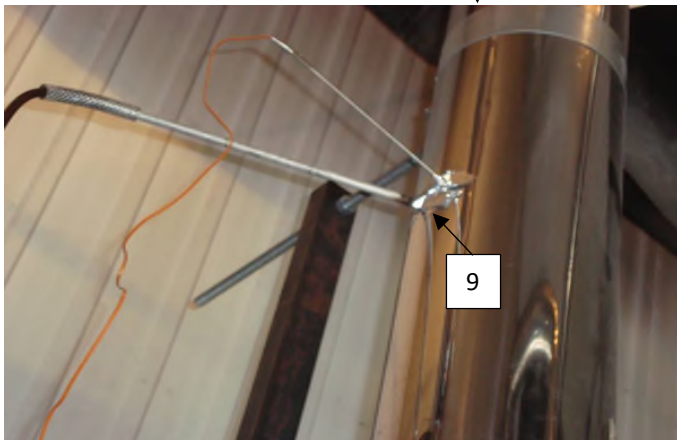
8 : 48 in. dia. Galvanized steel smoke captures hood

Picture 3: Stack sampling



Picture 3.1: Gas analysis and temperature probe

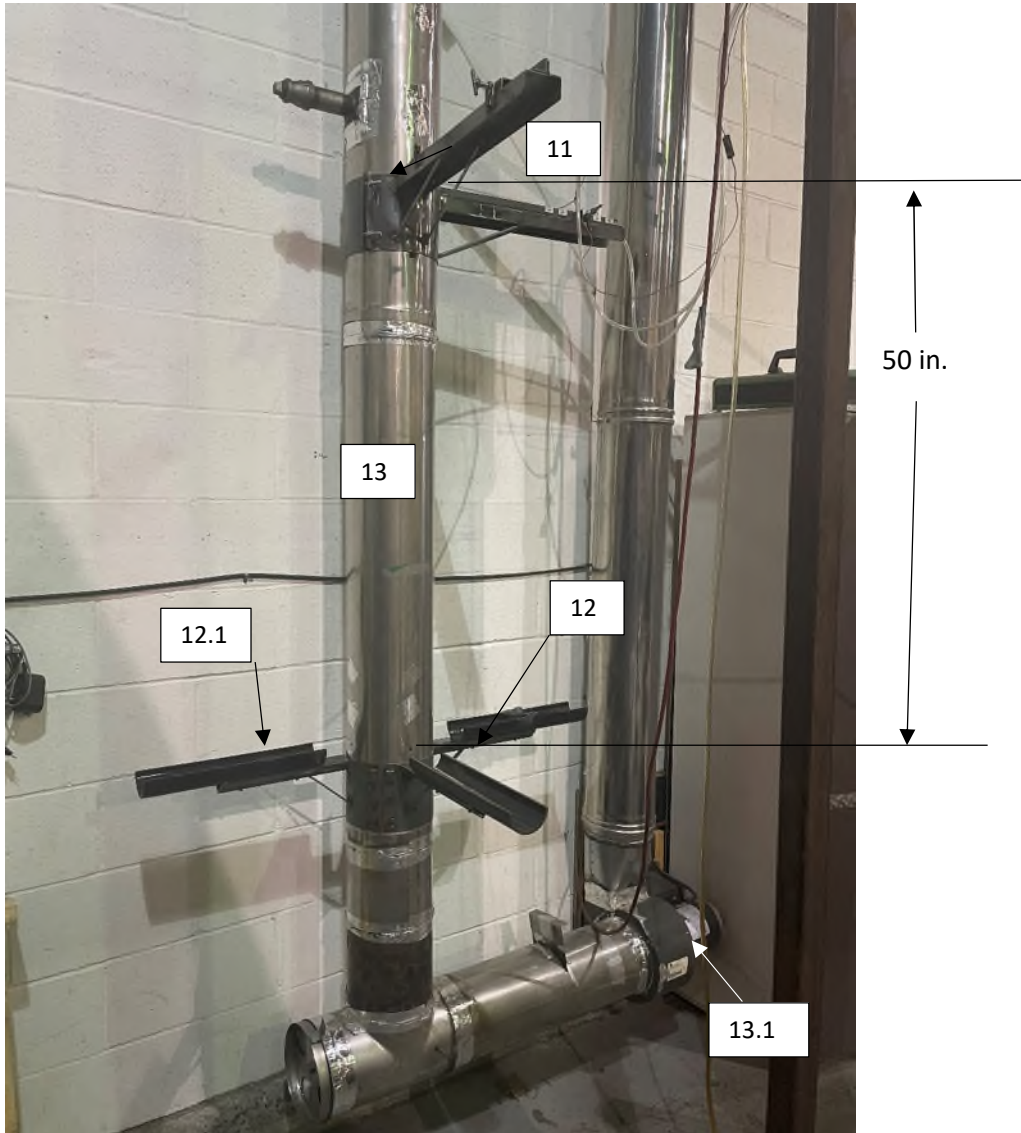
Picture 3.2: chimney support



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

10 : Exhaust system support bracket

Picture 4: Tunnel flow measurement and sampling probe



11: Velocity port

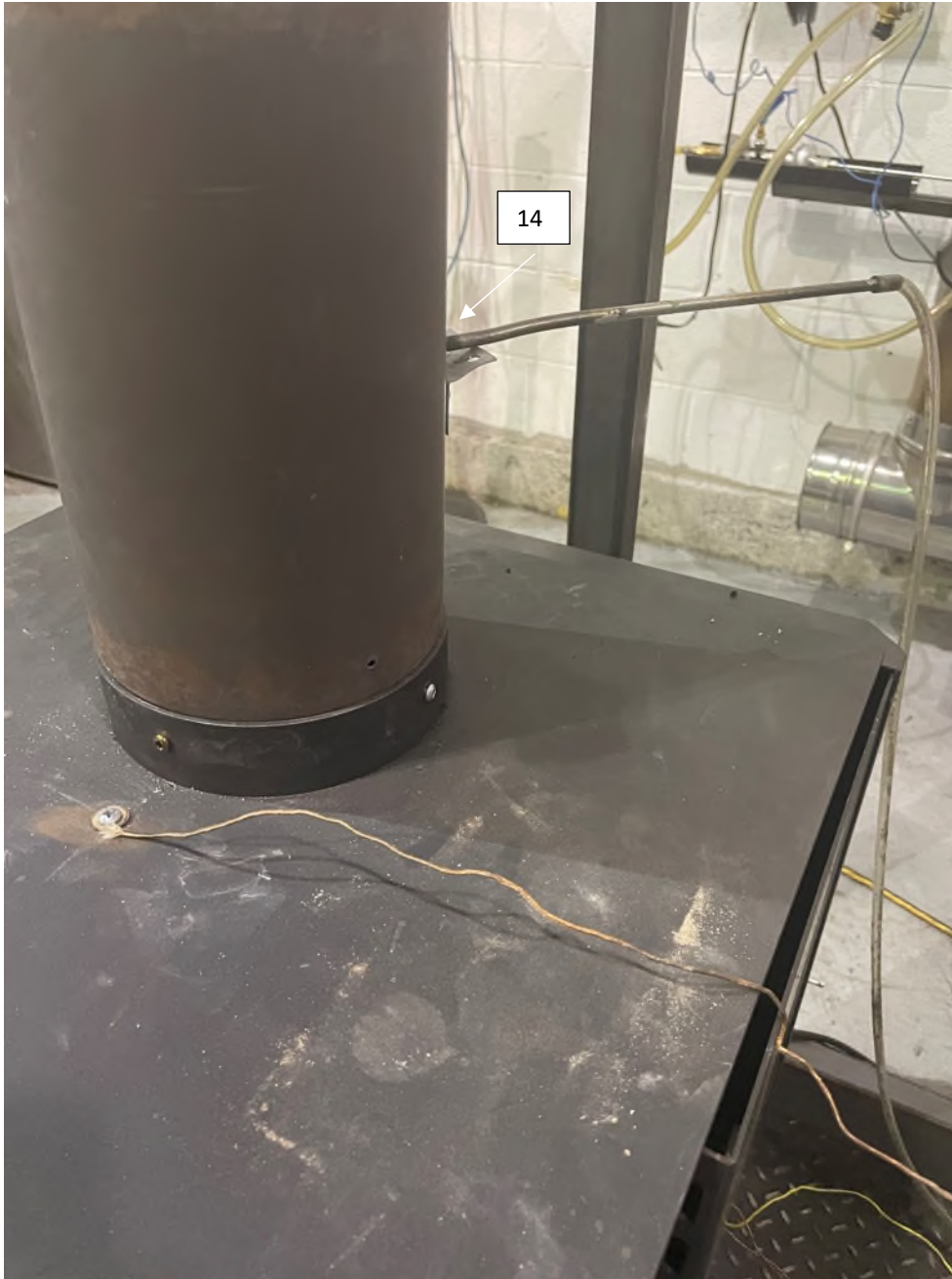
12: Sampling port, 2 sampling probes with 2x47 mm. dia.filter each.

