



TEST REPORT

TEST OF A PELLET STOVE FOR EMISSIONS AND EFFICIENCY

PER EPA METHODS 28R AND ASTM E2515 and ASTM E2779, MAY 2015

Client:

Laminox s.r.l.

62028 Sarnano

Zona industrial, Italy

Model name: Jessica Natural

Attention: Rafael Sanchez

TESTED BY:

Services Polytests inc.

695-B Gaudette

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

TEST DATES:

REPORT DATE: April 20th 2018

Test date: April 11th 2018

Revision 1: August 28th 2023

Project number: PI-20163

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Revision 1 (August 28th 2023):

- Section 3.6 and appendix 8, updated for more dilution tunnel details
- Appendix 1 Updated to include efficiency sample calculation (CSAB415.1-10 spreadsheet).
- Appendix 3 updated to included fuel analysis and all ISO17025 calibration certificate.
- Section 3.4 updated for appropriateness and validity for the run.
- Section 3.4 updated for discussion about no anomalies occur during the test.
- Appendix 1 include PM report with filters negative weight rounded to 0.
- Appendix 1 revised to include PM emission with uncorrected negative weight in gr/hr.
- Table 2.6 updated for dual train precision in g/Kg and %
- Section 3.4 updated to add discussion about negative weight mass on back filter and they were handled properly, all numbers detail can be found in appendix 1.
- Appendix 7 manual updated for replacement parts critical for emissions and the warranty details. Label

List of appendixes

- APPENDIX 1: Raw data, forms and results
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- APPENDIX 14: Drawing Air flow pattern
- APPENDIX 15: WHA, CoC, 30 Days Notices, Others

1 INTRODUCTION

1.1 GENERAL

Laboratory

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

Test program

- Purpose: unit qualification NSPS 2020
- Test date: April 11th 2018
- Test methods used:
 - Particulate emissions: ASTM E2779-10 ; 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: Laminox
- Product type: Pellet stove
- Combustion system: no-electricity
- Unit tested: Jessica Natural

Particularities

- Included also other models Veronica Air, only Esthetic differences. All stoves have the same combustion components, setting, and firebox dimensions.
- Models included: Jessica Natural and veronica Natural. ref. appendix 6 for detail on

1.3 RESULTS

Emission results obtained

- Weighted average emission rate: 1.2 grams/hour
- Overall Efficiency: 60.82 %
- Maximum output: 17 000 btu/hr

Conformity: NSPS Phase 2020

1.4 PRETEST INFORMATION

Unit condition: The unit was received by carrier on April 2017. The 50hrs of aging is made in January 2018.

- Venting system type: pellet venting conduit 3inch. diameter
- System height from floor: 15 feet
- Particularities: none

Break in period

- Duration: the unit was received from the manufacturer and ran for at least 50 hours at 50% of the maximum burn rate with adequate documentation of fuel additions and flue and unit temperatures during month of January 2018.
- Fuel: wood pellet

2 SUMMARY OF TEST RESULTS

2.1 EMISSIONS

Run Number	Date			Run Time (Min.)	Heat Output (Btu/hr)	1st Hour Emissions (g/hr)	Integrated Total (g/hr)	CO Emissions (g/min)	Overall CO Emissions (g/min)	Heating Efficiency (% HHV)	Overall Heating Efficiency (% HHV)
		Setting	Burn Rate								
1	April 11 th 2018	H	1.34	60	17 096	1.36	1.2	0.1	0.17	68.23	60.8
		M	0.4	120	4 736			.14		61.6	
		L	0.53	180	5 350			0.2		53.6	
		OA	0.62	360	11 689			0.17		60.8	

2.2 AVERAGE CALCULATION

NA : Pellet Stove tested as ASTM E2779 section 9.4.1 integrate test run

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	69	80	30,062	29,943	24,2	24,4	2	4

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.)
1	5	4.44	na	8.67	na	4.44	na

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

Average dilution tunnel measurements				Sample Data			
Run Number	Burn Rate (Min)	Volumetric Flow Rate (dscf/min)	Total Temperatures (°R)	Volume sampled (DSCF)		Particulate catch (mg)	
				1	2	1	2
1	360	161,92	553,17	60,139	61,193	7,50	7,20

2.6 DILUTION TUNNEL DUAL TRAIN PRECISION

Run Number	Sample Ratio		Total Emission (g)			
	Train 1	Train 2	Train 1	Train 2	% Deviation	Deviation gr/Kg
1	969,26	952,56	7,17	6,76	2,96%	0,11

3 PROCESS DESCRIPTION

3.1 DISCUSSION

At the reception of the unit, setup, and aging (50hrs) at power 2 (medium setting) have been done prior to official emission test.

3.2 UNIT DIMENSIONS

Baffle

- Location: top of the combustion chamber
- Dimensions: refer to appendix 6 drawings
- Material: Steel

Bricks

- Location: back and side of the combustion chamber
- Dimensions: back: 7 7/8 wide X 14 ¼ height X 1 Thick; Sides: 5 3/8 wide X 15 height X 1 ½ Thick
- Material: Vermiculite

Flue gas exhaust

- Location: back of the unit at 7 from the bottom
- Dimensions: 3 inch (inside diameter)
- Material: steel

Overall unit dimension

- Overall dimension: 20 ¾ depth X 21 ¾ wide X 40 ½ height
- Firebox dimensions: 5 1/8 depth X 8 ¾ wide at the back X 14 ¼ Height
- Burner dimension: 3 ½ depth X 3 ½ wide X 3 ¾ height

Gasket

- Door, glass, motor
- Refer to appendix 6 for all details

Auger motor

- None

Convection fan

- none

Exhaust fan

- None

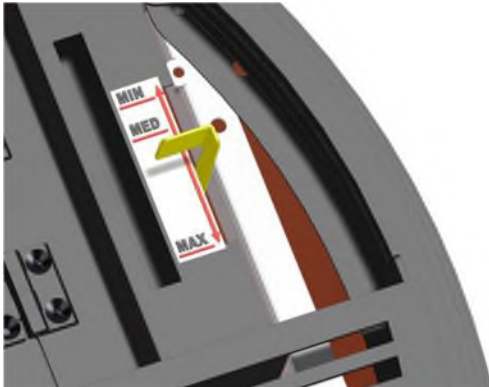
Glass

	Model Veronica Natural		Model Jessica Natural	
	Internal glass	External glass	Internal glass	External curved glass
Dimension	336 mm X 239 mm	740mm X 350 mm	336 mm X 239 mm	773 mm X 328 mm
Material	Ceramic glass	Tempered glass	Ceramic glass	Tempered glass
Thickness	5 mm	4 mm	5 mm	4 mm

3.3 AIR SUPPLY SYSTEM

Description (refer to appendix 6 for more details)

The feeder control system in the natural models is made by the regulation of combustion air. The brazier is continuously fed by gravity from the pellet present in the tank. As the pellet burns, the new pellet goes down into the brazier while the ashes fall into the drawer under it. The feeder at the different powers of the stove is therefore determined by the pellet burning speed through the primary air crossing the brazier. This regulation is made by a lever with three well-marked positions that determine the maximum, average and minimum.



3.4 OPERATION DURING TEST

Run #1

This run was performed April 11th 2018. It lasted 360 minutes and as ASTM E 2779 section 9.4.1 integrate test run obtained at 0.63 kg/hr & emission at 1.6 gr/hr. The pellet stove is preheated for 90 min. before the beginning of the test. For the first hour of the test the unit was set at the maximum setting, then for the next 2 hours we set at the medium setting to burn less than 50% of the maximum, and for the last portion of the test the pellet stove is set at the minimum setting for 3hours of minimum burn rate. Run have been found appropriate, no anomalies happened and have been validate and found compliant. Negative weight has been found on back filter du to sticking on gasket, these have been handled properly. It is not a weight loss but transfer from filter to gasket, for the compliance number we do not have to round the weight to zero for the filter.

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

Test fuel

- Test fuel: wood pellet (model: Energex),
- Description: The pellet for each test and pre-burn period was sent to Twin ports testing inc for test fuel calorific analysis. This laboratory is ISO/IEC 17025 recognize. For the test fuel property refer to test fuel analysis in the appendix D Calibration data.
- Handling and storage: keep all bags in the same room (at 20C ambient and 50% humidity) all wrap together to ensure the stability of the moisture.

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 section of 6-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 2%. Tunnel samplers are located downstream of the pitot tube and upstream from the end of this section, all details in Appendix 8.

3.7 DRAWINGS

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

3.8 EMISSIONS EFFICIENCY TESTING EQUIPMENT LIST

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

4 SAMPLING METHODS

4.1 PARTICULATE SAMPLING

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

5 QUALITY ASSURANCE

5.1 INSTRUMENT CALIBRATION

5.1.1 GAS METERS

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

LAM

Description du test

Test standard	EPA
Run #	1
Date	11-04-2018
Technicien	M.M
Project #	PI 20163

Description de l'unité

Manufacturier	LAMINOX	
Modèle	JESSIKA NATUREL	
Combustion system	Pellet	
Appliance type	PELLET STOVE	
Firebox volume	n.a.	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		
Targeted output	N.A	BTU/h
Cp steel	N.A	BTU/lb-°F

Échantillonnage

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

Tunnel

Targeted tunnel flow rate	140	scfm
Tunnel diameter	6	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 20163
Date	11-04-2018
Technicien	M.M

Fuel data

Fuel type	Dimension
Fuel specie	Other
HHV	19628,0 kJ/kg
%C	49,1
%H	6,1
%O	43,8
%Ash	0,8
HHV	8439,0 Btu/lb
LHV	7381,0 Btu/lb

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

	Start	End
Barometer (kPa):	101,8	101,4
Barometer (in.Hg):	30,061529	29,94340873
Dry Bulb (F):	69,62	79,81
Humidity (%):	24,2	24,4
Air velocity (ft/min)	2	4

DGM #1	Final:	23135,058	cuft
	Initial:	23071,756	cuft
DGM #2	Final:	21400,916	cuft
	Initial:	21336,242	cuft
DGM room			

	Final:	655111,870	Liter
	Initial:	653319,360	Liter
	Final:	606006,440	Liter
	Initial:	604175,080	Liter
	Final:	282,940	cuft
	Initial:	252,780	cuft

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

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

Project nu.	PI 20163
Date	11-04-2018
Technicien	M.M

Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,23 in. H2O
 Barometer: 29,900 in. Hg

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

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

PITOT CONSTANT=
0,958

Pour un tunnel moins de 12", prendre 4 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,051	72,82	0,2258
B center	0,050	72,86	0,2236
A1	0,048	73	0,2191
A2	0,050	73,22	0,2236
A3	0,047	73,23	0,2168
A4	0,040	73	0,2000
B1	0,041	73,290	0,2025
B2	0,049	73,430	0,2214
B3	0,048	72,980	0,2191
B4	0,040	72,890	0,2000
AVERAGE	0,0464	73,0720	0,2152

Project nu.	PI 20163
Date	11-04-2018
Technicien	M.M

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	3	107	108	10	4	109	110	12	13	111	112	15	113		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,4563	0,1263	0,1279	35,3320	61,3824	0,1268	0,1259	36,0156	95,1498	0,1276	0,1280	35,4117	0,1284	2018-04-10	17:00
Before (6)	61,4563	0,1263	0,1278	35,3319	61,3824	0,1269	0,1259	36,0155	95,1499	0,1275	0,1280	35,4116	0,1284	2018-04-11	09:00
After (1)	61,4566	0,1269	0,1278	35,3333	61,3830	0,1326	0,1254	36,0171	95,1514	0,1337	0,1278	35,4134	0,1285	2018-04-11	16:30
After (2)	61,4563	0,1266	0,1278	35,3330	61,3826	0,1323	0,1255	36,0167	95,1501	0,1335	0,1278	35,4129	0,1285	2018-04-19	08:00
After (3)	61,4563	0,1266	0,1278	35,3330	61,3826	0,1322	0,1255	36,0166	95,1501	0,1335	0,1278	35,4129	0,1285	2018-04-20	08:00
After (4)															
After (5)															
After (6)	61,4563	0,1266	0,1278	35,3330	61,3826	0,1322	0,1255	36,0166	95,1501	0,1335	0,1278	35,4129	0,1285	2018-04-20	08:00
Difference	0,0000	0,0003	0,0000	0,0011	0,0002	0,0053	-0,0004	0,0011	0,0002	0,0060	-0,0002	0,0013	0,0001		
Total (mg)		1,4				7,6				7,3			0,1		
Total ajusté (mg)		1,30				7,50				7,20					

Project nu.	PI 20163
Date	11-04-2018
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	3	107	108	10	4	109	110	12	13	111	112	15	113		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,4563	0,1263	0,1279	35,3320	61,3824	0,1268	0,1259	36,0156	95,1498	0,1276	0,1280	35,4117	0,1284	2018-04-10	17:00
Before (6)	61,4563	0,1263	0,1278	35,3319	61,3824	0,1269	0,1259	36,0155	95,1499	0,1275	0,1280	35,4116	0,1284	2018-04-11	09:00
After (1)	61,4566	0,1269	0,1278	35,3333	61,3830	0,1326	0,1254	36,0171	95,1514	0,1337	0,1278	35,4134	0,1285	2018-04-11	16:30
After (2)	61,4563	0,1266	0,1278	35,3330	61,3826	0,1323	0,1255	36,0167	95,1501	0,1335	0,1278	35,4129	0,1285	2018-04-19	08:00
After (3)	61,4563	0,1266	0,1278	35,3330	61,3826	0,1322	0,1255	36,0166	95,1501	0,1335	0,1278	35,4129	0,1285	2018-04-20	08:00
After (4)															
After (5)															
After (6)	61,4563	0,1266	0,1278	35,3330	61,3826	0,1322	0,1259	36,0166	95,1501	0,1335	0,1280	35,4129	0,1285	2018-04-20	08:00
Difference	0,0000	0,0003	0,0000	0,0011	0,0002	0,0053	0,0000	0,0011	0,0002	0,0060	0,0000	0,0013	0,0001		
Total (mg)		1,4				8				7,5			0,1		
Total ajusté (mg)		1,30				7,90				7,40					

Project nu.	PI 20163
Date	11-04-2018
Technicien	mm

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 1,2 g/hr
 Burn Rate : 0,628 Dry kg/hr

Test Duration: 360 min

PRESSURE FACTOR: DGM 1 0,96978
 DGM 2 0,96579
 DGM 3 1,00276

BAROMETRIC PRESSURE
 Average: 30,002469 in Hg
 Start: 30,061529 in Hg
 End: 29,943409 in Hg

TEMPERATURE FACTORS DGM 1 0,99167
 DGM 2 0,99117
 DGM 3 0,99546

DGM CONTROLLER VALUES

DGM 1 Final: 23135,058 Cuft
 Initial: 23071,756 Cuft

VOLUMES SAMPLED DGM 1 60,139 SCft
 DGM 2 61,193 SCft
 DGM 3 29,696 SCft

DGM 2 Final: 21400,916 Cuft
 Initial: 21336,242 Cuft

DGM #3 Final: 282,940 Cuft
 Initial: 252,780 Cuft

TOTAL TUNNEL VOLUME : 58290

TEMPERATURES

DGM 1 532,434 °R
 DGM 2 532,703 °R

SAMPLE RATIOS
 Sample Train 1: 969,255
 Sample Train 2: 952,560

CALIBRATION FACTORS

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

Patriculate concentration
 Sample Train 1 **0,000126** g/dscf
 Sample Train 2 **0,000119** g/dscf
 Room **0,000003** g/dscf

TUNNEL FLOW RATE: 161,918 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **7,17** g
 Sample Train 2 **6,76** g

PARTICULATE CATCH
 Total Sample Train 1: 7,60 mg
 Total Sample Train 2: 7,30 mg
 Total Sample Train 1 1st hour: 1,40 mg

EMISSION RATES
 Sample Train 1 **1,20** g/hr
 Sample Train 2 **1,13** g/hr

1st hour emission rate **1,36** g/hr

DEVIATION: 2,96%

Cs Train 1 Train 2
 0,0001264 0,00011929

*		*	*	*	*	*1	*2	*3
Elapsed		Weight				Flue	Room	Tunnel
Time	Raw data row	Remaining	CO	CO ₂	O ₂	Gas	Temp	Dry Bulb
min		lbs	%	%	%	°F	°F	°F
0,00	131,00	8,7	0,0	9,2	0,0	610,0	69,4	112,0
1,0	132,0	8,5	0,0	9,1	0,0	608,7	69,1	112,5
2,0	133,0	8,5	0,0	8,9	0,0	609,8	69,4	113,0
3,0	134,0	8,4	0,0	9,7	0,0	606,0	69,4	112,5
4,0	135,0	8,4	0,1	8,0	0,0	606,5	69,3	112,1
5,0	136,0	8,3	0,1	8,8	0,0	599,1	69,4	113,7
6,0	137,0	8,2	0,0	8,5	0,0	603,2	69,6	112,8
7,0	138,0	8,2	0,0	7,3	0,0	589,1	69,7	112,6
8,0	139,0	8,2	0,0	8,9	0,0	597,7	69,8	112,9
9,0	140,0	8,1	0,1	8,8	0,0	597,3	69,6	113,1
10,0	141,0	8,1	0,0	8,0	0,0	588,1	69,8	113,0
11,0	142,0	8,0	0,1	6,6	0,0	585,9	69,5	112,7
12,0	143,0	8,0	0,0	10,6	0,0	591,2	69,6	111,6
13,0	144,0	7,9	0,0	8,1	0,0	585,2	69,8	112,0
14,0	145,0	7,9	0,1	7,4	0,0	589,1	69,9	111,2
15,0	146,0	7,8	0,0	10,2	0,0	591,1	69,6	111,1
16,0	147,0	7,8	0,0	8,0	0,0	591,1	69,7	111,2
17,0	148,0	7,7	0,0	9,9	0,0	592,2	69,7	112,0
18,0	149,0	7,6	0,0	10,7	0,0	592,1	69,8	112,3
19,0	150,0	7,5	0,1	7,4	0,0	596,6	69,9	111,1
20,0	151,0	7,5	0,1	12,5	0,0	598,2	70,1	110,2
21,0	152,0	7,4	0,0	8,6	0,0	594,3	69,9	111,9
22,0	153,0	7,4	0,0	10,1	0,0	597,8	70,0	112,0
23,0	154,0	7,4	0,0	9,1	0,0	595,7	69,8	112,7
24,0	155,0	7,3	0,1	6,8	0,0	581,7	70,1	112,0
25,0	156,0	7,2	0,0	7,8	0,0	591,2	70,0	112,0
26,0	157,0	7,2	0,0	10,0	0,0	594,7	70,0	111,7
27,0	158,0	7,1	0,0	10,0	0,0	593,8	69,6	111,3
28,0	159,0	7,0	0,0	10,5	0,0	597,6	70,0	111,4
29,0	160,0	7,0	0,0	9,1	0,0	596,0	70,1	111,4
30,0	161,0	7,0	0,1	9,8	0,0	595,0	69,8	111,6
31,0	162,0	6,9	0,0	8,6	0,0	590,4	70,0	112,3
32,0	163,0	6,9	0,0	7,7	0,0	595,0	70,0	112,7
33,0	164,0	6,8	0,0	8,1	0,0	595,2	70,1	111,8
34,0	165,0	6,8	0,0	9,5	0,0	590,7	70,3	111,4
35,0	166,0	6,7	0,1	7,1	0,0	580,0	70,3	112,9
36,0	167,0	6,7	0,0	6,7	0,0	585,9	70,0	112,1
37,0	168,0	6,6	0,0	10,4	0,0	578,6	70,0	112,5
38,0	169,0	6,6	0,1	5,6	0,0	576,0	70,0	112,0
39,0	170,0	6,5	0,0	10,4	0,0	581,5	70,2	111,6
40,0	171,0	6,5	0,0	8,0	0,0	579,0	69,9	110,7
41,0	172,0	6,4	0,0	9,1	0,0	574,1	69,9	111,0
42,0	173,0	6,3	0,0	9,6	0,0	581,3	70,2	111,3
43,0	174,0	6,3	0,0	8,4	0,0	584,0	70,2	111,2
44,0	175,0	6,2	0,0	9,5	0,0	583,2	69,9	111,1
45,0	176,0	6,2	0,0	8,7	0,0	581,3	70,1	110,9
46,0	177,0	6,2	0,0	8,0	0,0	575,5	70,0	111,3
47,0	178,0	6,1	0,1	6,3	0,0	571,6	70,2	110,5
48,0	179,0	6,0	0,0	8,6	0,0	573,4	69,9	110,4
49,0	180,0	6,0	0,0	8,1	0,0	569,0	70,8	109,5
50,0	181,0	6,0	0,0	7,2	0,0	568,6	70,2	108,8
51,0	182,0	5,9	0,0	7,2	0,0	566,2	70,4	110,5
52,0	183,0	5,9	0,0	8,0	0,0	560,7	70,5	109,4
53,0	184,0	5,8	0,0	6,9	0,0	555,2	70,3	110,2
54,0	185,0	5,8	0,0	7,0	0,0	558,2	70,4	109,1
55,0	186,0	5,7	0,0	9,7	0,0	561,3	70,1	109,4
56,0	187,0	5,7	0,0	7,7	0,0	561,0	70,4	108,8
57,0	188,0	5,6	0,0	7,6	0,0	556,6	70,4	108,6
58,0	189,0	5,6	0,0	7,7	0,0	547,6	70,0	108,4
59,0	190,0	5,6	0,1	5,7	0,0	543,7	70,1	108,0
60,0	191,0	5,6	0,0	7,2	0,0	539,8	70,2	107,0
61,0	192,0	5,5	0,1	6,2	0,0	533,8	69,9	106,1
62,0	193,0	5,5	0,0	8,0	0,0	528,4	70,3	106,6
63,0	194,0	5,4	0,0	5,9	0,0	516,1	70,4	106,2
64,0	195,0	5,4	0,0	4,9	0,0	507,9	70,3	106,1
65,0	196,0	5,4	0,1	4,2	0,0	492,1	70,5	104,0
66,0	197,0	5,4	0,1	3,3	0,0	485,3	70,3	102,6
67,0	198,0	5,3	0,0	5,3	0,0	487,8	70,5	104,2

68,0	199,0	5,3	0,0	6,1	0,0	484,5	70,3	103,4
69,0	200,0	5,3	0,0	4,7	0,0	475,7	70,2	103,4
70,0	201,0	5,3	0,0	4,7	0,0	468,2	70,6	103,0
71,0	202,0	5,2	0,0	4,6	0,0	460,0	70,4	102,4
72,0	203,0	5,2	0,0	4,3	0,0	452,9	70,4	101,2
73,0	204,0	5,2	0,0	4,3	0,0	447,7	70,6	100,6
74,0	205,0	5,2	0,1	4,0	0,0	438,2	70,3	100,1
75,0	206,0	5,1	0,1	3,4	0,0	430,5	70,6	99,7
76,0	207,0	5,1	0,1	3,5	0,0	427,1	70,5	98,8
77,0	208,0	5,1	0,0	3,9	0,0	423,3	70,4	98,4
78,0	209,0	5,1	0,0	4,0	0,0	417,2	70,6	98,0
79,0	210,0	5,1	0,1	3,7	0,0	413,8	70,3	97,8
80,0	211,0	5,0	0,1	4,1	0,0	414,5	70,5	97,7
81,0	212,0	5,0	0,0	4,7	0,0	411,6	70,1	97,3
82,0	213,0	5,0	0,1	4,1	0,0	411,3	70,5	96,3
83,0	214,0	5,0	0,0	4,7	0,0	409,9	70,4	96,8
84,0	215,0	4,9	0,0	4,1	0,0	405,3	70,5	96,9
85,0	216,0	5,0	0,1	4,0	0,0	400,1	70,3	96,6
86,0	217,0	4,9	0,1	3,5	0,0	400,9	70,2	96,8
87,0	218,0	4,9	0,1	4,4	0,0	396,8	70,3	96,7
88,0	219,0	4,9	0,1	3,7	0,0	390,1	70,3	96,3
89,0	220,0	4,8	0,1	3,1	0,0	383,7	70,3	95,3
90,0	221,0	4,8	0,1	3,1	0,0	381,8	70,3	95,0
91,0	222,0	4,8	0,0	4,1	0,0	381,2	70,5	94,3
92,0	223,0	4,8	0,0	3,9	0,0	378,0	70,3	94,3
93,0	224,0	4,8	0,1	3,5	0,0	374,4	70,2	94,3
94,0	225,0	4,8	0,1	3,5	0,0	374,8	70,2	93,9
95,0	226,0	4,8	0,0	4,3	0,0	371,6	70,1	93,8
96,0	227,0	4,8	0,0	3,4	0,0	365,8	70,3	93,6
97,0	228,0	4,7	0,0	3,3	0,0	362,7	70,1	93,2
98,0	229,0	4,6	0,0	3,6	0,0	360,4	69,5	93,0
99,0	230,0	4,7	0,1	3,3	0,0	357,3	69,7	91,4
100,0	231,0	4,7	0,1	3,4	0,0	354,0	70,1	91,2
101,0	232,0	4,6	0,1	3,3	0,0	352,2	70,1	92,5
102,0	233,0	4,6	0,1	3,4	0,0	350,2	70,1	91,7
103,0	234,0	4,6	0,1	3,2	0,0	348,4	69,9	92,4
104,0	235,0	4,6	0,1	3,2	0,0	348,3	70,0	91,9
105,0	236,0	4,6	0,1	3,4	0,0	350,4	70,5	92,1
106,0	237,0	4,6	0,1	3,6	0,0	347,7	70,2	91,0
107,0	238,0	4,5	0,1	3,3	0,0	344,1	70,1	91,0
108,0	239,0	4,5	0,1	3,0	0,0	340,4	70,1	90,9
109,0	240,0	4,5	0,1	3,0	0,0	344,4	70,2	90,5
110,0	241,0	4,5	0,0	4,2	0,0	342,0	69,8	90,1
111,0	242,0	4,4	0,0	3,3	0,0	338,4	70,2	90,6
112,0	243,0	4,5	0,1	3,0	0,0	336,1	69,9	90,8
113,0	244,0	4,4	0,0	3,1	0,0	330,1	70,0	90,5
114,0	245,0	4,4	0,0	2,6	0,0	326,5	69,9	90,1
115,0	246,0	4,4	0,0	2,7	0,0	321,8	70,2	88,4
116,0	247,0	4,4	0,1	2,6	0,0	321,0	70,3	88,2
117,0	248,0	4,4	0,1	2,9	0,0	318,4	70,5	89,3
118,0	249,0	4,4	0,1	2,7	0,0	316,5	70,6	88,9
119,0	250,0	4,4	0,0	2,7	0,0	315,5	69,9	89,5
120,0	251,0	4,3	0,0	2,9	0,0	315,4	70,1	89,3
121,0	252,0	4,3	0,0	3,0	0,0	316,2	70,0	89,1
122,0	253,0	4,3	0,0	3,0	0,0	313,8	69,9	89,0
123,0	254,0	4,3	0,0	2,8	0,0	311,5	69,9	88,6
124,0	255,0	4,3	0,0	2,8	0,0	308,3	70,0	88,4
125,0	256,0	4,2	0,0	2,6	0,0	307,2	70,2	88,2
126,0	257,0	4,2	0,0	2,9	0,0	304,7	70,6	87,7
127,0	258,0	4,2	0,1	2,7	0,0	302,1	70,1	88,0
128,0	259,0	4,2	0,1	2,7	0,0	300,5	70,4	87,6
129,0	260,0	4,2	0,1	2,6	0,0	296,7	70,6	87,3
130,0	261,0	4,2	0,1	2,3	0,0	293,6	70,2	87,0
131,0	262,0	4,2	0,1	2,4	0,0	292,1	70,0	87,1
132,0	263,0	4,1	0,0	2,5	0,0	290,6	70,7	86,7
133,0	264,0	4,1	0,1	2,5	0,0	287,8	70,1	85,3
134,0	265,0	4,2	0,1	2,3	0,0	283,9	70,4	87,1
135,0	266,0	4,1	0,1	2,2	0,0	281,4	70,4	85,9
136,0	267,0	4,1	0,1	2,2	0,0	278,7	70,1	85,9
137,0	268,0	4,1	0,0	2,4	0,0	277,2	70,2	86,0
138,0	269,0	4,1	0,0	2,6	0,0	278,6	70,1	85,8
139,0	270,0	4,1	0,0	2,7	0,0	278,8	70,5	85,9
140,0	271,0	4,1	0,0	2,6	0,0	277,7	70,1	86,0