12.1: Sampling port, sampling probes with 2x47 mm. dia.filter each., for first hour sampling

13:18 feet long dilution tunnel

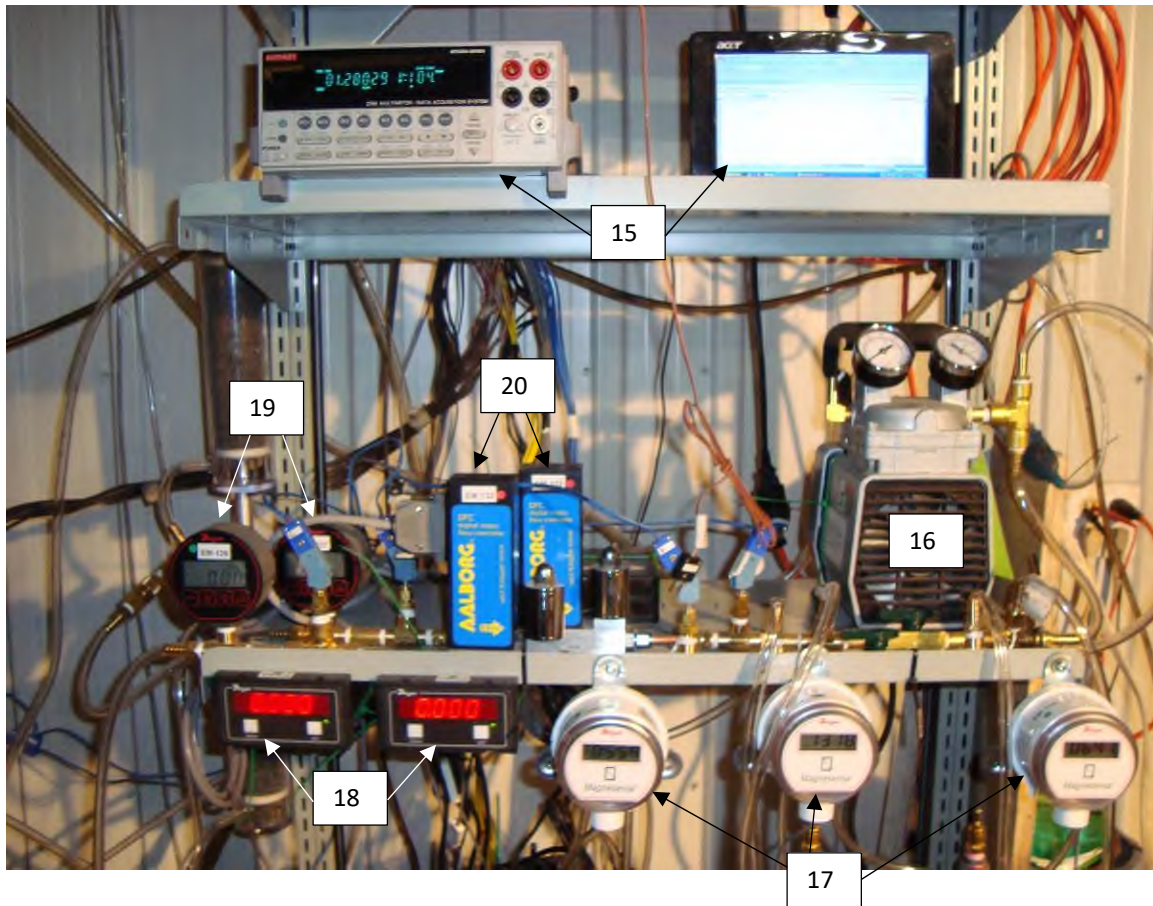
13.1: Extraction blower

Picture 5: Draft sampling



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

Picture 6: Equipments

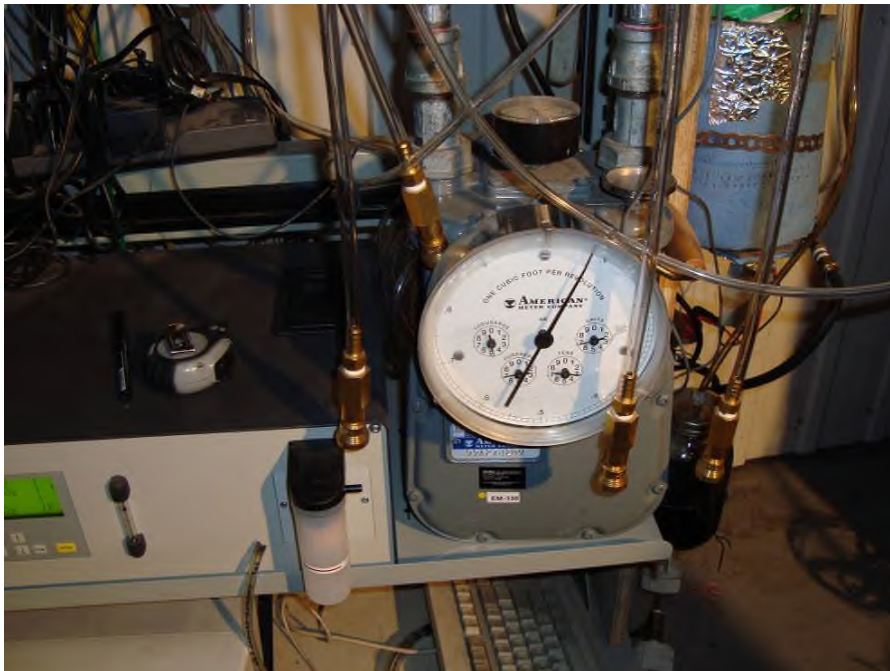


- 15 : Acquisition system
- 16 : Vacuum pump
- 17 : Digital manometer
- 18 : Digital read out for mass flow meter
- 19 : Digital vacuum gage
- 20 : Mass flow meter