141,0	272,0	4,1	0,0	2,5	0,0	276,5	70,1	85,9
142,0	273,0	4,0	0,1	2,5	0,0	273,3	70,0	85,1
143,0	274,0	4,0	0,1	2,2	0,0	272,0	69,9	84,8
144,0	275,0	4,0	0,1	2,3	0,0	271,0	70,0	84,9
145,0	276,0	4,0	0,1	2,4	0,0	270,4	70,2	84,8
146,0	277,0	4,0	0,1	2,5	0,0	271,3	70,2	84,9
147,0	278,0	4,0	0,0	2,7	0,0	270,6	70,4	83,6
148,0	279,0	4,0	0,1	2,6	0,0	270,0	69,9	84,0
149,0	280,0	4,0	0,1	2,5	0,0	267,5	70,2	84,5
150,0	281,0	3,9	0,1	2,4	0,0	265,4	70,4	84,0
151,0	282,0	3,9	0,1	2,4	0,0	266,0	70,3	84,5
152,0	283,0	3,9	0,1	2,5	0,0	265,3	70,6	84,9
153,0	284,0	3,9	0,1	2,5	0,0	264,9	70,1	84,7
154,0	285,0	3,9	0,1	2,5	0,0	264,0	70,0	84,8
155,0	286,0	3,9	0,1	2,3	0,0	262,4	70,0	84,8
156,0	287,0	3,9	0,1	2,3	0,0	259,9	69,8	84,4
157,0	288,0	3,9	0,1	2,2	0,0	258,2	70,1	84,2
158,0	289,0	3,8	0,1	2,3	0,0	257,7	70,4	84,0
159,0	290,0	3,8	0,1	2,3	0,0	258,0	70,1	83,8
160,0	291,0	3,8	0,1	2,4	0,0	257,3	70,1	83,7
161,0	292,0	3,8	0,1	2,4	0,0	255,6	70,1	83,4
162,0	293,0	3,8	0,1	2,1	0,0	253,0	70,6	83,5
163,0	294,0	3,8	0,1	2,1	0,0	251,4	69,7	82,5
164,0	295,0	3,8	0,1	2,2	0,0	250,5	69,6	83,0
165,0	296,0	3,8	0,1	2,1	0,0	249,2	69,5	83,3
166,0	297,0	3,8	0,1	2,1	0,0	246,8	70,1	82,6
167,0	298,0	3,7	0,1	2,0	0,0	243,7	69,9	82,1
168,0	299,0	3,7	0,1	1,9	0,0	242,6	70,1	83,5
169,0	300,0	3,7	0,1	2,1	0,0	240,9	70,0	82,7
170,0	301,0	3,7	0,1	1,9	0,0	238,2	70,0	82,7
171,0	302,0	3,7	0,1	1,8	0,0	235,0	70,6	82,7
172,0	303,0	3,7	0,1	1,7	0,0	232,1	69,8	82,5
173,0	304,0	3,7	0,1	1,6	0,0	230,1	69,9	82,0
174,0	305,0	3,7	0,1	1,6	0,0	227,4	69,9	82,2
175,0	306,0	3,7	0,1	1,6	0,0	226,1	70,0	81,8
176,0	307,0	3,7	0,0	1,7	0,0	225,2	70,2	81,6
177,0	308,0	3,7	0,0	1,7	0,0	223,5	70,0	81,5
178,0	309,0	3,6	0,0	1,7	0,0	221,4	69,7	81,1
179,0	310,0	1,6	0,0	1,6	0,0	219,4	70,0	80,5
180,0	311,0	3,7	0,0	1,5	0,0	216,6	69,9	80,5
181,0	312,0	3,6	0,0	1,6	0,0	214,1	70,0	79,3
182,0	313,0	4,0	0,0	1,5	0,0	210,5	70,2	80,7
183,0	314,0	3,5	0,0	0,9	0,0	201,4	70,3	81,4
184,0	315,0	3,1	0,0	0,8	0,0	199,1	70,4	81,9
185,0	316,0	3,5	0,1	1,0	0,0	202,0	70,3	81,6
186,0	317,0	3,4	0,1	1,7	0,0	246,2	70,5	81,5
187,0	318,0	3,4	0,0	1,4	0,0	263,4	70,4	82,1
188,0	319,0	3,4	0,0	1,0	0,0	274,8	70,1	83,0
189,0	320,0	3,4	0,0	0,9	0,0	278,8	70,0	83,2
190,0	321,0	3,4	0,0	1,1	0,0	293,7	70,1	84,4
191,0	322,0	3,4	0,0	1,1	0,0	299,4	70,1	85,1
192,0	323,0	3,4	0,0	1,0	0,0	303,1	70,1	85,6
193,0	324,0	3,3	0,0	0,9	0,0	308,6	69,9	86,1
194,0	325,0	3,3	0,0	0,9	0,0	315,0	70,0	86,9
195,0	326,0	3,2	0,0	1,0	0,0	321,7	69,9	87,6
196,0	327,0	3,2	0,0	1,0	0,0	321,4	69,9	87,8
197,0	328,0	3,2	0,0	4,1	0,0	325,2	69,8	87,8
198,0	329,0	3,2	0,0	4,8	0,0	326,8	69,9	88,2
199,0	330,0	3,2	0,0	4,2	0,0	326,1	70,2	87,8
200,0	331,0	3,1	0,0	4,4	0,0	330,5	69,9	87,7
201,0	332,0	3,1	0,0	4,5	0,0	335,3	70,4	89,3
202,0	333,0	3,1	0,0	5,0	0,0	337,0	70,2	89,5
203,0	334,0	3,0	0,0	4,4	0,0	340,5	70,1	90,1
204,0	335,0	3,0	0,0	4,9	0,0	343,8	70,3	90,4
205,0	336,0	3,0	0,1	0,9	0,0	345,0	70,3	90,8
206,0	337,0	3,0	0,0	4,6	0,0	352,2	70,3	91,0
207,0	338,0	3,0	0,0	1,0	0,0	355,6	70,3	91,3
208,0	339,0	2,9	0,0	1,0	0,0	355,1	70,3	91,5
209,0	340,0	2,9	0,1	4,2	0,0	359,7	70,4	91,8
210,0	341,0	2,9	0,0	1,1	0,0	365,2	70,5	92,2
211,0	342,0	2,9	0,0	1,0	0,0	361,2	70,4	91,9
212,0	343,0	2,8	0,1	4,0	0,0	359,3	70,3	92,2
213,0	344,0	2,8	0,1	4,1	0,0	358,2	70,5	92,1

214,0	345,0	2,8	0,0	4,3	0,0	361,0	70,3	92,0
215,0	346,0	2,8	0,0	4,6	0,0	359,5	70,6	92,0
216,0	347,0	2,7	0,0	4,2	0,0	365,8	70,1	92,2
217,0	348,0	2,7	0,0	1,1	0,0	366,6	70,4	92,3
218,0	349,0	2,7	0,1	4,3	0,0	370,0	70,4	91,2
219,0	350,0	2,7	0,0	1,0	0,0	373,5	70,2	91,8
220,0	351,0	2,6	0,0	1,0	0,0	374,3	70,6	92,7
221,0	352,0	2,6	0,0	0,9	0,0	370,1	70,6	92,9
222,0	353,0	2,6	0,0	4,1	0,0	369,4	70,3	93,2
223,0	354,0	2,6	0,1	4,2	0,0	368,6	70,2	93,3
224,0	355,0	2,5	0,1	4,0	0,0	368,7	70,6	93,8
225,0	356,0	2,5	0,0	4,1	0,0	369,4	70,8	93,1
226,0	357,0	2,5	0,0	4,4	0,0	372,1	70,7	93,5
227,0	358,0	2,5	0,0	4,5	0,0	372,9	70,4	93,6
228,0	359,0	2,4	0,1	4,4	0,0	373,2	70,9	93,6
229,0	360,0	2,4	0,1	4,4	0,0	371,7	70,5	93,5
230,0	361,0	2,4	0,1	4,1	0,0	369,4	70,4	93,1
231,0	362,0	2,4	0,1	3,8	0,0	370,7	70,7	93,4
232,0	363,0	2,4	0,1	1,0	0,0	376,3	70,5	93,3
233,0	364,0	2,3	0,0	0,9	0,0	372,8	70,7	93,1
234,0	365,0	2,3	0,1	3,9	0,0	369,9	70,6	92,1
235,0	366,0	2,3	0,1	3,8	0,0	369,1	70,3	92,7
236,0	367,0	2,3	0,1	4,3	0,0	369,7	70,5	92,5
237,0	368,0	2,2	0,0	4,2	0,0	366,5	70,7	92,3
238,0	369,0	2,2	0,1	3,9	0,0	364,1	70,5	91,4
239,0	370,0	2,2	0,1	3,8	0,0	370,2	71,0	93,4
240,0	371,0	2,1	0,0	5,0	0,0	370,7	70,5	92,6
241,0	372,0	2,1	0,0	4,2	0,0	370,6	70,4	93,0
242,0	373,0	2,1	0,1	4,4	0,0	369,9	70,2	91,9
243,0	374,0	2,1	0,1	4,0	0,0	367,3	69,9	92,7
244,0	375,0	2,1	0,1	4,3	0,0	366,4	70,0	92,9
245,0	376,0	2,0	0,1	4,0	0,0	366,4	70,0	92,7
246,0	377,0	2,0	0,1	4,0	0,0	369,7	70,2	92,8
247,0	378,0	2,0	0,1	4,5	0,0	369,3	70,1	93,2
248,0	379,0	2,0	0,1	4,1	0,0	365,2	70,2	92,9
249,0	380,0	2,0	0,1	3,7	0,0	365,3	70,8	92,5
250,0	381,0	1,9	0,1	4,1	0,0	364,7	70,7	92,6
251,0	382,0	1,9	0,1	3,9	0,0	363,8	70,5	92,2
252,0	383,0	1,9	0,1	3,9	0,0	361,0	70,6	92,2
253,0	384,0	1,9	0,1	3,8	0,0	359,5	70,5	91,2
254,0	385,0	1,9	0,2	3,5	0,0	354,5	70,4	91,1
255,0	386,0	1,8	0,2	3,2	0,0	353,1	70,6	91,2
256,0	387,0	1,8	0,1	3,6	0,0	356,8	70,8	91,0
257,0	388,0	1,8	0,1	4,1	0,0	355,0	70,7	89,9
258,0	389,0	1,8	0,1	3,6	0,0	353,4	70,7	92,0
259,0	390,0	1,8	0,1	3,8	0,0	353,1	70,5	92,3
260,0	391,0	1,7	0,1	3,8	0,0	349,5	70,6	92,5
261,0	392,0	1,7	0,1	3,3	0,0	343,9	70,4	92,2
262,0	393,0	1,7	0,1	3,0	0,0	348,9	70,8	92,2
263,0	394,0	1,7	0,1	4,7	0,0	353,3	70,9	92,2
264,0	395,0	1,6	0,1	4,2	0,0	348,7	70,7	92,2
265,0	396,0	1,6	0,2	3,3	0,0	342,8	70,5	91,9
266,0	397,0	1,6	0,2	2,9	0,0	341,4	70,5	92,1
267,0	398,0	1,6	0,1	3,7	0,0	347,7	70,5	92,0
268,0	399,0	1,6	0,1	4,1	0,0	343,1	70,7	92,0
269,0	400,0	1,6	0,1	3,1	0,0	338,2	70,7	91,5
270,0	401,0	1,6	0,1	3,0	0,0	335,3	70,7	91,0
271,0	402,0	1,6	0,1	3,0	0,0	331,2	70,7	90,7
272,0	403,0	1,5	0,1	2,8	0,0	328,1	70,6	90,1
273,0	404,0	1,5	0,1	2,7	0,0	327,0	70,8	90,2
274,0	405,0	1,5	0,1	3,0	0,0	326,7	70,2	90,2
275,0	406,0	1,5	0,1	3,2	0,0	326,8	70,4	89,9
276,0	407,0	1,4	0,1	3,2	0,0	325,8	70,7	90,1
277,0	408,0	1,5	0,1	3,2	0,0	322,4	70,4	89,9
278,0	409,0	1,4	0,1	2,7	0,0	315,7	70,4	89,7
279,0	410,0	1,4	0,1	2,4	0,0	310,9	71,1	89,0
280,0	411,0	1,4	0,1	2,3	0,0	308,6	70,4	87,6
281,0	412,0	1,4	0,1	2,6	0,0	308,5	70,9	89,0
282,0	413,0	1,4	0,1	3,1	0,0	307,8	70,8	88,3
283,0	414,0	1,4	0,0	3,0	0,0	305,5	70,6	88,6
284,0	415,0	1,3	0,1	2,6	0,0	301,6	70,7	88,7
285,0	416,0	1,3	0,1	2,5	0,0	299,1	70,6	88,6
286,0	417,0	1,3	0,1	2,5	0,0	297,3	70,7	87,9

287,0	418,0	1,3	0,1	2,6	0,0	297,5	70,8	87,2
288,0	419,0	1,3	0,1	2,8	0,0	294,5	70,7	86,5
289,0	420,0	1,3	0,1	2,5	0,0	294,5	70,3	87,5
290,0	421,0	1,2	0,1	2,8	0,0	291,7	70,7	87,7
291,0	422,0	1,2	0,1	2,5	0,0	289,7	70,6	86,1
292,0	423,0	1,2	0,1	2,6	0,0	279,1	70,9	86,3
293,0	424,0	1,2	0,0	1,7	0,0	280,6	70,5	86,6
294,0	425,0	1,2	0,0	2,2	0,0	290,0	70,6	87,2
295,0	426,0	1,2	0,0	4,5	0,0	308,7	70,8	87,2
296,0	427,0	1,2	0,0	0,9	0,0	308,8	70,5	86,4
297,0	428,0	1,1	0,0	3,8	0,0	302,7	70,4	87,6
298,0	429,0	1,1	0,1	2,7	0,0	296,6	70,7	88,0
299,0	430,0	1,1	0,0	2,7	0,0	309,7	70,3	88,1
300,0	431,0	1,0	0,0	5,0	0,0	313,4	70,6	87,3
301,0	432,0	1,0	0,0	3,4	0,0	307,9	70,7	86,3
302,0	433,0	1,0	0,1	2,9	0,0	308,0	70,6	86,5
303,0	434,0	1,0	0,0	3,7	0,0	308,8	70,8	86,4
304,0	435,0	1,0	0,0	3,2	0,0	305,8	70,4	86,8
305,0	436,0	1,0	0,0	2,9	0,0	300,2	71,1	86,9
306,0	437,0	1,0	0,0	2,7	0,0	299,6	70,7	86,7
307,0	438,0	0,9	0,0	2,9	0,0	295,4	71,0	88,2
308,0	439,0	0,9	0,0	2,6	0,0	294,8	70,7	88,0
309,0	440,0	0,9	0,0	2,7	0,0	293,2	70,7	88,3
310,0	441,0	0,9	0,0	2,7	0,0	294,7	70,9	87,4
311,0	442,0	0,9	0,0	2,9	0,0	292,8	70,8	88,2
312,0	443,0	0,8	0,0	2,7	0,0	296,3	71,3	87,0
313,0	444,0	0,8	0,0	3,8	0,0	302,0	70,9	87,6
314,0	445,0	0,8	0,0	3,5	0,0	304,3	71,3	87,8
315,0	446,0	0,8	0,0	3,9	0,0	299,7	71,2	87,8
316,0	447,0	0,8	0,0	2,8	0,0	296,2	71,2	86,6
317,0	448,0	0,8	0,0	2,9	0,0	293,1	71,4	87,5
318,0	449,0	0,8	0,0	2,8	0,0	291,6	71,6	87,8
319,0	450,0	0,7	0,0	2,8	0,0	299,5	71,5	87,6
320,0	451,0	0,7	0,0	4,2	0,0	300,7	71,6	87,5
321,0	452,0	0,7	0,0	3,3	0,0	298,7	71,6	87,9
322,0	453,0	0,7	0,0	3,0	0,0	295,1	71,7	87,8
323,0	454,0	0,7	0,1	2,7	0,0	292,2	71,5	88,2
324,0	455,0	0,7	0,0	2,8	0,0	291,4	71,7	88,3
325,0	456,0	0,6	0,0	2,8	0,0	288,2	71,7	88,3
326,0	457,0	0,6	0,0	2,4	0,0	283,9	71,7	88,3
327,0	458,0	0,6	0,1	2,3	0,0	281,2	71,9	87,7
328,0	459,0	0,6	0,0	2,5	0,0	279,4	72,1	87,7
329,0	460,0	0,6	0,0	2,4	0,0	275,9	71,8	87,4
330,0	461,0	0,6	0,1	2,2	0,0	273,7	71,5	87,8
331,0	462,0	0,6	0,0	2,2	0,0	272,0	71,6	87,6
332,0	463,0	0,6	0,0	2,3	0,0	269,4	71,7	87,2
333,0	464,0	0,6	0,1	2,1	0,0	266,2	71,4	86,8
334,0	465,0	0,5	0,0	2,1	0,0	264,3	71,2	86,0
335,0	466,0	0,6	0,0	2,1	0,0	261,8	70,9	86,3
336,0	467,0	0,5	0,1	2,0	0,0	259,3	71,1	86,3
337,0	468,0	0,5	0,1	2,2	0,0	256,8	70,9	86,0
338,0	469,0	0,5	0,1	2,0	0,0	254,1	70,8	85,9
339,0	470,0	0,5	0,1	1,9	0,0	254,3	71,0	85,9
340,0	471,0	0,5	0,1	2,7	0,0	264,9	71,2	86,1
341,0	472,0	0,4	0,0	3,8	0,0	269,3	71,5	86,3
342,0	473,0	0,4	0,0	3,1	0,0	272,6	71,2	86,4
343,0	474,0	0,4	0,0	3,7	0,0	270,7	71,3	86,2
344,0	475,0	0,4	0,0	2,8	0,0	272,5	71,3	86,4
345,0	476,0	0,4	0,0	3,5	0,0	275,8	71,3	86,3
346,0	477,0	0,4	0,1	2,9	0,0	273,6	71,2	87,0
347,0	478,0	0,3	0,1	2,5	0,0	257,0	71,3	85,9
348,0	479,0	0,3	0,5	1,3	0,0	271,8	71,2	86,6
349,0	480,0	0,3	0,1	1,1	0,0	277,7	71,5	86,9
350,0	481,0	0,3	0,1	3,2	0,0	274,7	71,3	87,0
351,0	482,0	0,3	0,1	2,8	0,0	273,1	71,5	86,9
352,0	483,0	0,2	0,1	2,6	0,0	269,7	71,4	87,1
353,0	484,0	0,2	0,1	2,7	0,0	275,7	71,5	87,3
354,0	485,0	0,2	0,1	3,7	0,0	271,5	71,5	87,2
355,0	486,0	0,2	0,1	2,6	0,0	279,2	71,3	87,5
356,0	487,0	0,1	0,0	3,9	0,0	285,6	71,5	87,8
357,0	488,0	0,1	0,0	3,9	0,0	283,2	71,4	87,9
358,0	489,0	0,1	0,1	2,7	0,0	290,6	71,4	87,9
359,0	490,0	0,1	0,0	4,5	0,0	299,0	71,6	88,2

360,0	491,0	0,0	0,0	4,0	0,0	295,6	71,8	87,5
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Manufacturer: LAMINOX
 Model: JESSIKA NATUREL

Run: 1
 Project #: PI 20163
 Test Duration: 360 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: 60,82%
 Combustion Efficiency: 99,50%
 Heat Transfer Efficiency: 61,12%

	HHV	LHV
Eff	60,82%	65,15%
Comb Eff	99,50%	99,50%
HT Eff	61,12%	65,48%
Output	7 494	kJ/h
Burn Rate	0,63	kg/h
Grams CO	61	g
Input	12 323	kJ/h
MC wet	4,25	

Ultimate CO₂
 CO_{2-ult} 20,40
 F₀ 1,017

Heat Output:	7 109 Btu/h
Heat Input:	11 689 Btu/h
Burn Duration:	6,00 h
Burn Rate:	1,38 lb/h
Stack Temp:	365,6 Deg. F