Picture 7: Gaz analyser



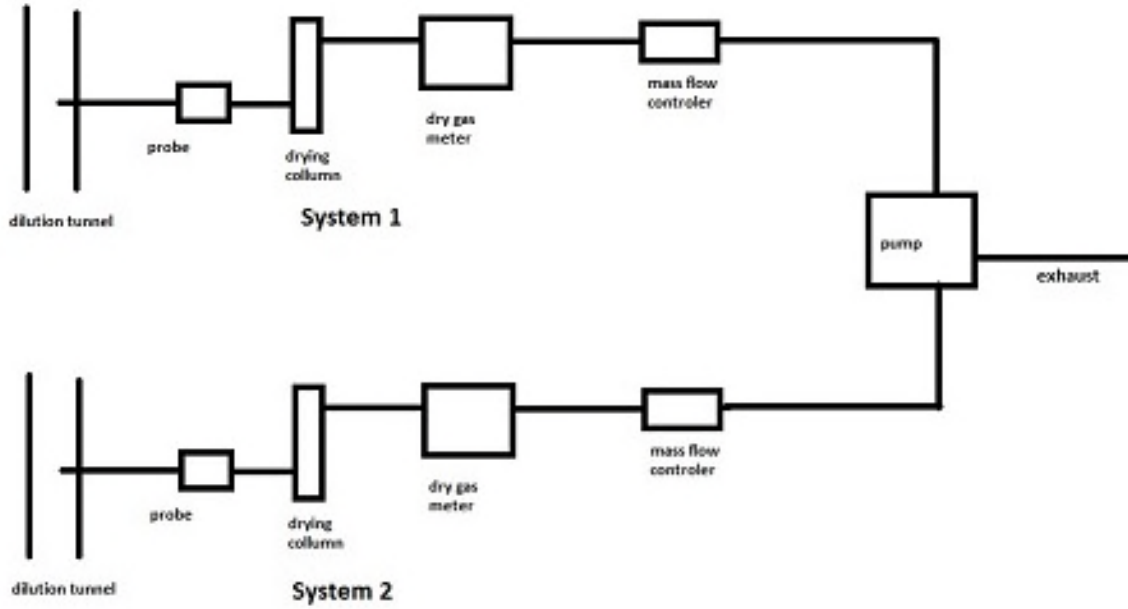
Picture 8: Reference dry gas meter



Picture 11: Dry gas meter



Picture 12: Dilution tunnel sample system



Picture 13: Dilution tunnel

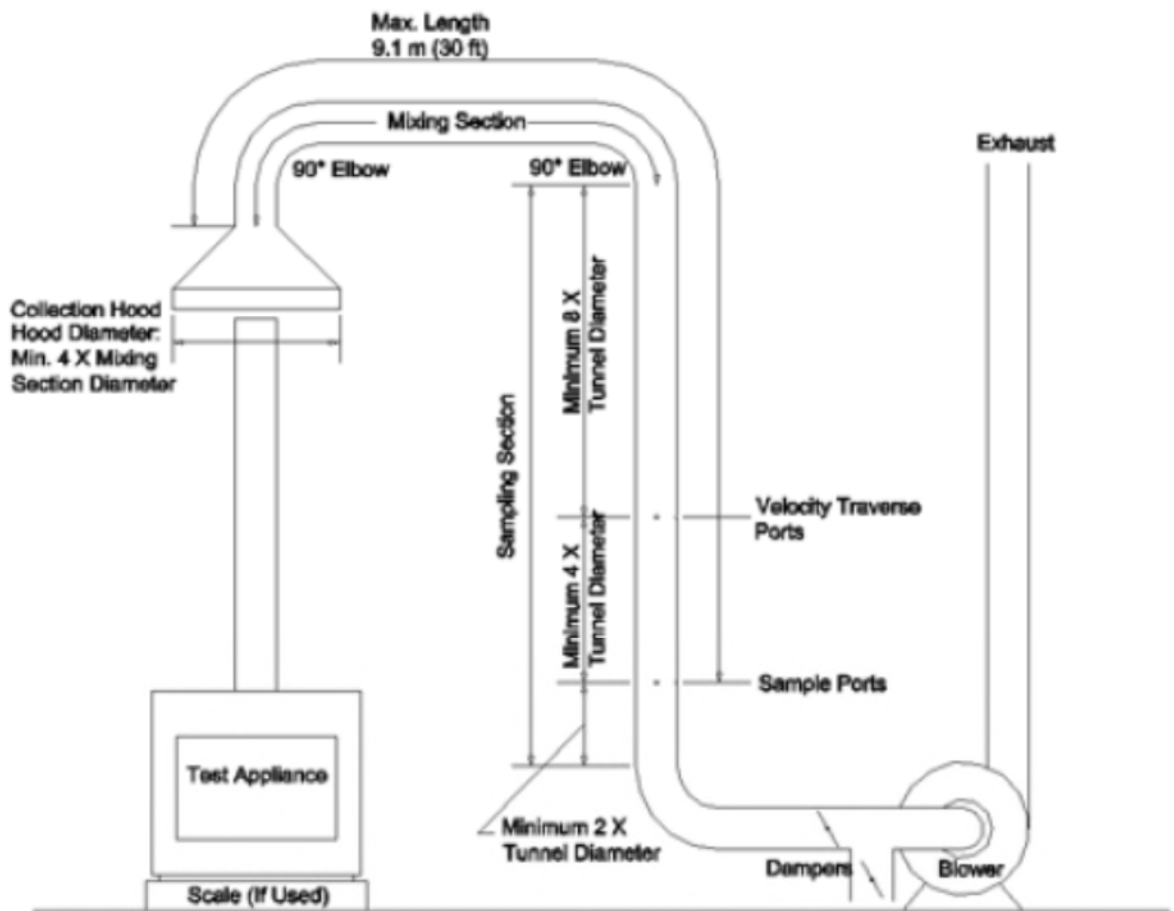


FIG. 3 Steel-Constructed Dilution Tunnel Apparatus

APPENDIX 9: Test load photographs

Run 1 September 29th 2020 low burn

Testing load



Back view



Testing load



Load in stove



Run 2 September 30th 2020 low burn

Side view



Testing load



Testing load



Load in stove

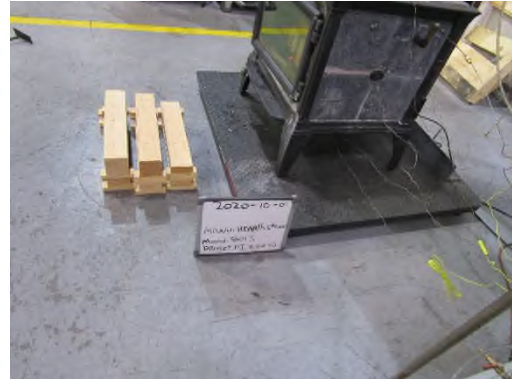


Run 3 October 1st 2020 maximum burn rate

Testing load



Testing load



Load in stove

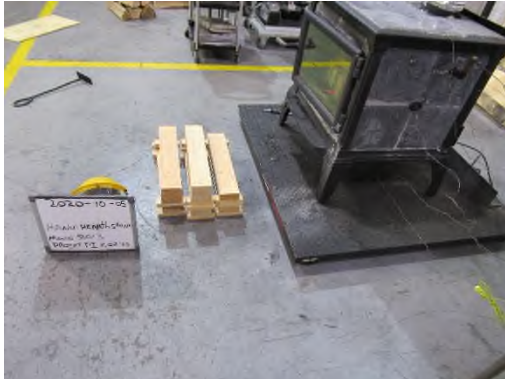


Testing load



Run 4 October 5th 2020 Medium burn (category 3)

Testing load



Testing load



Load in stove



Testing load

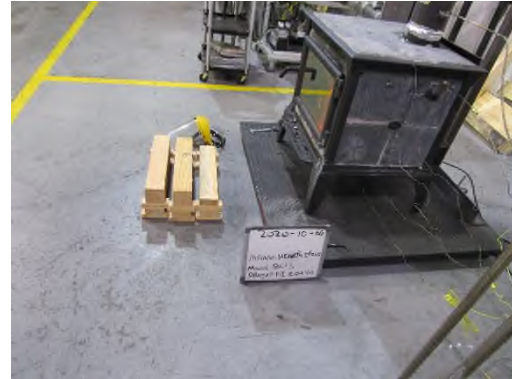


Run 5 October 6th 2020 minimum burn rate

Testing load



Testing load



Load in stove



Testing load



Run 6 October 7th 2020 no fan confirmation test

Testing load



Testing load



Load in stove



Testing load



APPENDIX 10: Laboratory Operating Procedures

POLYTESTS Services inc.

SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

INTRODUCTION

This document provides a step by step guide for the technician conducting tests to EPA standard requirements. Procedures outlined here, when followed, will result in tests in conformance with EPA Methods 28R, ASTM E2780, ASTM E2515, ASTM E2618, Method 28WHH, Method 28 PTS, Method ALT-125, ASTM E3053.

The primary measurements to be made are particulate emissions rates. The technician's duties include the following steps.

1. Incoming inspection of test units.
2. Set-up of test units.
3. Preliminary testing to establish unit operating procedures and familiarity with operating controls.
4. Calibration of test equipment.
5. Set-up, checking and operation of sampling apparatus.
6. Conduct of tests including complete record keeping and data recording for non-automated functions.
7. Operation of hardware and software included in automatic data acquisition system.
8. Review and analysis of data at test completion to ensure test validity.

The technician running this test must be familiar with the following documents, which are to be kept in the laboratory at all, times.

EPA METHODS

1. EPA METHODS 28R
2. ASTM E2780
3. ASTM E2515
4. ASTM E2618
5. METHOD 28WHH
6. METHOD 28 PTS
7. ALT-125
8. ASTM E3053

POLYTESTS Services inc.

SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

I. APPLIANCE INSPECTION AND SET-UP

A. INCOMING INSPECTION

1. Check for completeness of unit including parts, accessories, installation and operating instructions, drawings and specifications etc. Note any discrepancies or missing parts or information.
2. Check for shipping damage. If damage has occurred, notify the laboratory manager. In some cases, repairs may be made, provided the manufacturer and laboratory manager concur that repairs will not affect the unit's performance. If damage is irreparable, a new unit will need to be obtained.
3. Note whether unit is catalytic or non-catalytic.
4. Mark unit with manufacturer's name, model number, work order number and date received.
5. If unit is safety listed, note label data including listing agency and serial number. If unit is not listed, mark all data sheets "UNLISTED". Test results will not be released until unit passes safety tests without modification unless authorized by laboratory manager.

B. UNIT SET-UP

1. All new units must be operated for a breaking in period as follows.
 - a) Non-catalytic units: Ten (48) hours at medium burn rate with Douglas Fir scrap or cordwood.
 - b) Catalytic units: Fifty (50) hours at medium burn rate with Douglas Fir scrap or cordwood.

During these break-in runs the unit may be connected to a lab chimney and fuel additions noted into the corresponding data acquisition file. For catalytic units, a thermocouple must be installed in the catalyst.

Record catalyst temperature at 1-hour intervals or on chart recorder. Operating should continue until data shows at least fifty (50) hours of operation with catalyst temperature in excess of 500 degrees Fahrenheit (active range).

For non-catalytic units a stack thermocouple should be installed and stack temperature recorded at 1-hour intervals. Fourty-eight (48) hours minimum burn time with a stack temperature of at least 250 degrees Fahrenheit is required.

Once break-in is completed, allow unit to cool. Clean unit thoroughly.

POLYTESTS Services inc.

SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

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.

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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 CO₂ and CO analyzers are “ZEROED” on nitrogen. The O₂ 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 (O₂ should be 20.93, CO and CO₂ should equal 0).
- b) Flow the calibration gas in the unit and start stop watch. Note the time required for each unit to reach .90 of the calibration gas bottle value. If all three analyzers reach this value within 15 seconds of each other, synchronization is adequate. If not, contact the laboratory manager. Synchronization is adjusted by internal instrument setting.

4. Set-up sample clean-up and water collection train as follows.

- a) Load impingers as follows:
Impinger #1: 100 ml distilled water and 5 ml H₂SO₄
Impinger #2: 100 ml distilled water and 5 ml H₂SO₄
Impinger #3: Empty
Impinger #4: 200 – 300 grams silica gel (dry)

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- 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 ambient conditions on data form no. EPA-8-TP.

B. DILUTION TUNNEL SAMPLE TRAIN SET-UP

- 1. Filters and holders.
 - a) Clean probes and filter holder front housings carefully and desiccate for at least 24 hours prior to use.
 - b) Filters should be numbered and filter and probe combinations labeled prior to use.
 - c) Weigh desiccated filters and probe-filter units on analytical balance. Record weights data form no. EPA-10-TP. Note that probe and front half of front filter are to be weighed as a unit.
 - d) Carefully assemble filter holder units and connect to sampling systems. Check "DRIERITE" columns for adequate dry absorbent (blue).
- 2. Leak checking.
 - a) Each sample system is to be checked for leakage prior to inserting probes in tunnel.
 - b) Plug probes and start samplers, adjust pump bypass valve to produce a vacuum reading of 5 inches Hg. (NOTE: During test, vacuum must not exceed 5 inches unless posttest leak check shows acceptable results.)

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c) Allow vacuum indication to stabilize for two (2) minutes, then record time and dry gas (DGM₁) and (DGM₂) meter readings. Wait ten (10) minutes and record dry gas meter readings again (DGM₃, DGM₄). NOTE: If mark, system is leaking too much and all seals should be checked.

d) Calculate leakage rate as follows.

$$1) \text{ System 1: } \frac{(DGM_3 - DGM_1)}{10} = CFM_1$$

$$2) \text{ System 2: } \frac{(DGM_4 - DGM_2)}{10} = CFM_2$$

If CFM₁ or CFM₂ is greater than .02 CFM, leakage is unacceptable and system must be resealed.

If CFM₁ or CFM₂ 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.

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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 anemometer. Must be less than 50 ft/min.
4. Check all equipment for proper operation. Analyzers should be on and in sample mode. Computer should be loaded with test program and awaiting test start command.
5. Zero scale and start fire with uncolored newspaper and kindling representing 10 % of test load with the same type of fuel.
6. Once kindling is burning well after 5 minutes, add splitted pieces having a bottom surface around 4 sq. inches and representing 25% of test load weight. Operate at high fire for 15 minutes. Then adjust settings to intended test run levels as per the manufacturer's.
7. Following addition of pretest fuel load (splitted pieces), start computer for data logging.
8. All fuel additions, air intake settings and operational characteristics shall be noted with associated time stamp on form no. EPA-1-TP.

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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 allowed for ALT-125 method)
 - f) An alarm will sound an audible signal at the (10) minutes intervals. This signal a reading interval. You must verify at each interval that the following readings are correctly logged by the data acquisition system and make observations of any unusual or non-routine events that could occur.
 - 1) Rotometer readings.
 - 2) Tunnel pitot tube reading.
(Zero regularly between readings)
 - 3) Gas meter readings.
 - 4) Temperature readings.
 - 5) Draft reading
 - 6) Test load weight
 - 7) CO, CO₂ and O₂ 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,

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remove filter holder and probes from tunnel and impingers from sample line.

IV. POST TEST PROCEDURES

A. SAMPLE RECOVERY – FILTER TRAINS

1. Carefully clean outside of probes and filter housings with alcohol.
2. Disassemble filter holder and transfer filters to clean petri dish. Scrape gasket with scalpel and collect any loose material on filters.
3. Place probe and front half of first filter holders (still assembled) and filters in desiccator. Allow 24-hour desiccation before weighing.
4. Weigh probe filter holder units and filters at six (6) hour intervals until weight change between weighings is less than 0.2 mg. Record all weights taken on data form no. EPA-10-TP.

B. CALCULATION OF RESULTS

The computer program carries out all final calculations. When run, it will ask for data from forms used during the test. Enter data as called for.

GENERAL

This guide cannot cover every possible contingency, which may develop during a particular test program. Many questions, which may arise, can be answered by a complete understanding of the test standards and their intent. When in doubt on any detail, check with the laboratory manager and be sure you understand the procedures involved.

It is critical that all spaces on the data forms be properly filled in. Each test must be represented by a complete record of what was done and when.

APPENDIX 11: Sample calculations

Validation du fichier de calcul avec les équations provenant des normes:

ASTM E2515-11

ASTME2618

Dry burn rate (BR)

Equation used

B415.1, 13.4

$$BR = \left[\frac{60W_{WD}}{\theta} \right] \left[\frac{100 - \%M_W}{100} \right]$$

Nomenclature

BR	Dry wood burn rate, kg/hr (lb/hr)
W_{WD}	Total mass of wood burned (wet basis) during the test run, kg (lb)
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}	18,22 lbs
θ	443 min
$\%M_W$	17,84 %

Calculation

BR	0,920 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	79,94 dcf
Y	1,00769769
P_{bar}	29,71 in Hg
ΔH	-0,5652 in Hg
T_m	549,6 R

Calculation

$V_{m(std)}$	75,35 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	0,002 g

Calculation

m_n	2,200 mg
-------	----------

Calculation based of train 2 data

Particulate concentration (C_s)

Equation used

ASTM 2515, equation 13

$$C_s = (0,001 \text{ g/mg}) \times \left(\frac{m_n}{V_{m(\text{std})}} \right)$$

Nomenclature

C_s	Concentration of particulate matter in stack gas or dilution tunnel, dry basis, corrected to standard conditions, g/dsm^3 (g/dscf)
m_n	Total amount of particulate matter collected in the sampling train, mg
$V_{m(\text{std})}$	Volume of gas sample measured corrected to dry standard conditions, dsm^3 (dscf)

Sample calculation

Data

m_n	2,200 mg
$V_{m(\text{std})}$	75,35 dscf

Calculation

C_s	0,000029 g/dscf
-------	-----------------

Calculation based of train 2 data

Particulate concentration for room air (C_r)

Equation used

ASTM 2515, equation 14

$$C_r = (0,001 \text{ g/mg}) \times \left(\frac{m_r}{V_{mr(std)}} \right)$$

Nomenclature

C_r	Concentration of particulate matter in room air, dry basis, corrected to standard conditions, g/dsm 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 (dscf)

Sample calculation

Data

m_r	0,100 mg
$V_{mr(std)}$	58,86 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 cacluated after the Pitot tube traverse
V_{scent}	Average gas velocity at the center of the dilution tunnel cacluated after the multi-point Pitot traverse
F_P	Adjustment factor for center of tunnel pitot tube placement

Sample calculation

Data

V_{strav}	0,263434974
V_{scent}	0,280177094

Calculation

F_P	0,940245
-------	----------

Average dilution tunnel gas velocity (V_S)

Equation used

ASTM 2515, equation 9

$$V_S = F_p K_p C_p (\sqrt{\Delta P})_{avg} \sqrt{\frac{T_S}{P_S M_S}}$$

Nomenclature

V_S	Average dilution tunnel gas velocity, m/s (ft/s)
K_p	Pitot tube constant For the metric units: $34.97 \text{ m/sec} \left[\frac{(\frac{\text{g}}{\text{g-mole}})(\text{mm Hg})}{(^{\circ}\text{K})(\text{mm H}_2\text{O})} \right]^{1/2}$ For English units: $85.49 \text{ ft/sec} \left[\frac{(\frac{\text{lb}}{\text{lb-mole}})(\text{in Hg})}{(^{\circ}\text{R})(\text{in H}_2\text{O})} \right]^{1/2}$
C_p	Pitot tube coefficient (use 0.99 for standard pitot tube, 0.84 may be used for S-type tubes constructed according to Method 2 specifications)
F_p	Pitot tube correction factor
$(\sqrt{\Delta P})_{avg}$	Average square root of each individual velocity head (ΔP)
P_{bar}	Barometric pressure at measurement site, mm H ₂ O (in. H ₂ O)
P_g	Stack static pressure, mm Hg (in. Hg)
P_S	Absolute dilution tunnel static gas pressure, mm Hg (in. Hg), or $P_{bar} + P_g$
M_S	Molecular weight of dilution tunnel gas, wet basis, g/g-mole (lb/lb-mol) may be assumed to be 28.78 or 29 for CSA B415
t_s	Dilution tunnel temperature, °C (°F)
T_S	Absolute dilution tunnel temperature, °K (°R), or $273 + t_s$ for metric units, $460 + t_s$ for English units