Averages				0,05	3,95	5,98	20,83	16,86	185,73	21,23	100,2%	60,4%	#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	3,93	0,02	9,23	120,7%	20,70	11,46	321,1	20,8	100,2%	69,8%	69,9%		
1,00	3,87	0,01	9,06	124,9%	20,70	11,63	320,4	20,6	100,3%	69,4%	69,6%		
2,00	3,86	0,01	8,86	129,9%	20,70	11,84	321,0	20,8	100,3%	68,9%	69,1%		
3,00	3,81	0,01	9,67	110,7%	20,68	11,00	318,9	20,8	100,2%	70,9%	71,0%		
4,00	3,81	0,07	7,99	153,1%	20,73	12,70	319,2	20,7	99,7%	66,8%	66,6%		
5,00	3,77	0,06	8,76	131,4%	20,71	11,92	315,0	20,8	99,8%	69,2%	69,1%		
6,00	3,74	0,04	8,48	139,4%	20,71	12,21	317,3	20,9	100,0%	68,3%	68,3%		
7,00	3,72	0,03	7,30	178,3%	20,75	13,43	309,5	20,9	100,1%	65,6%	65,6%		
8,00	3,72	0,02	8,93	128,0%	20,70	11,77	314,3	21,0	100,2%	69,6%	69,8%		
9,00	3,68	0,05	8,78	130,9%	20,71	11,90	314,0	20,9	99,9%	69,3%	69,3%		
10,00	3,68	0,05	8,01	153,3%	20,73	12,70	308,9	21,0	99,9%	67,8%	67,7%		
11,00	3,63	0,06	6,59	206,6%	20,76	14,14	307,7	20,8	99,8%	63,1%	63,0%		
12,00	3,63	0,05	10,56	92,3%	20,66	10,08	310,7	20,9	99,9%	73,1%	73,0%		
13,00	3,59	0,04	8,15	149,0%	20,72	12,55	307,3	21,0	100,0%	68,3%	68,3%		
14,00	3,57	0,05	7,42	172,9%	20,74	13,29	309,5	21,0	99,9%	66,0%	65,9%		
15,00	3,54	0,01	10,15	100,8%	20,67	10,52	310,6	20,9	100,2%	72,4%	72,5%		
16,00	3,54	0,03	8,03	153,0%	20,73	12,68	310,6	20,9	100,1%	67,7%	67,7%		
17,00	3,50	0,01	9,88	106,1%	20,68	10,79	311,2	20,9	100,2%	71,9%	72,0%		
18,00	3,45	0,03	10,71	90,0%	20,66	9,93	311,2	21,0	100,1%	73,3%	73,3%		
19,00	3,40	0,06	7,41	172,9%	20,74	13,30	313,7	21,0	99,8%	65,6%	65,4%		
20,00	3,40	0,05	12,51	62,3%	20,61	8,07	314,6	21,1	99,8%	75,5%	75,4%		
21,00	3,36	0,02	8,65	135,4%	20,71	12,05	312,4	21,0	100,2%	69,2%	69,3%		
22,00	3,36	0,01	10,14	101,0%	20,67	10,53	314,3	21,1	100,2%	72,1%	72,2%		
23,00	3,36	0,02	9,09	123,9%	20,70	11,60	313,2	21,0	100,2%	70,1%	70,3%		
24,00	3,31	0,05	6,84	196,2%	20,76	13,90	305,4	21,2	100,0%	64,4%	64,3%		
25,00	3,27	0,02	7,80	161,0%	20,73	12,93	310,7	21,1	100,3%	67,0%	67,2%		
26,00	3,27	0,01	9,98	104,1%	20,68	10,69	312,6	21,1	100,2%	71,9%	72,1%		
27,00	3,22	0,01	10,04	103,0%	20,67	10,63	312,1	20,9	100,2%	72,1%	72,2%		
28,00	3,18	0,01	10,46	94,8%	20,66	10,20	314,2	21,1	100,2%	72,7%	72,8%		
29,00	3,18	0,02	9,15	122,6%	20,70	11,54	313,3	21,1	100,2%	70,2%	70,4%		
30,00	3,18	0,08	9,83	105,8%	20,68	10,80	312,8	21,0	99,6%	71,7%	71,4%		
31,00	3,13	0,03	8,57	137,2%	20,71	12,13	310,2	21,1	100,1%	69,2%	69,2%		
32,00	3,13	0,04	7,68	164,2%	20,74	13,04	312,8	21,1	100,0%	66,5%	66,5%		
33,00	3,09	0,04	8,12	150,1%	20,72	12,59	312,9	21,1	100,1%	67,8%	67,8%		
34,00	3,09	0,01	9,50	114,3%	20,69	11,18	310,4	21,3	100,2%	71,2%	71,4%		
35,00	3,04	0,05	7,06	186,7%	20,75	13,66	304,5	21,3	99,9%	65,3%	65,2%		
36,00	3,04	0,05	6,68	203,3%	20,76	14,06	307,7	21,1	100,0%	63,5%	63,5%		
37,00	3,00	0,02	10,39	96,1%	20,66	10,27	303,7	21,1	100,2%	73,3%	73,4%		
38,00	3,00	0,10	5,63	256,0%	20,79	15,11	302,2	21,1	99,2%	59,3%	58,8%		
39,00	2,95	0,05	10,39	95,4%	20,66	10,25	305,3	21,2	99,9%	73,2%	73,1%		
40,00	2,95	0,02	7,96	155,8%	20,73	12,76	303,9	21,0	100,3%	68,1%	68,3%		
41,00	2,91	0,01	9,09	124,1%	20,70	11,60	301,2	21,0	100,3%	71,1%	71,3%		
42,00	2,86	0,02	9,64	111,3%	20,68	11,04	305,2	21,2	100,2%	71,9%	72,0%		
43,00	2,86	0,02	8,40	142,4%	20,72	12,31	306,7	21,2	100,3%	69,0%	69,2%		
44,00	2,81	0,01	9,46	115,3%	20,69	11,22	306,2	21,1	100,2%	71,4%	71,6%		
45,00	2,81	0,01	8,73	133,3%	20,71	11,97	305,1	21,2	100,3%	70,0%	70,1%		
46,00	2,81	0,01	8,01	154,5%	20,73	12,72	301,9	21,1	100,4%	68,4%	68,7%		
47,00	2,77	0,05	6,33	219,8%	20,77	14,42	299,8	21,2	100,0%	62,9%	62,9%		
48,00	2,72	0,01	8,58	137,3%	20,71	12,12	300,8	21,0	100,3%	70,0%	70,2%		
49,00	2,72	0,02	8,06	152,7%	20,73	12,66	298,3	21,6	100,3%	68,9%	69,1%		
50,00	2,72	0,03	7,18	182,9%	20,75	13,55	298,1	21,2	100,2%	66,3%	66,5%		
51,00	2,68	0,03	7,20	182,5%	20,75	13,54	296,8	21,4	100,2%	66,5%	66,7%		
52,00	2,68	0,02	7,96	155,7%	20,73	12,76	293,7	21,4	100,2%	69,0%	69,2%		
53,00	2,63	0,02	6,88	195,4%	20,76	13,86	290,7	21,3	100,3%	66,0%	66,3%		
54,00	2,63	0,04	7,05	187,5%	20,75	13,68	292,3	21,4	100,0%	66,5%	66,5%		
55,00	2,59	0,01	9,69	110,3%	20,68	10,99	294,1	21,2	100,2%	72,8%	73,0%		
56,00	2,59	0,03	7,68	164,9%	20,74	13,05	293,9	21,3	100,2%	68,2%	68,4%		
57,00	2,54	0,02	7,63	166,8%	20,74	13,10	291,5	21,3	100,3%	68,3%	68,5%		
58,00	2,54	0,01	7,74	163,2%	20,73	12,99	286,4	21,1	100,4%	69,1%	69,4%		
59,00	2,54	0,05	5,73	252,6%	20,79	15,03	284,3	21,2	99,9%	62,0%	61,9%		
60,00	2,53	0,01	7,25	180,9%	20,75	13,49	282,1	21,2	100,4%	68,1%	68,3%		
61,00	2,50	0,05	6,23	224,9%	20,77	14,52	278,8	21,1	100,0%	64,8%	64,8%		
62,00	2,50	0,01	8,01	154,5%	20,73	12,71	275,8	21,3	100,4%	70,8%	71,0%		
63,00	2,45	0,03	5,85	246,9%	20,78	14,92	269,0	21,3	100,3%	64,3%	64,6%		
64,00	2,45	0,03	4,86	317,4%	20,81	15,94	264,4	21,3	100,4%	59,7%	59,9%		
65,00	2,45	0,05	4,16	384,6%	20,83	16,65	255,6	21,4	100,0%	55,9%	56,0%		
66,00	2,44	0,07	3,32	501,9%	20,85	17,50	251,8	21,3	99,7%	48,1%	48,0%		
67,00	2,41	0,02	5,34	280,1%	20,80	15,44	253,2	21,4	100,4%	63,9%	64,2%		
68,00	2,41	0,01	6,08	234,8%	20,78	14,69	251,4	21,3	100,5%	67,3%	67,7%		
69,00	2,41	0,03	4,71	330,3%	20,81	16,09	246,5	21,3	100,5%	61,3%	61,6%		
70,00	2,41	0,02	4,70	332,6%	20,82	16,11	242,3	21,4	100,7%	61,8%	62,2%		
71,00	2,36	0,04	4,56	343,9%	20,82	16,24	237,8	21,3	100,3%	61,6%	61,8%		
72,00	2,36	0,03	4,29	371,9%	20,83	16,52	233,9	21,3	100,5%	60,4%	60,7%		
73,00	2,35	0,05	4,26	373,9%	20,83	16,54	230,9	21,5	100,2%	60,6%	60,7%		
74,00	2,36	0,08	3,98	402,8%	20,83	16,81	225,6	21,3	99,6%	59,4%	59,2%		
75,00	2,32	0,10	3,38	485,1%	20,85	17,41	221,4	21,4	98,9%	54,8%	54,2%		
76,00	2,31	0,09	3,53	465,0%	20,84	17,28	219,5	21,4	99,3%	56,6%	56,2%		
77,00	2,31	0,04	3,85	424,5%	20,84	16,97	217,4	21,3	100,4%	59,8%	60,0%		
78,00	2,31	0,03	3,95	412,6%	20,83	16,87	214,0	21,4	100,6%	61,1%	61,5%		
79,00	2,31	0,06	3,73	438,4%	20,84	17,08	212,1	21,3	99,7%	59,7%	59,6%		
80,00	2,29	0,07	4,09	389,9%	20,83	16,70	212,5	21,4	99,7%	62,4%	62,2%		
81,00	2,27	0,04	4,68	331,8%	20,81	16,11	210,9	21,1	100,2%	66,2%	66,3%		
82,00	2,27	0,08	4,05	393,9%	20,83	16,74	210,7	21,4	99,6%	62,4%	62,2%		
83,00	2,27	0,02	4,69	332,8%	20,82	16,11	209,9	21,3	100,6%	66,4%	66,8%		
84,00	2,22	0,04	4,06	397,5%	20,83	16,75	207,4	21,4	100,4%	63,0%	63,3%		
85,00	2,26	0,10	3,98	399,7%	20,83	16,80	204,5	21,3	99,0%	62,9%	62,4%		
86,00	2,22	0,09	3,55	461,7%	20,84	17,25	204,9	21,2	99,3%	59,4%	59,0%		
87,00	2,22	0,06	4,39	358,2%	20,82	16,40	202,7	21,3	99,9%	65,8%	65,8%		
88,00	2,22	0,12	3,71	432,5%	20,84	17,07	198,9	21,3	98,6%	61,9%	61,0%		
89,00	2,18	0,08	3,10	542,4%	20,86	17,72	195,4	21,3	99,6%	56,9%	56,7%		
90,00	2,18	0,11	3,08	540,2%	20,86	17,72	194,3	21,3	98,7%	57,0%	56,3%		
91,00	2,18	0,04	4,05	398,2%	20,83	16,76	194,0	21,4	100,2%	65,1%	65,3%		
92,00	2,18	0,05	3,88	419,8%	20,84	16,94	192,2	21,3	100,2%	64			