Sample calculation

Data

K_p	85,49
C_p	0,99
F_p	0,940
$(\sqrt{\Delta P})_{avg}$	0,2759 in H ₂ O ^{1/2}
P_{bar}	29,71 in Hg
P_g	0,28 in H ₂ O
P_S	29,73 in Hg
M_S	28,78 lb/lb-mol
t_s	86,13 F
T_S	546,13 R

Calculation

V_S	17,5408 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 ($^{\circ}\text{R}$), or $273 + t_s$ for metric units, $460 + t_s$ for English units
t_s	Dilution tunnel temperature, °C (°F)
P_S	Absolute dilution tunnel static gas pressure, mm Hg (in. Hg), or $P_{bar} + P_g$
P_{bar}	Barometric pressure at measurement site, mm Hg (in. Hg)
P_g	Dilution tunnel static pressure, mm Hg (in. Hg)
P_{std}	Standard absolute pressure, 760 mm Hg (29.92 in. Hg)

Sample calculation

Data

B_{WS}	0,02
V_S	17,541
A	0,349 ft^2
T_{std}	528 R
T_S	546,13 R
P_S	29,727 in Hg
P_{std}	29,92 in Hg

Calculation

Q_{std}	345,84 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	0,000029 g/dscf
C_r	0,000002 g/dscf
Q_{std}	345,84 dscf/min

Calculation

E	0,01 g/min
E	0,57 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	0,000029 g/dscf
C_r	0,000002 g/dscf
Q_{std}	345,84 dscf/min
θ	443 min

Calculation

E	4,21 g
---	--------

Calculation based on train 2 data.

Average gas velocity in dilution tunnel during each min interval, i, of the test run

Equation used

ASTM 2515, equation 10

$$v_{si} = F_p K_p C_p \sqrt{\Delta p_i} \sqrt{\frac{T_{si}}{P_s M_s}}$$

Nomenclature

	Average gas velocity in dilution tunnel during each min interval, i of the test run
v_{si}	m/sec (ft/sec)
F_p	Pitot tube correction factor
K_p	Pitot tube constant For the metric units: $34.97 \text{ m/sec} \left[\frac{(\frac{g}{g\text{-mole}})(\text{mm Hg})}{(^{\circ}\text{K})(\text{mm H}_2\text{O})} \right]^{1/2}$ For English units: $85.49 \text{ ft/sec} \left[\frac{(\frac{\text{lb}}{\text{lb-mole}})(\text{in Hg})}{(^{\circ}\text{R})(\text{in H}_2\text{O})} \right]^{1/2}$
C_p	Pitot tube coefficient (use 0.99 for standard pitot tube, 0.84 may be used for S-type tubes constructed according to Method 2 specifications)
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 $P_{\text{bar}} + P_g$
M_s	Molecular weight of dilution tunnel gas, wet basis, g/g-mole (lb/lb-mol) may be assumed to be 28.78

Sample calculation

Data

i=1		i=2	
F_p	0,940	F_p	0,940
K_p	85,49	K_p	85,49
C_p	0,99	C_p	0,99
Δp_i	0,076 in H ₂ O	Δp_i	0,075 in H ₂ O
T_{si}	553,2 R	T_{si}	550,0 R
P_s	29,73 in Hg	P_s	29,73 in Hg
M_s	28,78 lb/lb-mol	M_s	28,78 lb/lb-mol

Calculation

i=1		i=2	
v_{si}	17,68 ft/sec	v_{si}	17,43 ft/sec

Percent of proportional sampling rate (PR)

Equation used

B415, equation 13.1

$$PR = \left(\frac{\theta V_{mi(std)} V_S T_m T_{Si}}{\theta_i V_m V_{Si} T_{mi} T_S} \right) \times 100$$

Nomenclature

PR	Percent of proportional sampling rate (%)
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	443	min	θ	443	min
θ_i	1	min	θ_i	1	min
V_m	77,58	dcf	V_m	75,38	dcf
$V_{mi(std)}$	0,172	cuft	$V_{mi(std)}$	0,1715	cuft
V_S	17,55	ft/sec	V_S	17,55	ft/sec
V_{Si}	17,694	ft/sec	V_{Si}	17,694	ft/sec
T_m	537,1	R	T_m	549,6	R
T_{mi}	534,72	R	T_{mi}	535,86	R
T_S	546,13	R	T_S	546,13	R
T_{Si}	553,2	R	T_{Si}	553,2	R

Calculation

train=1		train=2	
PR	99,0 %	PR	103,8 %

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, m ² (ft ²)

Sample calculation

Data

V_{mL}	0,169 dcf
F_A	0,0116 ft ²

Calculation

FV_{max}	14,58 ft/min
------------	--------------

Dual train precision

Equation used

$$\frac{\text{Train 1} - \text{average train 1 and train 2}}{\text{average train 1 and train 2}} \times 100 \leq 7.5\%$$

Nomenclature

Dual train precision	Deviation between emission's train 1 and 2
Train 1	Total emission for train 1
Train 2	Total emission for train 2

Sample calculation

Data

Train 1	4,68 g
Train 2	4,21 g

Calculation

Dual train precision	5,24 %
----------------------	--------

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

APPENDIX 13: Operating instruction

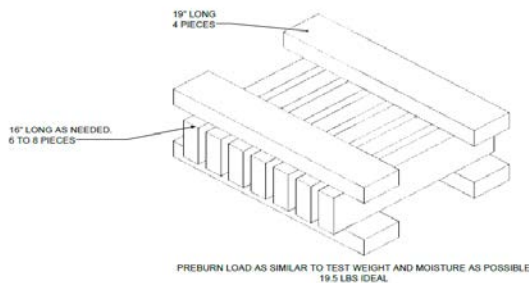
MODEL: 8013
 DATE: 8/31/2020
 TEST ENGINEER: SPB



NOTE: AIR CONTROL HANDLE IS PULLED OUT FOR HIGH AND PUSHED IN FOR LOW.
 BYPASS HANDLE (FROM RIGHT SIDE) IS TURNED CLOCKWISE TO OPEN AND COUNTER
 CLOCKWISE TO CLOSE

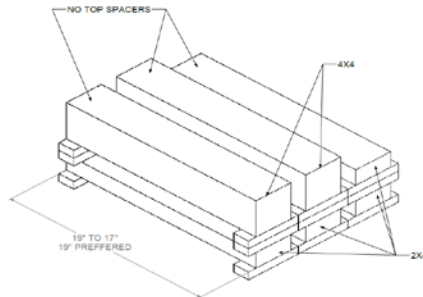
BURN RATE CATEGORY	KINDLING	WARM UP	PREBURN START	AIR SETTINGS	TEST FAN SETTING	COAL BED PREP	TEST LOAD	START OF TEST (AT AVERAGE TEMP)
LOW .96KG/H	5.0 LBS, BURN WITH DOOR OPEN 3" FOR 2.5 LBS, CLOSE DOOR @ 2.5LBS, BURN ANOTHER 1.5LBS	LOAD WARM UP @ 1 LB KINDLE REMAINING. SEE FIGURE 1 FOR SIZES AND WEIGHT RANGE KEEP DOOR CRACKED AS NEEDED	2.5 LBS 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 SHUTTER TO LOW, PUSHED FULLY IN.	OFF FOR WARMUP, LOW FOR PREBURN, ON LOW FOR ENTIRETY OF TEST	25 MINS INTO PREBURN: RAKE UNBURNT PREBURN WOOD FORWARD. 2 MIN BEFORE START OF TEST: BREAK UP COALS, MAKE EVEN SIZE, DENSITY, AND HIGHT, FRONT TO BACK AND SIDE TO SIDE OF FIREBOX	SEE FIGURE 2 FOR SIZE AND NUMBER OF PIECES 19.5 LBS IDEAL	AT 445°F AVG TEMP, OPEN BYPASS AND PRIMARY, INSERT WOOD PRESSING SPACERS INTO COAL BED , CLOSE LOAD DOOR AND BYPASS, AIR SHUTTER ON HIGH FOR FIRST 5 MINUTES. @ 5 MIN SET AIR SHUTTER TO LOW, KEEP LPAO CLEAR OF COALS IN FRONT OF TEST LOAD
MED LOW .96KG/H	5.0 LBS, BURN WITH DOOR OPEN 3" FOR 2.5 LBS, CLOSE DOOR @ 2.5LBS, BURN ANOTHER 1.5LBS		2.5 LBS 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 SHUTTER TO LOW, PUSHED FULLY IN.	OFF FOR WARMUP, LOW FOR PREBURN, ON LOW FOR ENTIRETY OF TEST			AT 445°F AVG TEMP, OPEN BYPASS AND PRIMARY, INSERT WOOD PRESSING SPACERS INTO COAL BED , CLOSE LOAD DOOR AND BYPASS, AIR SHUTTER ON HIGH FOR FIRST 5 MINUTES. @ 5 MIN SET AIR SHUTTER TO LOW, KEEP LPAO CLEAR OF COALS IN FRONT OF TEST LOAD
MED HIGH 1.37KG/H	5.0 LBS, BURN WITH DOOR OPEN 3" FOR 2.5 LBS, CLOSE DOOR @ 2.5LBS, BURN ANOTHER 1.5LBS		3.0 LBS 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 SHUTTER TO MED-HIGH, PULL AIR SHUTTER TO 4.875" FROM WHITE DOT (FIGURE 3).	OFF FOR WARMUP, LOW FOR PREBURN, ON LOW FOR ENTIRETY OF TEST			AT 445°F AVG TEMP, OPEN BYPASS AND PRIMARY, INSERT WOOD PRESSING SPACERS INTO COAL BED , CLOSE LOAD DOOR AND BYPASS, AIR SHUTTER ON HIGH FOR FIRST 5 MINUTES. @ 5 MIN SET AIR SHUTTER TO MED-HIGH (AIR SHUTTER TO 4.875" WHEN MEASURED FROM WHITE DOT, FIGURE 3), KEEP LPAO CLEAR OF COALS IN FRONT OF TEST LOAD
HIGH 2.46KG/H	5.0 LBS, BURN WITH DOOR OPEN 3" FOR 2.5 LBS, CLOSE DOOR @ 2.5LBS, BURN ANOTHER 1.5LBS		12 LBS 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 SHUTTER TO HIGH, PULLED FULLY OUT.	OFF FOR WARMUP, HIGH FOR PREBURN, ON HIGH FOR ENTIRETY OF TEST			AT 520°F AVG TEMP, OPEN BYPASS, INSERT WOOD PRESSING SPACERS INTO COAL BED, CLOSE LOAD DOOR AND BYPASS, AIR SHUTTER ON HIGH FOR ENTIRETY OF TEST. KEEP LPAO CLEAR OF COALS IN FRONT OF TEST LOAD

FIGURE 1 Warmup Load Arrangement



SET WOOD LOAD TO BACK OF STOVE
 WARMUP WEIGHT AND MOISTURE SIMILAR TO TEST LOAD

FIGURE 2 Test Load Arrangement



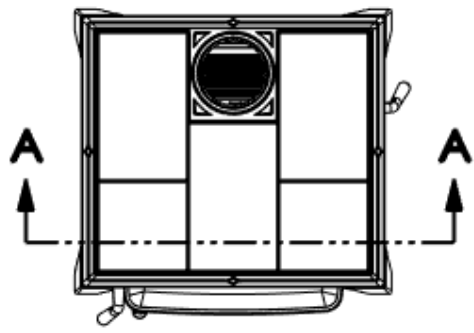
SET WOOD LOAD TO BACK OF STOVE
 21.5% TO 22.5% MOISTURE IDEAL



FIGURE 3 MED-HIGH SETTING

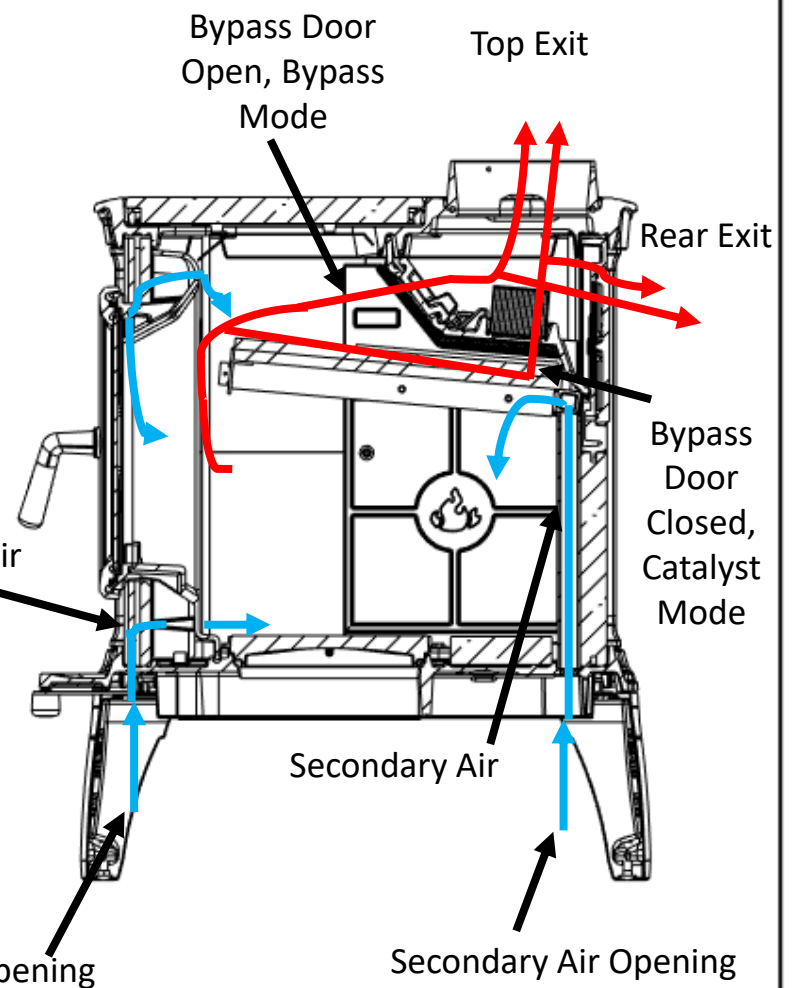
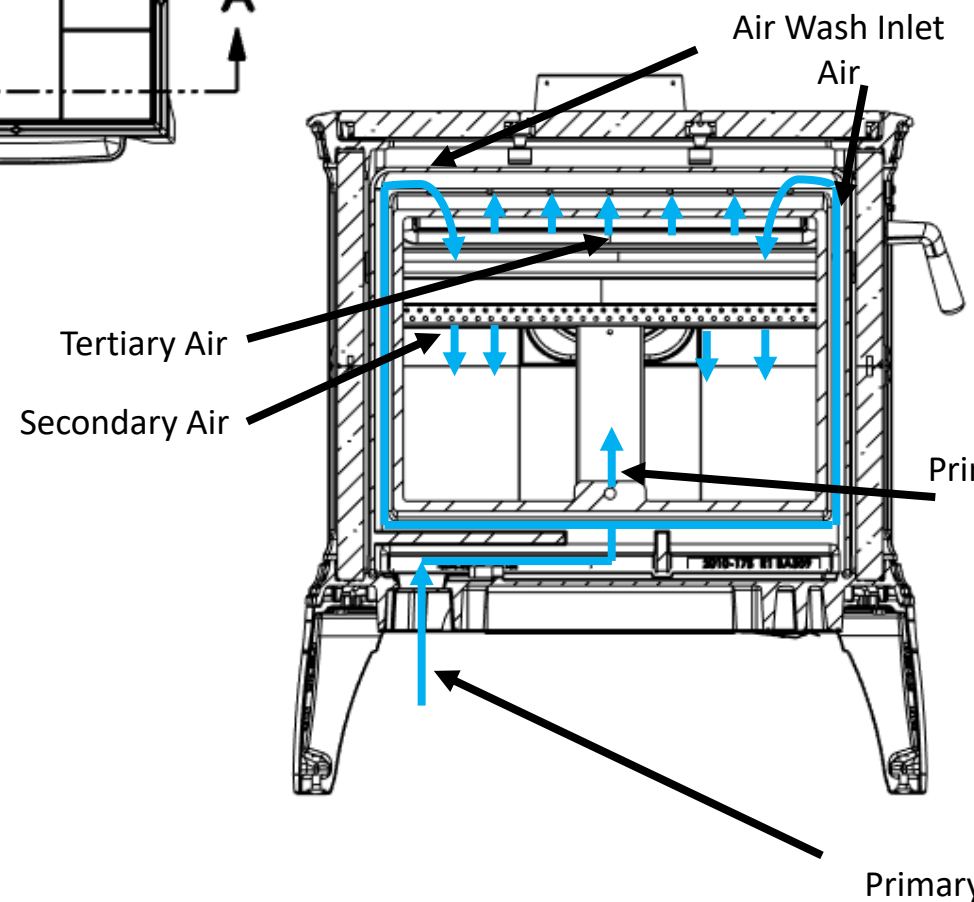