93,00	2,18	0,10	3,50	467,1%	20,84	17,30	190,2	21,2	99,0%	61,7%	61,1%
94,00	2,18	0,08	3,47	475,4%	20,85	17,34	190,4	21,2	99,6%	61,5%	61,2%
95,00	2,18	0,02	4,33	368,2%	20,82	16,48	188,7	21,2	100,6%	67,6%	68,0%
96,00	2,17	0,05	3,43	487,5%	20,85	17,40	185,4	21,3	100,3%	62,0%	62,2%
97,00	2,13	0,04	3,29	512,6%	20,85	17,54	183,7	21,2	100,4%	61,1%	61,4%
98,00	2,10	0,04	3,58	462,7%	20,84	17,24	182,4	20,8	100,3%	63,7%	63,9%
99,00	2,13	0,06	3,27	513,6%	20,85	17,56	180,7	21,0	100,1%	61,5%	61,6%
100,00	2,13	0,08	3,43	481,7%	20,85	17,38	178,9	21,1	99,4%	63,3%	62,9%
101,00	2,09	0,07	3,27	510,7%	20,85	17,55	177,9	21,2	99,7%	62,1%	62,0%
102,00	2,09	0,06	3,36	497,6%	20,85	17,46	176,8	21,2	100,1%	63,1%	63,1%
103,00	2,09	0,07	3,23	518,5%	20,85	17,59	175,8	21,1	99,9%	62,1%	61,9%
104,00	2,09	0,08	3,19	523,9%	20,85	17,62	175,7	21,1	99,4%	61,8%	61,5%
105,00	2,09	0,06	3,38	493,0%	20,85	17,44	176,9	21,4	99,9%	63,3%	63,2%
106,00	2,08	0,06	3,57	461,9%	20,84	17,24	175,4	21,2	99,9%	65,0%	64,9%
107,00	2,04	0,08	3,27	509,5%	20,85	17,54	173,4	21,2	99,6%	63,0%	62,8%
108,00	2,04	0,12	2,98	556,8%	20,86	17,81	171,3	21,2	98,3%	60,9%	59,8%
109,00	2,04	0,10	3,04	549,3%	20,86	17,76	173,6	21,2	99,0%	61,0%	60,3%
110,00	2,04	0,04	4,17	384,8%	20,83	16,64	172,2	21,0	100,4%	69,2%	69,5%
111,00	2,00	0,04	3,31	509,0%	20,85	17,52	170,2	21,2	100,5%	64,0%	64,3%
112,00	2,04	0,06	2,98	571,0%	20,86	17,85	168,9	21,1	100,1%	61,3%	61,3%
113,00	2,00	0,02	3,06	561,4%	20,86	17,78	165,6	21,1	101,1%	62,7%	63,3%
114,00	2,00	0,03	2,60	673,5%	20,87	18,25	163,6	21,1	100,9%	58,2%	58,8%
115,00	2,00	0,04	2,70	643,4%	20,87	18,14	161,0	21,2	100,5%	60,0%	60,4%
116,00	2,00	0,07	2,63	654,8%	20,87	18,20	160,5	21,3	99,7%	59,4%	59,2%
117,00	2,00	0,06	2,86	599,3%	20,86	17,97	159,1	21,4	100,0%	62,2%	62,2%
118,00	2,00	0,06	2,65	651,2%	20,87	18,18	158,0	21,4	100,0%	60,3%	60,3%
119,00	1,98	0,03	2,69	649,5%	20,87	18,16	157,5	21,0	100,9%	60,7%	61,3%
120,00	1,95	0,04	2,93	587,5%	20,86	17,91	157,4	21,2	100,6%	63,2%	63,6%
121,00	1,95	0,04	3,02	567,6%	20,86	17,82	157,9	21,1	100,6%	63,9%	64,3%
122,00	1,95	0,03	3,02	567,7%	20,86	17,82	156,5	21,0	100,7%	64,2%	64,7%
123,00	1,95	0,04	2,76	629,0%	20,87	18,09	155,3	21,0	100,7%	62,0%	62,4%
124,00	1,95	0,03	2,75	633,9%	20,87	18,10	153,5	21,1	101,0%	62,3%	62,9%
125,00	1,91	0,04	2,63	665,6%	20,87	18,22	152,9	21,2	100,8%	61,1%	61,6%
126,00	1,91	0,03	2,89	598,5%	20,86	17,96	151,5	21,4	100,7%	64,2%	64,6%
127,00	1,91	0,07	2,74	627,8%	20,87	18,10	150,1	21,2	99,8%	63,0%	62,9%
128,00	1,91	0,07	2,70	637,6%	20,87	18,13	149,2	21,3	99,9%	62,9%	62,8%
129,00	1,91	0,08	2,61	660,1%	20,87	18,22	147,1	21,4	99,4%	62,4%	62,1%
130,00	1,91	0,09	2,30	756,0%	20,88	18,54	145,4	21,2	99,2%	59,0%	58,5%
131,00	1,91	0,06	2,45	714,1%	20,87	18,40	144,5	21,1	100,2%	61,1%	61,2%
132,00	1,86	0,05	2,52	693,8%	20,87	18,33	143,7	21,5	100,5%	62,3%	62,6%
133,00	1,88	0,05	2,52	693,6%	20,87	18,33	142,1	21,1	100,2%	62,5%	62,7%
134,00	1,89	0,05	2,34	753,9%	20,88	18,51	139,9	21,3	100,4%	61,0%	61,2%
135,00	1,86	0,07	2,19	801,1%	20,88	18,65	138,6	21,3	99,7%	59,4%	59,3%
136,00	1,86	0,06	2,24	785,7%	20,88	18,61	137,0	21,2	99,9%	60,4%	60,4%
137,00	1,86	0,05	2,36	748,7%	20,88	18,50	136,2	21,2	100,6%	62,2%	62,5%
138,00	1,86	0,05	2,64	660,0%	20,87	18,21	137,0	21,2	100,5%	65,1%	65,4%
139,00	1,86	0,04	2,73	637,3%	20,87	18,12	137,1	21,4	100,8%	66,0%	66,5%
140,00	1,86	0,04	2,56	683,8%	20,87	18,29	136,5	21,2	100,7%	64,4%	64,8%
141,00	1,86	0,05	2,46	712,8%	20,87	18,39	135,8	21,2	100,5%	63,5%	63,8%
142,00	1,82	0,05	2,46	711,6%	20,87	18,39	134,1	21,1	100,3%	63,9%	64,1%
143,00	1,82	0,06	2,20	804,4%	20,88	18,65	133,3	21,0	100,1%	60,9%	60,9%
144,00	1,82	0,06	2,34	748,7%	20,88	18,50	132,8	21,1	100,0%	62,9%	62,9%
145,00	1,82	0,06	2,36	740,9%	20,88	18,48	132,4	21,2	100,0%	63,3%	63,3%
146,00	1,82	0,06	2,52	692,8%	20,87	18,33	133,0	21,2	100,1%	64,8%	64,9%
147,00	1,82	0,04	2,68	650,3%	20,87	18,17	132,6	21,3	100,6%	66,5%	67,0%
148,00	1,82	0,05	2,58	674,1%	20,87	18,26	132,2	21,1	100,3%	65,7%	65,9%
149,00	1,82	0,08	2,55	675,2%	20,87	18,28	130,8	21,2	99,3%	65,7%	65,3%
150,00	1,78	0,07	2,35	742,1%	20,88	18,49	129,7	21,3	99,6%	63,9%	63,7%
151,00	1,77	0,06	2,42	720,3%	20,87	18,42	130,0	21,3	99,9%	64,6%	64,6%
152,00	1,77	0,06	2,50	697,4%	20,87	18,34	129,6	21,5	100,1%	65,6%	65,6%
153,00	1,77	0,07	2,51	690,7%	20,87	18,33	129,4	21,2	99,8%	65,7%	65,6%
154,00	1,77	0,09	2,49	691,7%	20,87	18,34	128,9	21,1	99,0%	65,6%	64,9%
155,00	1,77	0,11	2,35	729,6%	20,87	18,47	128,0	21,1	98,3%	64,3%	64,2%
156,00	1,77	0,07	2,30	761,2%	20,88	18,54	126,6	21,0	99,7%	64,1%	63,9%
157,00	1,75	0,08	2,20	797,9%	20,88	18,65	125,7	21,2	99,5%	63,1%	62,8%
158,00	1,72	0,07	2,32	753,2%	20,88	18,52	125,4	21,3	99,7%	64,7%	64,5%
159,00	1,72	0,08	2,35	741,4%	20,88	18,49	125,6	21,2	99,5%	64,9%	64,6%
160,00	1,73	0,09	2,41	715,9%	20,87	18,42	125,2	21,1	99,1%	65,8%	65,2%
161,00	1,72	0,11	2,37	721,3%	20,87	18,45	124,2	21,1	98,2%	65,6%	64,4%
162,00	1,72	0,11	2,13	810,3%	20,88	18,69	122,8	21,4	98,3%	63,2%	62,1%
163,00	1,72	0,09	2,09	835,2%	20,88	18,75	121,9	20,9	98,8%	62,7%	62,0%
164,00	1,72	0,07	2,15	817,3%	20,88	18,69	121,4	20,9	99,7%	63,7%	63,5%
165,00	1,72	0,08	2,15	817,6%	20,88	18,70	120,6	20,8	99,5%	63,8%	63,5%
166,00	1,72	0,06	2,08	850,3%	20,88	18,77	119,4	21,2	100,0%	63,5%	63,5%
167,00	1,68	0,06	1,98	898,1%	20,89	18,87	117,6	21,1	100,1%	62,5%	62,6%
168,00	1,68	0,07	1,87	952,9%	20,89	18,99	117,0	21,1	99,7%	61,0%	60,9%
169,00	1,68	0,09	2,05	852,3%	20,88	18,79	116,1	21,1	99,0%	64,1%	63,4%
170,00	1,68	0,10	1,92	909,1%	20,89	18,91	114,5	21,1	98,5%	62,7%	61,8%
171,00	1,68	0,08	1,76	1011,6%	20,89	19,09	112,8	21,5	99,4%	60,8%	60,4%
172,00	1,68	0,05	1,67	1086,5%	20,89	19,20	111,1	21,0	100,6%	59,5%	59,9%
173,00	1,68	0,06	1,60	1125,8%	20,90	19,26	110,0	21,0	100,1%	58,7%	58,7%
174,00	1,68	0,06	1,63	1108,6%	20,90	19,24	108,5	21,1	100,2%	59,7%	59,9%
175,00	1,68	0,05	1,58	1150,4%	20,90	19,29	107,8	21,1	100,6%	59,0%	59,4%
176,00	1,68	0,05	1,67	1088,3%	20,89	19,20	107,3	21,2	100,9%	61,0%	61,6%
177,00	1,68	0,03	1,75	1046,7%	20,89	19,13	106,4	21,1	101,5%	62,6%	63,6%
178,00	1,64	0,03	1,65	1110,4%	20,90	19,23	105,2	20,9	101,7%	61,4%	62,4%
179,00	1,71	0,03	1,58	1164,6%	20,90	19,30	104,1	21,1	101,8%	60,5%	61,6%
180,00	1,68	0,03	1,55	1199,1%	20,90	19,34	102,5	21,0	102,2%	60,3%	61,7%
181,00	1,63	0,03	1,56	1181,5%	20,90	19,32	101,1	21,1	101,9%	61,3%	62,4%
182,00	1,80	0,04	1,53	1197,4%	20,90	19,35	99,2	21,2	101,4%	61,6%	62,4%
183,00	1,60	0,03	0,93	2024,1%	20,91	19,97	94,1	21,3	103,5%	45,9%	47,5%
184,00	1,41	0,04	0,75	2479,8%	20,92	20,15	92,8	21,3	103,2%	36,5%	37,7%
185,00	1,59	0,05	1,01	1811,2%	20,91	19,87	94,4	21,3	101,0%	49,5%	50,0%
186,00	1,54	0,07	1,66	1083,7%	20,89	19,20	119,0	21,4	99,9%	56,5%	56,5%
187,00	1,54	0,03	1,38	1345,0%	20,90	19,50	128,6	21,4	102,3%	45,4%	46,4%
188,00	1,54	0,02	0,99	1913,7%	20,91	19,91	134,9	21,2	104,1%	23,7%	24,7%
189,00	1,54	0,02	0,95	2018,2%	20,91	19,96	137,1	21,1	104,5%	18,8%	19,7%
190,00	1,54	0,02	1,08	1751,9%	20,91	19,82	145,4	21,2	103,4%	22,9%	23,7%
191,00	1,54	0,01	1,14	1674,2%	20,91	19,77	148,6	21,2	104,0%	24,5%	25,5%
192,00	1,54	0,02	0,95	2000,0%	20,91	19,95	150,6	21,2	104,6%	10,9%	11,4%
193,00	1,50	0,02	0,94	2015,0%	20,91	19,96	153,7	21,1	104,0%	7,9%	8,2%
194,00	1,50	0,02	0,95	2000,4%	20,91	19,95	157,2	21,1	103,9%	6,2%	6,4%
195,00	1,45	0,03	1,04	1808,1%	20,91	19,86					

207,00	1,36	0,04	1,00	1867,9%	20,91	19,89	179,8	21,3	102,4%	-3,0%	-3,1%
208,00	1,32	0,04	1,05	1773,4%	20,91	19,84	179,5	21,3	102,0%	1,5%	1,5%
209,00	1,32	0,05	4,21	378,5%	20,83	16,59	182,0	21,3	100,1%	68,0%	68,0%
210,00	1,32	0,03	1,08	1749,2%	20,91	19,82	185,1	21,4	103,2%	0,4%	0,4%
211,00	1,32	0,03	1,02	1846,7%	20,91	19,88	182,9	21,3	103,5%	-3,0%	-3,1%
212,00	1,27	0,06	4,00	402,4%	20,83	16,80	181,8	21,3	100,0%	66,8%	66,8%
213,00	1,27	0,05	4,14	386,8%	20,83	16,67	181,2	21,4	100,0%	67,7%	67,7%
214,00	1,27	0,02	4,25	376,7%	20,83	16,56	182,8	21,3	100,6%	68,1%	68,5%
215,00	1,27	0,03	4,60	340,6%	20,82	16,20	182,0	21,4	100,5%	69,9%	70,3%
216,00	1,23	0,04	4,22	379,4%	20,83	16,59	185,4	21,2	100,4%	67,4%	67,7%
217,00	1,23	0,02	1,09	1732,7%	20,91	19,81	185,9	21,3	103,3%	0,8%	0,8%
218,00	1,23	0,05	4,32	365,9%	20,82	16,47	187,8	21,3	100,0%	67,7%	67,7%
219,00	1,22	0,03	1,05	1789,2%	20,91	19,85	189,7	21,2	102,8%	-4,8%	-4,9%
220,00	1,18	0,03	1,01	1874,3%	20,91	19,89	190,2	21,4	103,4%	-8,8%	-9,1%
221,00	1,18	0,05	0,93	1988,9%	20,91	19,96	187,9	21,5	101,7%	-14,8%	-15,0%
222,00	1,18	0,05	4,08	394,0%	20,83	16,73	187,4	21,3	100,1%	66,3%	66,4%
223,00	1,18	0,06	4,23	374,5%	20,83	16,56	187,0	21,2	99,8%	67,3%	67,2%
224,00	1,14	0,08	3,99	400,8%	20,83	16,80	187,1	21,4	99,5%	65,9%	65,6%
225,00	1,13	0,04	4,10	392,7%	20,83	16,71	187,5	21,5	100,3%	66,5%	66,6%
226,00	1,13	0,05	4,37	362,0%	20,82	16,43	188,9	21,5	100,1%	67,8%	67,8%
227,00	1,13	0,03	4,55	345,1%	20,82	16,25	189,4	21,3	100,4%	68,6%	68,9%
228,00	1,09	0,06	4,36	361,2%	20,82	16,43	189,6	21,6	99,9%	67,7%	67,6%
229,00	1,09	0,09	4,40	354,1%	20,82	16,37	188,7	21,4	99,3%	68,0%	67,6%
230,00	1,09	0,06	4,15	385,2%	20,83	16,65	187,4	21,3	100,0%	66,8%	66,8%
231,00	1,09	0,10	3,77	426,6%	20,84	17,02	188,2	21,5	99,0%	64,3%	63,6%
232,00	1,09	0,05	1,00	1844,9%	20,91	19,89	191,3	21,4	101,3%	-9,8%	-9,9%
233,00	1,04	0,05	0,93	1993,2%	20,91	19,96	189,3	21,5	101,9%	-15,8%	-16,1%
234,00	1,04	0,06	3,89	416,5%	20,84	16,92	187,7	21,4	99,9%	65,1%	65,1%
235,00	1,04	0,09	3,76	429,8%	20,84	17,03	187,3	21,3	99,2%	64,3%	63,8%
236,00	1,04	0,06	4,28	369,6%	20,82	16,51	187,6	21,4	99,8%	67,5%	67,4%
237,00	1,01	0,04	4,24	376,1%	20,83	16,56	185,8	21,5	100,2%	67,6%	67,7%
238,00	1,00	0,06	3,87	419,4%	20,84	16,94	184,5	21,4	100,0%	65,5%	65,5%
239,00	1,00	0,07	3,76	432,7%	20,84	17,04	187,9	21,6	99,7%	64,2%	64,1%
240,00	0,97	0,03	4,96	308,7%	20,81	15,83	188,2	21,4	100,4%	70,6%	70,9%
241,00	0,95	0,05	4,23	376,3%	20,83	16,57	188,1	21,3	100,1%	67,1%	67,2%
242,00	0,95	0,05	4,45	353,3%	20,82	16,35	187,7	21,2	100,0%	68,3%	68,3%
243,00	0,95	0,06	4,03	399,0%	20,83	16,77	186,3	21,1	99,9%	66,2%	66,1%
244,00	0,95	0,08	4,27	370,0%	20,82	16,52	185,8	21,1	99,6%	67,7%	67,4%
245,00	0,91	0,08	4,00	399,8%	20,83	16,79	185,8	21,1	99,5%	66,1%	65,8%
246,00	0,91	0,07	4,03	398,1%	20,83	16,77	187,6	21,2	99,7%	66,0%	65,8%
247,00	0,91	0,08	4,53	343,1%	20,82	16,25	187,4	21,2	99,6%	68,8%	68,5%
248,00	0,91	0,07	4,12	386,1%	20,83	16,67	185,1	21,2	99,6%	67,0%	66,7%
249,00	0,90	0,08	3,67	444,1%	20,84	17,13	185,2	21,5	99,6%	64,1%	63,8%
250,00	0,86	0,07	4,09	389,7%	20,83	16,70	184,9	21,5	99,7%	66,9%	66,7%
251,00	0,86	0,09	3,91	409,6%	20,83	16,88	184,3	21,4	99,3%	65,8%	65,4%
252,00	0,86	0,08	3,93	408,4%	20,83	16,86	182,8	21,4	99,4%	66,2%	65,8%
253,00	0,86	0,14	3,83	413,6%	20,83	16,93	182,0	21,4	98,2%	65,7%	64,5%
254,00	0,86	0,18	3,52	451,2%	20,84	17,23	179,2	21,4	97,2%	64,1%	62,3%
255,00	0,82	0,16	3,16	514,3%	20,85	17,61	178,4	21,4	97,3%	61,2%	59,6%
256,00	0,82	0,10	3,64	446,4%	20,84	17,16	180,4	21,5	99,1%	64,7%	64,1%
257,00	0,82	0,07	4,12	386,5%	20,83	16,67	179,4	21,5	99,6%	67,9%	67,6%
258,00	0,82	0,13	3,60	447,1%	20,84	17,18	178,5	21,5	98,4%	64,8%	63,7%
259,00	0,82	0,08	3,81	423,9%	20,84	16,99	178,4	21,4	99,4%	66,2%	65,8%
260,00	0,77	0,06	3,78	432,2%	20,84	17,03	176,4	21,5	100,0%	66,3%	66,3%
261,00	0,78	0,10	3,32	496,6%	20,85	17,48	173,3	21,3	99,0%	63,5%	62,9%
262,00	0,77	0,13	3,02	548,1%	20,86	17,77	176,1	21,6	98,1%	60,3%	59,2%
263,00	0,77	0,06	4,73	326,0%	20,81	16,05	178,5	21,6	99,9%	71,0%	71,0%
264,00	0,73	0,06	4,24	374,7%	20,83	16,56	175,9	21,5	99,9%	69,1%	69,0%
265,00	0,73	0,15	3,27	496,4%	20,85	17,51	172,6	21,4	97,7%	63,3%	61,8%
266,00	0,73	0,17	2,86	571,5%	20,86	17,91	171,9	21,4	96,8%	59,6%	57,7%
267,00	0,73	0,09	3,67	441,6%	20,84	17,12	175,4	21,4	99,2%	65,8%	65,3%
268,00	0,73	0,06	4,08	393,0%	20,83	16,72	172,8	21,5	100,0%	68,7%	68,7%
269,00	0,73	0,10	3,09	540,0%	20,86	17,72	170,1	21,5	98,9%	62,1%	61,4%
270,00	0,72	0,11	2,95	565,2%	20,86	17,85	168,5	21,5	98,5%	61,2%	60,3%
271,00	0,73	0,12	2,99	555,7%	20,86	17,81	166,2	21,5	98,3%	62,1%	61,0%
272,00	0,68	0,09	2,85	594,2%	20,86	17,97	164,5	21,5	99,1%	61,0%	60,4%
273,00	0,68	0,09	2,75	620,2%	20,86	18,08	163,9	21,5	99,2%	60,0%	#DIV/0!
274,00	0,68	0,07	3,01	562,9%	20,86	17,81	163,7	21,2	99,8%	62,7%	62,6%
275,00	0,68	0,06	3,18	530,4%	20,85	17,65	163,8	21,3	100,0%	64,2%	64,2%
276,00	0,65	0,07	3,21	522,7%	20,85	17,61	163,2	21,5	99,7%	64,6%	64,4%
277,00	0,68	0,06	3,20	524,6%	20,85	17,62	161,3	21,3	99,9%	64,9%	64,8%
278,00	0,64	0,07	2,69	638,1%	20,87	18,14	157,6	21,4	99,6%	60,8%	60,6%
279,00	0,64	0,12	2,42	704,8%	20,87	18,40	155,0	21,7	98,1%	58,3%	57,1%
280,00	0,64	0,09	2,34	737,5%	20,88	18,49	153,7	21,3	98,9%	57,5%	56,8%
281,00	0,64	0,12	2,59	652,3%	20,87	18,22	153,6	21,6	98,0%	60,7%	59,6%
282,00	0,64	0,07	3,13	537,7%	20,86	17,69	153,2	21,5	99,8%	66,0%	65,9%
283,00	0,64	0,04	2,96	578,9%	20,86	17,88	152,0	21,5	100,5%	64,8%	65,1%
284,00	0,59	0,07	2,60	664,2%	20,87	18,23	149,8	21,5	99,8%	61,7%	61,6%
285,00	0,59	0,08	2,46	705,9%	20,87	18,38	148,4	21,5	99,5%	60,3%	60,0%
286,00	0,59	0,08	2,50	689,9%	20,87	18,33	147,4	21,5	99,4%	61,2%	60,8%
287,00	0,59	0,07	2,57	673,7%	20,87	18,27	147,5	21,5	99,8%	61,9%	61,7%
288,00	0,59	0,08	2,79	610,6%	20,86	18,03	145,9	21,5	99,5%	64,6%	64,3%
289,00	0,59	0,07	2,53	683,7%	20,87	18,31	145,8	21,3	99,6%	61,8%	61,5%
290,00	0,54	0,05	2,82	609,0%	20,86	18,01	144,3	21,5	100,2%	65,2%	65,3%
291,00	0,54	0,07	2,52	685,6%	20,87	18,31	143,1	21,4	99,6%	62,4%	62,2%
292,00	0,54	0,07	2,55	677,7%	20,87	18,28	137,3	21,6	99,6%	64,2%	64,0%
293,00	0,54	0,04	1,75	1038,8%	20,89	19,12	138,1	21,4	101,0%	51,5%	52,0%
294,00	0,54	0,04	2,23	796,4%	20,88	18,63	143,4	21,5	100,7%	58,6%	59,0%
295,00	0,54	0,05	4,53	345,7%	20,82	16,26	153,7	21,5	100,2%	73,7%	73,9%
296,00	0,53	0,02	0,95	2009,8%	20,91	19,96	153,8	21,4	104,2%	8,3%	8,7%
297,00	0,50	0,03	3,76	438,3%	20,84	17,07	150,4	21,3	100,5%	70,6%	71,0%
298,00	0,50	0,06	2,69	640,5%	20,87	18,14	147,0	21,5	100,0%	63,3%	63,3%
299,00	0,50	0,05	2,71	640,3%	20,87	18,14	154,3	21,3	100,4%	61,7%	62,0%
300,00	0,45	0,03	4,97	308,0%	20,81	15,82	156,4	21,4	100,4%	74,9%	75,2%
301,00	0,45	0,05	3,44	484,9%	20,85	17,38	153,3	21,5	100,2%	68,2%	68,4%
302,00	0,45	0,05	2,86	601,4%	20,86	17,98	153,4	21,4	100,3%	63,5%	63,7%
303,00	0,45	0,03	3,69	448,4%	20,84	17,14	153,8	21,5	100,6%	69,7%	70,1%
304,00	0,45	0,03	3,17	536,4%	20,86	17,67	152,1	21,4	100,6%	66,5%	66,9%
305,00	0,45	0,03	2,90	595,0%	20,86	17,94	149,0	21,7	100,9%	64,9%	65,5%
306,00	0,43	0,03	2,73	639,1%	20,87	18,12	148,6	21,5	100,9%	63,3%	63,9%
307,00	0,41	0,04	2,85	605,7%	20,86	17,99	146,3	21,7	100,7%	65,1%	65,5%
308,00	0,41	0,04	2,63	662,5%	20,87	18,22	146,0	21,5	100,5%	62,9%	63,2%
309,00	0,41	0,04	2,73	636,8%	20,87	18,12	145,1	21,5	100,7%		