MED-HIGH SETTING
 4.875" FROM WHITE DOT TO FLAT SECTION OF AIR SHUTTER

APPENDIX 14: Drawing Air flow pattern




 Inlet Air
 Exhaust Air



SECTION A-A
SCALE 1 : 6

WEIGHT:

REV.	DESCRIPTION	DATE	APPROVED

 VIEWS ARE THIRD ANGLE	UNLESS OTHERWISE SPECIFIED: TOLERANCES ARE: FINISHES: DIMENSIONS: ANGLES: 1/64 .0015 ± 0.15 ± 1/4° JOCK: .005	CAD GENERATED DRAWING. DO NOT MANUALLY UPDATE
	1.) DIMENSIONS ARE IN INCHES / MM 2.) ALL MACHINED SURFACES TO BE DE-BURRED AND SMOOTHED MATERIAL: SEE NOTES FINISH: FINISH	APPROVALS DATE DRAWN: 2/11/2021 CHECKED: _____ REP' ENG: _____ INFO ENG: _____ QUAL ENG: _____

APPENDIX 15: 30-day notice, Wood heater application, C.o.C.

**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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- ▶ 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):	<input checked="" type="checkbox"/> Adjustable Burn Rate Wood Heater	<input type="checkbox"/> Pellet Stove	<input type="checkbox"/> Single Burn Rate Heater	<input type="checkbox"/> Hydronic Heater	<input type="checkbox"/> Forced Air Furnace	<input type="checkbox"/> Other:
Hydronic Heater Type (Circle One):	<input type="checkbox"/> Traditional	<input type="checkbox"/> Full Storage	<input type="checkbox"/> Partial Storage	<input type="checkbox"/> Indoor/Outdoor	<input type="checkbox"/> Other:	
Forced-Air Furnace Type (Circle One):	<input type="checkbox"/> Small (less than 65,000 BTU/hr heat output)		<input type="checkbox"/> Large (greater than 65,000 BTU/hr heat output)		<input type="checkbox"/> Other:	
Fuel Type:	<input checked="" type="checkbox"/> Crib	<input type="checkbox"/> Pellet	<input type="checkbox"/> Cordwood	<input type="checkbox"/> Other:		

Model Name and Number: Mansfield 8013

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
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- ▶ 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.

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

Date(s) of Proposed Test: Sept 28th thru Oct 9th

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
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- ▶ 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

09/22/2020
Date

Remarks:

The Mansfield 8013 is a "Hybrid"-type appliance, incorporating both a secondary combustion system and a catalyst, and should be listed as such.

v1

St-jean-sur-Richelieu, September 8th 2021

Att.: Rafael Sanchez, Steffan Johnson

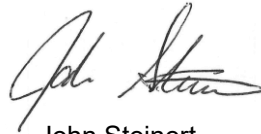
Subject: TYPO, mixing baffle in template report

In our report template we forgot to remove the reference of the mixing baffle in the dilution tunnel in the description section 3.1 and in the drawing in appendix 8 for our report template. This TYPO will can be found in most of our EPA reports. In reality the mixing baffles has been removed from the tunnel in 2015 when the E.P.A. review the regulation and refer to the ASMT E2515 for sampling standard. Our Iso 17025 accreditor (IAS) has audited Polytests for the ASMT E2515 and other testing method in March 2015 and found the dilution tunnel compliant to the standard (no mixing baffle in place). Moreover, we have been audited every two years by the EPA proficiency testing and dilution tunnel have been dismantling and inspected by the auditor and no mixing baffle was in the dilution tunnels. In order to fix this issue, reports are updated to remove the TYPO and updated the drawing of the dilution tunnel in appendix 8.

Thank you
Best regards,



Danick Power
Polytests services inc.
695-B Gaudette
St-jean-sur-richelieu
J3B 7S7
Phone. : 450 741-3636
e-mail: infos@polytests.com



John Steinert
Vice President Hearth Products Division
PFS TECO
11785 SE Hwy 212 - Ste 305
Clackamas, OR 97015
john.steinert@pfsteco.com
503-650-0088

IAS Laboratory Assessment Report

File or TL No.: File 2014-12-10

Laboratory Name: Services Polytests, Inc.

Laboratory Address: 695B Gaudette, St. Jean-sur-Richelieu, Quebec, J3B 7S7, Canada

Name and Title of Laboratory Contact: Gaetan Piedalue, P. Eng.; President

Name of Assessor: Douglas Sickles, P.E.

Date(s) of Assessment: March 16-20, 2015

Use this space to record names and titles of persons present at opening meeting:

Services Polytests : Gaetan Piedalue, P. Eng.; President ; Danick Power, VP,
Operation Manager; Marie-Josée Brudeau, Quality Manager

IAS: Douglas Sickles, P.E.

Use this space to record names and titles of persons present at closing meeting:

Services Polytests : Gaetan Piedalue, P. Eng.; President ; Danick Power, VP,
Operations Manager

IAS: Douglas Sickles, P.E.

Signature of Laboratory Representative:

Signature of Assessor:

Reviewer Comments:

Reviewed by:

Date:

<u>Report</u>	<u>Date</u>	<u>Client</u>	<u>Product</u>	<u>Standards</u>	<u>Tested By:</u>	<u>Reviewer</u>
P-1164	12-2012	ICC	Chimney Liner	ULC S640, UL 1777	Alain Lefebvre	Danick Power
P-1223	10-2014	ICC	Flexible Liner	ULC S640, UL 1777	Alain Lefebvre	Danick Power
P-1231	12-2014	ESIM	Automatically fed pellet/wood chip fired boiler	CSA B366.1 CSA B415.1 UL 2523 EPA Method 28 WHH ASTM 2515A	Maxime Martin	Danick Power
P-1246	11-2014	JA Roby	Wood Stove	UL 1482, ULC S627		Danick Power

TEST METHODS DEMONSTRATED AND REVIEWED:

Test methods demonstrated: (many tests shared between standards)

Test Standard/Method	Title
ANSI/UL 1482	Solid Fuel Type Room Heaters
CAN/ULC S627	Standard for Space Heaters for use with Solid Fuels
ASTM E1509	Standard Specification for Room Heaters, Pellet Fuel Burning type
CAN/CSA B366.1	Solid Fuel Fired Heating Appliances
CAN/CSA B415	Performance Testing of Solid Fuel Burning Heating Appliances
ASTM E2515	Determination of particulate matter collected by a dilution tunnel

Test methods that involved interviews and equipment review:

Test Standard/Method	Title
ULC S628	Fireplace Inserts
ANSI/UL 2523	Solid Fuel Fired Hydronic Heating Appliances, Water Heaters and Boilers
CAN/ULC S610	Standard for Factory Built Fireplaces
ANSI/UL 127	Factory Built Fireplaces
ANSI/UL 391	Solid Fuel and Combination Fuel Central and Supplementary Furnaces"
CAN/ULC S632	Standard for Heat Shields
ANSI/UL 1618	Wall protectors, floor protectors and hearth extensions
EPA 40 CFR Part 60, Subpart AAA, Method 28R	Certification and Auditing of Wood Heaters
EPA 40 CFR Part 60, Subpart QQQ, Method 28WHH	Measurement of Particulate Emissions and Heating Efficiency of Wood-Fired Hydronic Heating Appliances
E2558,E2618, E2779, E2780	Particulate Matter Emissions for Wood, heaters, Pellet heaters, Boilers, Wood Fireplaces
ULC S604	Standard for Factory-Built type A Chimneys
ULC S629	Standard for 650°C Factory-Built Chimneys
UL 103	Factory-Built Chimneys for Residential type and Building Heating Appliances
ULC S640	Standard for Lining Systems for New Masonry Chimneys
ULC S641	Standard for Factory-Built Chimney connectors and wall pass-through assemblies
UL 1777	Chimney Liners
ULC S635	Standard for Lining Systems for Existing Masonry or Factory-Built Chimneys and Vents

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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EPA-Approved Test Laboratory	3
Compliance Statements and Acknowledgements – Sections 60.533(b) and 60.5475(b)	4
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For emissions data summary tables see attachments	4
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A. <i>Summary Results – Adjustable Wood Burning Heaters</i>	7

**APPLICATION FOR A CERTIFICATE OF COMPLIANCE PURSUANT TO 40 CFR
PART 60 SUBPARTS AAA AND QQQQ
2015 STANDARDS OF PERFORMANCE FOR NEW RESIDENTIAL WOOD HEATERS, NEW
RESIDENTIAL HYDRONIC HEATERS AND FORCED-AIR FURNACES**

GENERAL INFORMATION

Manufacturer's Name: 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) Method 28, ASMT2780

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):

Mansfield 8013

Physical Address (Street number and Address, not P.O. Box):
317 Stafford Ave

Mailing Address:
Same

City: Morrisville

State: VT

ZIP Code: 05661

Phone: 802-851-4044

Email:
SBOOTH@HEARTHSTONESTOVES.COM

Website:
WWW.HEARTHSTONESTOVES.COM

EPA Submission Date of 30 day Notice: 09/22/2020

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:
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: Clackamas

State: OR

ZIP Code: 97015

Phone: 503.650.0088

Email:
john.steinert@pfsteco.com

Website: www.PFSTECO.com

Remarks:

COMPLIANCE STATEMENTS AND ACKNOWLEDGEMENTS – SECTIONS 60.533(B) AND 60.5475(B)

INSTRUCTIONS: PLEASE READ THE BELOW STATEMENTS AND AFFIRMATIONS AND ADDRESS ACCORDINGLY.

FOR EMISSIONS DATA SUMMARY TABLES SEE ATTACHMENTS

1. Engineering Drawings Statement

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

(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

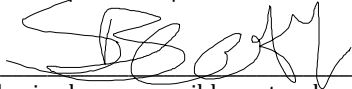
A statement acknowledging that it is unlawful to sell, distribute or offer to sell or distribute an affected wood heater without a valid certificate of compliance.

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

Date: 2/18/2021

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
1	0,920	0,60	81,2%	14 043	0,27
5	0,961	0,42	79,9%	14 447	0,41
4	1,479	0,32	75,7%	21 048	1,30
3	2,307	1,18	74,2%	32 200	1,08
Weighted particulate emission average of 4 test runs: 0.54 grams per hour.					
Weighted average HHV efficiency of 4 test runs: 77.7 %.					
Average Co 0.82 gr/min					
Average 1 st hour 1.26 grams per hour.					

List of Issues Found			
Issue	Applicable Method/Rule Section	Notes	How addressed by Test lab/MFG (include page # in the revised test report)
<p>1. Incomplete information - Pre-burn run data are missing for each test run, meaning Continuous emission monitor data.</p> <p>We recognize the pre-test fuel data is in the test report.</p>	<p>ASTM E2780 (9.5.2), (9.5.2.1), (9.5.3), (9.5.4), (9.5.5), (9.5.5.1)</p>	<p>In the revised test report, include test run data for pre-burn period for each test run.</p>	<p>Preburn data for each run have been added to appendix 1.</p>
<p>2. Incomplete information- Could not find both dual train comparisons (precision) % and g/kg in the test report.</p> <p>Found % but not g/kg.</p>	<p>ASTM E2515 (11.7)</p>	<p>In the revised test report include dual train comparison (precision) in both % and g/kg. The criteria for acceptance is either/or, but both must be presented in the report.</p>	<p>Report p.9 updated table 2.6 to include value in g/kg</p>
<p>3. Page 8/354 (non-CBI) gives test load density</p>	<p>ASTM E2780 (9.4.1.3), (9.4.1.5)</p>	<p>In the revised test report, explain why that 7 lb/ft³ could not be met. Was it due to loading constraints or some other reason? See below:</p> <p>Additionally, test fuel density per ASTM E2780 section 9.4.1.3 for some tests is just below the 25 lb/ft³. Please provide an explanation for this in the test report.</p> <p>ASTM E2780</p> <p>9.4.1.5 The test fuel crib loading density shall be 112 ± 11.2 kg/m³ (7 ± 0.7 lb/ft³) of usable firebox volume on a wet basis.</p>	<p>The weight for all loads meets the requirement range. As per clause below:</p> <p>9.4.1.5 The test fuel crib loading density shall be 112 ± 11.2 kg/m³ (7 ± 0.7 lb/ft³) of usable firebox volume on a wet basis.</p> <p>Fuel density have been recalculating to exclude spacers and found compliant for each run as per clause 9.4.1.3 between 25 to 36 lb/ft³. Appendix 1 have been updated to represent those numbers.</p>

<p>1. Clarification requested - Page 84/354 (non-CBI) shows the air inlet was closed at 4.875 in"? What is the 4.875" referring to?</p> <p>Page 277/354 (non-CBI) shows the user manual settings recommended by the manufacturer.</p>		<p>While we recognize that the run summary states this run was done at a medium setting in the test report, we still need the following clarification.</p> <p>How does this correlate to the manufacturer's instructions in the manual for the medium burn? Please correlate the 4.875" to the settings recommended by the manufacturer. In addition, clarify what the 4.875" dimension is referring to.</p> <p>Please clarify this matter in the revised test report.</p>	<p>Please find picture in appendix 13 already in. this was a measurement from the front of the stove during testing cat 3 medium high. Burn rate between 1.25kg/hr and 1.9 kg/hr.</p>
<p>2. Compliance determination cannot be made - Calibration sheets and dates of calibrations (starts on page 174/354).</p>	<p>ASTM E2515 (8.1), (8.2), (8.3), (8.4)</p>	<p>In the revised test report, include calibration records in English or have the provider submit a certification statement that the equipment was calibrated per the methods when the certification test took place.</p>	<p>All of our equipment's are ISO17025 calibrated by accredited external calibration company. ISO17025 accredited calibration could be considered a step above a NIST calibration because the discipline of calibration is reviewed in addition to the traceability of the standards. Additionally, the ISO/IEC 17025 calibration is not only including the measurement traceability, but it also includes the measurement uncertainties of the calibration results</p> <p>Most part of our calibration certificate Appendix 3 have been updated in English, for the one in French we have submitted a template example in English of the certificate, original certificate can easily be translated with goggle translate if needed. For future report, we will request English certificate for all instruments from all our calibration provider.</p>

<p>3. Page 246/354 (non-CBI), please provide the tabulated data resulting in the graph for unit conditioning.</p> <p>Please indicate burn rate as well.</p>	<p>40 CFR 60.533(b)(5) M 28R (2.1.4) ASTM E2780 (9.1.3), (9.1.4), (9.1.5), (9.1.6)</p>	<p>In the revised test report, add the tabulated data for unit conditioning. Include burn rate as well.</p>	<p>Appendix 4 updated to include all data for aging, reading every minute for 50 hrs.</p>
<p>4. Page 296/354 (non-CBI) shows mixing baffles. The diagram on page 304/354 does as well. Discussion on page 13/354 as well.</p>		<p>In the revised test report, update the existing template with the correct ASTM template. In addition, add a test lab/certifier statement acknowledging the error along with an ISO certification review of the equipment.</p>	<p>Updated appendix 8 tunnel and appendix 15 letter signed from lab and third party. Also, p15 discussion removed mixing baffle</p>
<p>5. Pages 306 – 311/354 (non-CBI) photos. Please include closer images of the fuel crib and fuel crib loaded in the stove. Some runs had close-up photos of the crib, while others did not.</p>		<p>In the revised test report, include expanded images of the fuel crib and fuel crib loaded in the stove for the runs.</p>	<p>Appendix 9 updated with more picture, please note all crib configuration and localization in the stove was the same for all the tests.</p>
<p>6. Page 339/354 gives volume measurements. Please provide the actual volume calculation used to determine the firebox volume in the test report.</p>	<p>ASTM E2780 (9.3) 40 CFR 60.533(b)(3) 40 CFR 60.533(b)(5)</p>	<p>In the revised test report, include the volume calculation that resulted in the firebox volume used in the test report.</p>	<p>Appendix 12 updated with calculation details</p>

		(E)						(K)		
		Ave.		Heat						
	Burn	Emission		Output	CO			Weighting		
Test No.	Rate	Rate g/hr	(OHE)	(BTU/HR)	gr/min)	hour 1st	Prob.	Factor	(KxE)	KxOHE
1	0,92	0,700	0,81	14043	0,27	1,58	0,3110	0,3399	0,2379	0,28
5	0,96	0,500	0,80	14447	0,41	0,99	0,3399	0,4272	0,2136	0,34
4	1,48	0,900	0,76	21048	1,30	0,39	0,7383	0,6060	0,5454	0,46
3	2,31	2,000	0,74	32200	1,08	3,28	0,9459	0,2617	0,5234	0,19
							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
4										
								1,634848	1,5204	1,27
	Weighted average emissions rate:									0,9300
	Weighted Average OHE									77,7%
	Weighted Average CO (gr/min)									0,82

Negative filter weight rounded to Zero, demonstration weighted average calculation