321,00	0,32	0,03	3,27	519,2%	20,85	17,57	148,1	22,0	100,8%	68,1%	68,6%
322,00	0,32	0,05	2,96	578,5%	20,86	17,88	146,2	22,0	100,3%	66,1%	66,3%
323,00	0,32	0,05	2,72	636,0%	20,87	18,12	144,6	21,9	100,3%	64,3%	64,5%
324,00	0,32	0,03	2,80	618,8%	20,86	18,04	144,1	22,1	100,8%	65,2%	65,7%
325,00	0,27	0,03	2,85	609,6%	20,86	18,00	142,3	22,0	101,0%	66,0%	66,6%
326,00	0,27	0,04	2,45	718,5%	20,87	18,40	140,0	22,1	100,6%	62,5%	62,9%
327,00	0,27	0,05	2,26	780,1%	20,88	18,59	138,4	22,2	100,3%	60,6%	60,8%
328,00	0,27	0,03	2,48	710,0%	20,87	18,37	137,4	22,3	100,9%	63,6%	64,2%
329,00	0,27	0,04	2,40	736,1%	20,88	18,45	135,5	22,1	100,9%	63,1%	63,7%
330,00	0,27	0,06	2,23	792,2%	20,88	18,62	134,3	22,0	100,2%	61,3%	61,4%
331,00	0,27	0,05	2,19	813,7%	20,88	18,67	133,3	22,0	100,6%	61,0%	61,3%
332,00	0,27	0,04	2,26	786,5%	20,88	18,60	131,9	22,1	100,9%	62,4%	62,9%
333,00	0,27	0,06	2,14	826,7%	20,88	18,71	130,1	21,9	100,1%	61,3%	61,3%
334,00	0,23	0,04	2,10	851,8%	20,88	18,76	129,0	21,8	100,8%	60,9%	61,4%
335,00	0,27	0,04	2,13	836,3%	20,88	18,73	127,7	21,6	100,7%	61,8%	62,2%
336,00	0,23	0,06	2,04	871,5%	20,88	18,82	126,3	21,7	100,1%	60,9%	60,9%
337,00	0,23	0,06	2,16	820,1%	20,88	18,69	124,9	21,6	100,1%	62,9%	63,0%
338,00	0,23	0,06	2,03	875,8%	20,88	18,82	123,4	21,6	100,1%	61,6%	61,6%
339,00	0,23	0,06	1,95	915,1%	20,89	18,91	123,5	21,7	100,0%	60,3%	60,3%
340,00	0,23	0,07	2,68	642,5%	20,87	18,15	129,4	21,8	99,8%	67,4%	67,3%
341,00	0,18	0,03	3,82	429,5%	20,84	17,00	131,8	21,9	100,6%	74,2%	74,7%
342,00	0,18	0,04	3,14	541,3%	20,86	17,69	133,7	21,8	100,6%	70,1%	70,5%
343,00	0,18	0,03	3,66	452,6%	20,84	17,17	132,6	21,9	100,5%	73,3%	73,7%
344,00	0,18	0,04	2,78	624,6%	20,87	18,07	133,6	21,8	100,6%	67,3%	67,7%
345,00	0,18	0,04	3,47	481,7%	20,85	17,36	135,4	21,8	100,5%	71,8%	72,1%
346,00	0,18	0,05	2,94	580,6%	20,86	17,89	134,2	21,8	100,2%	68,5%	68,7%
347,00	0,14	0,06	2,48	703,4%	20,87	18,37	125,0	21,8	99,9%	66,6%	66,6%
348,00	0,14	0,48	1,33	1029,3%	20,89	19,33	133,2	21,8	80,8%	44,5%	35,9%
349,00	0,14	0,07	1,05	1712,6%	20,91	19,82	136,5	22,0	99,3%	27,5%	27,3%
350,00	0,14	0,08	3,20	521,1%	20,85	17,61	134,8	21,8	99,4%	70,3%	69,9%
351,00	0,13	0,08	2,83	599,4%	20,86	17,99	134,0	21,9	99,3%	67,8%	67,3%
352,00	0,09	0,08	2,57	670,7%	20,87	18,26	132,0	21,9	99,5%	65,8%	65,5%
353,00	0,09	0,08	2,72	627,6%	20,87	18,10	135,4	22,0	99,3%	66,5%	66,0%
354,00	0,09	0,07	3,65	448,2%	20,84	17,16	133,1	21,9	99,7%	73,2%	73,0%
355,00	0,09	0,13	2,57	656,7%	20,87	18,24	137,3	21,8	97,9%	64,6%	63,2%
356,00	0,06	0,05	3,91	416,3%	20,84	16,91	140,9	22,0	100,2%	73,1%	73,3%
357,00	0,05	0,04	3,85	423,9%	20,84	16,96	139,5	21,9	100,3%	73,1%	73,3%
358,00	0,05	0,12	2,69	627,1%	20,87	18,12	143,7	21,9	98,2%	64,2%	63,1%
359,00	0,05	0,03	4,45	355,0%	20,82	16,35	148,4	22,0	100,5%	74,3%	74,6%
360,00	0,00	0,03	3,97	409,6%	20,83	16,85	146,5	22,1	100,5%	72,5%	72,9%

PRE / POST CHECKS

Date: 2018-04-11

Manufacturer: Laminox

Model: Jessie's Natural

Project #: PI 20163

Run: 1

Tech: MM

Reviewer: DL

Moisture Meter Calibration Check:

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

Pre-Test

Post-Test

Facility Conditions:

Air Velocity from less than 2 feet

2 (max 50 Fpm)	4 (max 50 Fpm)
<u>ok</u>	<u>ok</u>
4 sides <u>ok</u>	<u>ok</u>

Smoke Capture Check.....

Picture.....

Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....

<u>2018-04-11</u>
<u>2018-04-11</u>
<u>ok</u>
<u>ok</u>

Date Dilution Tunnel Cleaned.....

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

Traverse before ignition.....

Flow Rate 140 cfm ±10%.....

<u>ok</u>

Temperature System:

Ambient (65°-90°F).....

<u>ok</u>	°F
<u>ok</u>	°F

Wood Heater Surface (±125°F).....

Proportional Checks:

Thermocouple check.....

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

Pitot Clean.....

Pitot verification.....

Sampling Train ID Numbers:

Probe.....

Filter Front.....

Filter Back.....

Filter Thermocouple.....

Filter (<90°F).....

Train 1 st hour	Train 1	Train 2
<u>03</u>	<u>04</u>	<u>13</u>
<u>107</u>	<u>109</u>	<u>111</u>
<u>108</u>	<u>110</u>	<u>112</u>
<u>11</u>	<u>11</u>	<u>12</u>
<u>ok</u>	<u>ok</u>	<u>ok</u>

SAMPLING EQUIPMENT CHECK OUT

 Date: 2018-04-11

 Manufacturer: laminox

 Model: Jessika Natural

 Project #: PI 20163

 Run: 1

 Tech: mm

 Reviewer: DP

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)	653309, 92	655112, 85	653310, 02	655112, 99	604156, 39	606007, 37
Initial 1minute DGM (Liter)	653309, 92	655112, 84	653310, 00	655112, 97	604156, 38	606007, 36
Change © (Liter)	∅	0.01	0.02	0.02	0.01	0.01
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

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	.5	3	.4
Check OK (no change after 15 sec.)	ok	ok	ok	ok

Date: 2018-04-10
Project #: PI 20163
Manufacturer: Laminox
Tech: MR
Model: Jessica N Stunzel

Run: 1
Reviewer: DR

		SYSTEM 1 - 1 st hour					SYSTEM 1				
Pre-test Weight Record	Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
			03	107	108	10	04	109	110	12	113
	2018-04-10	77:00	614563	01263	01279	35 3320	613824	01268 01276	01259	36 0156	01284
	2018-04-11	9:00	614563	01263	01278	35 3319	613824	01269	01259	36 0155	01284

		SYSTEM 1 - 1 st hour					SYSTEM 1				
Post-test Weight Record	Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
			03	107	108	10	04	109	110	12	113
	2018-04-11	16:30	614566	01269	01278	35 3333	613830	01326	01254	36 0171	01285
	2018-04-19	8:00	614563	01266	01278	35 3330	613826	01323	01255	36 0167	01285
	2018-04-20	8:00	614563	01266	01278	35 3330	613826	01322	01255	36 0166	01285

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2018-04-10 Manufacturer: la m n o s Model: Jessica Malone

Project #: PT 20163 Run: 1 Tech: MM Reviewer: DP

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time				
2018-04-10	17:00	951498	01276	01280	35, 4117
2018-04-11	9:00	951499	01275	01280	35, 4116

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time				
2018-04-11	16:30	951514	01337	01278	35, 4134
2018-04-19	8:00	951501	01335	01278	35, 4129
2018-04-20	8:00	951501	01335	01278	35, 4129

APPENDIX 2: Proportionality results

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	99,97	99,25	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
14,642	531,7	531,9			0,164	0,166	0	0,2219073
14,932	531,7	531,9	104,13	100,57	0,166	0,166	1	0,2262066
14,909	531,7	531,9	103,96	101,44	0,168	0,166	2	0,2257599
14,686	531,7	531,9	105,00	102,24	0,167	0,166	3	0,2224816
14,598	531,6	531,9	103,60	103,66	0,165	0,166	4	0,221221
14,739	531,6	531,8	105,74	102,12	0,166	0,166	5	0,2230472
14,607	531,6	531,9	106,09	102,91	0,168	0,165	6	0,2212204
14,755	531,7	531,9	103,06	102,28	0,166	0,166	7	0,2235001
14,758	531,7	531,9	102,82	102,36	0,164	0,166	8	0,2235003
14,865	531,7	531,9	101,62	101,68	0,164	0,166	9	0,2250835
14,864	531,7	532,0	103,00	101,56	0,164	0,166	10	0,2250827
14,726	531,7	531,9	104,89	102,24	0,166	0,166	11	0,2230467
14,741	531,7	531,9	102,63	102,26	0,166	0,166	12	0,2235004
14,777	531,7	531,9	102,98	102,13	0,164	0,166	13	0,2239654
14,767	531,7	531,9	102,52	102,06	0,165	0,166	14	0,2239543
14,839	531,7	531,9	102,19	101,36	0,164	0,166	15	0,2250831
14,915	531,7	531,9	101,10	101,10	0,164	0,166	16	0,226207
14,925	531,7	532,0	100,69	101,12	0,163	0,166	17	0,2262068
14,676	531,7	532,0	102,63	103,24	0,163	0,167	18	0,2223637
14,885	531,7	532,0	102,91	100,83	0,165	0,166	19	0,2257585
14,823	531,7	532,0	101,02	101,44	0,164	0,166	20	0,2249983
14,850	531,8	532,1	103,82	100,74	0,165	0,166	21	0,2250834
14,895	531,8	532,1	100,83	101,12	0,165	0,165	22	0,2257586
14,786	531,9	532,2	102,69	102,14	0,163	0,166	23	0,2239549
14,747	531,9	532,2	104,20	101,84	0,165	0,166	24	0,2235009
14,777	532,0	532,2	104,41	101,35	0,167	0,165	25	0,2239547
14,638	532,0	532,2	102,48	103,32	0,165	0,166	26	0,2219081
14,916	532,0	532,2	102,77	100,54	0,164	0,166	27	0,2262071
14,888	532,0	532,2	100,53	101,26	0,164	0,166	28	0,2257591
14,770	532,0	532,3	102,59	101,80	0,163	0,166	29	0,2239547
14,891	532,0	532,3	103,05	100,66	0,165	0,166	30	0,2257586
14,570	531,9	532,2	105,67	103,33	0,167	0,166	31	0,2207618
14,651	532,0	532,2	105,12	102,24	0,167	0,165	32	0,2219075
14,670	531,9	532,2	105,04	102,46	0,167	0,165	33	0,2223635
14,528	532,0	532,3	105,23	102,95	0,166	0,165	34	0,2203018
14,759	532,1	532,3	104,03	101,49	0,166	0,165	35	0,2235009
14,897	532,1	532,4	100,56	101,69	0,164	0,166	36	0,2257589
14,754	532,2	532,4	101,67	102,25	0,162	0,167	37	0,2235007
14,597	532,2	532,5	104,82	103,24	0,164	0,166	38	0,2212214
14,847	532,2	532,5	101,04	101,53	0,164	0,166	39	0,2250832
14,835	532,3	532,5	103,25	101,08	0,164	0,166	40	0,2250837
14,839	532,3	532,5	102,88	100,65	0,166	0,165	41	0,2250831
14,708	532,3	532,6	104,42	102,24	0,166	0,165	42	0,2230476
14,989	532,3	532,6	99,90	100,87	0,165	0,166	43	0,2273259
14,631	532,3	532,6	104,72	102,59	0,164	0,166	44	0,2219081
14,911	532,4	532,6	101,62	100,77	0,165	0,166	45	0,2262071
14,768	532,3	532,6	103,57	101,39	0,165	0,166	46	0,2239559
14,758	532,3	532,7	103,81	101,44	0,166	0,165	47	0,2239549
14,875	532,3	532,7	102,79	100,56	0,166	0,165	48	0,2257589
14,863	532,3	532,6	100,39	100,43	0,164	0,165	49	0,2257587
14,808	532,3	532,7	102,53	101,03	0,164	0,166	50	0,2250674
14,728	532,4	532,7	103,43	101,99	0,165	0,166	51	0,2235009
14,892	532,4	532,7	101,75	100,09	0,165	0,166	52	0,2262064
14,754	532,4	532,7	101,20	101,65	0,164	0,165	53	0,2239547
14,680	532,4	532,7	103,83	101,60	0,164	0,166	54	0,2230474
14,533	532,4	532,7	104,79	102,86	0,166	0,165	55	0,2207615

14,735	532,4	532,7	102,51	101,60	0,165	0,166	56	0,2239548
14,733	532,4	532,7	100,57	101,78	0,163	0,166	57	0,2239544
14,805	532,4	532,7	100,41	101,40	0,162	0,166	58	0,2250839
14,666	532,5	532,7	101,43	101,69	0,162	0,166	59	0,2230475
14,830	532,4	532,7	102,88	100,17	0,165	0,165	60	0,2257591
14,701	532,4	532,7	103,32	100,95	0,166	0,165	61	0,223955
14,677	532,4	532,7	101,22	101,47	0,164	0,166	62	0,2235013
14,820	532,4	532,7	101,83	99,63	0,164	0,165	63	0,2257596
14,774	532,3	532,6	100,26	101,13	0,164	0,165	64	0,2250815
14,542	532,3	532,6	101,57	101,96	0,162	0,166	65	0,221963
14,476	532,4	532,6	104,21	102,22	0,164	0,166	66	0,2212248
14,794	532,4	532,7	99,51	100,00	0,164	0,166	67	0,2257592
14,605	532,5	532,7	100,98	101,57	0,162	0,166	68	0,2230471
14,666	532,5	532,7	102,95	101,09	0,164	0,166	69	0,2239547
14,910	532,5	532,8	98,48	98,96	0,164	0,166	70	0,2277708
14,946	532,5	532,8	100,76	98,93	0,164	0,166	71	0,2284392
14,637	532,5	532,8	100,11	100,82	0,164	0,166	72	0,2239554
14,629	532,4	532,7	102,76	100,84	0,164	0,166	73	0,2239554
14,872	532,4	532,7	100,81	99,10	0,166	0,166	74	0,2277713
14,837	532,4	532,7	99,62	98,56	0,165	0,165	75	0,2273261
14,781	532,4	532,7	98,58	99,35	0,163	0,165	76	0,2266558
14,748	532,3	532,6	98,88	99,41	0,162	0,166	77	0,2262077
14,815	532,3	532,6	98,90	98,75	0,162	0,165	78	0,2273259
14,666	532,3	532,6	99,53	100,29	0,162	0,166	79	0,2250833
14,912	532,3	532,6	98,54	97,77	0,163	0,166	80	0,2288824
14,586	532,3	532,6	100,05	100,51	0,163	0,165	81	0,2239548
14,573	532,3	532,6	99,95	100,22	0,162	0,166	82	0,2239548
14,754	532,4	532,7	98,63	98,95	0,162	0,165	83	0,2266556
14,551	532,4	532,7	101,95	100,86	0,163	0,166	84	0,2235018
14,694	532,4	532,7	99,27	98,73	0,164	0,165	85	0,2257589
14,726	532,5	532,7	101,16	99,44	0,164	0,165	86	0,2262075
14,797	532,5	532,7	98,41	98,79	0,164	0,166	87	0,2273261
14,865	532,5	532,8	97,70	98,26	0,162	0,166	88	0,228439
14,808	532,5	532,8	97,96	98,28	0,162	0,165	89	0,2277715
14,775	532,4	532,7	100,51	98,43	0,164	0,165	90	0,2273267
14,619	532,4	532,7	101,03	100,17	0,165	0,166	91	0,2250837
14,765	532,4	532,7	98,35	98,12	0,164	0,166	92	0,2273257
14,837	532,4	532,7	97,81	97,73	0,162	0,165	93	0,2284392
14,717	532,4	532,7	100,90	99,17	0,164	0,166	94	0,2266556
14,686	532,4	532,7	100,88	99,42	0,166	0,166	95	0,2262073
14,766	532,4	532,7	99,98	99,20	0,165	0,167	96	0,227477
14,533	532,3	532,7	99,76	99,97	0,164	0,166	97	0,223956
14,848	532,3	532,6	99,74	98,16	0,164	0,166	98	0,2288825
14,406	532,3	532,6	101,17	100,54	0,165	0,166	99	0,222363
14,724	532,3	532,6	98,03	98,47	0,163	0,166	100	0,2273264
14,842	532,3	532,7	98,21	98,03	0,163	0,166	101	0,2288819
14,731	532,3	532,7	100,51	98,37	0,165	0,166	102	0,2273259
14,769	532,3	532,6	98,59	98,34	0,165	0,166	103	0,2277721
14,806	532,3	532,6	97,79	97,51	0,163	0,165	104	0,2284389
14,737	532,3	532,6	100,16	98,82	0,164	0,166	105	0,2273271
14,649	532,3	532,6	100,55	98,84	0,166	0,166	106	0,226209
14,751	532,2	532,6	98,11	98,36	0,164	0,166	107	0,2277718
14,892	532,2	532,6	96,48	97,32	0,162	0,166	108	0,2299879
14,672	532,2	532,6	98,26	98,68	0,162	0,166	109	0,2266562
14,709	532,2	532,6	98,20	98,18	0,162	0,166	110	0,2273264
14,789	532,2	532,6	99,77	97,98	0,164	0,166	111	0,2284394
14,718	532,2	532,6	98,68	98,28	0,165	0,166	112	0,2273265
14,672	532,2	532,5	99,07	98,88	0,163	0,166	113	0,2266566
14,981	532,2	532,6	97,96	96,83	0,164	0,166	114	0,2315255
14,366	532,2	532,6	100,28	100,49	0,164	0,166	115	0,2223642
14,582	532,2	532,6	99,23	98,57	0,163	0,166	116	0,2257595

14,627	532,3	532,6	100,26	98,66	0,164	0,165	117	0,2262077
14,621	532,3	532,6	98,46	98,55	0,164	0,166	118	0,2262074
14,730	532,3	532,6	97,80	97,75	0,162	0,165	119	0,2277715
14,799	532,3	532,6	99,24	97,82	0,164	0,166	120	0,2288818
14,696	532,3	532,6	99,46	98,38	0,165	0,166	121	0,2273261
14,694	532,3	532,6	98,35	98,28	0,164	0,166	122	0,227326
14,889	532,3	532,6	97,25	97,09	0,163	0,166	123	0,2304291
14,600	532,3	532,6	98,89	98,77	0,163	0,166	124	0,2259837
14,855	532,3	532,6	96,11	96,38	0,162	0,165	125	0,2299877
14,677	532,2	532,5	99,59	98,26	0,163	0,165	126	0,2273266
14,682	532,2	532,5	99,96	98,37	0,166	0,166	127	0,227326
14,633	532,2	532,5	98,72	98,34	0,165	0,166	128	0,2266556
14,744	532,1	532,5	99,50	98,12	0,165	0,166	129	0,2284389
14,567	532,1	532,5	98,21	98,26	0,164	0,166	130	0,2257598
14,841	532,1	532,4	96,46	96,65	0,162	0,165	131	0,2299874
14,621	532,1	532,4	99,84	98,48	0,164	0,166	132	0,2266554
14,601	532,1	532,4	98,31	97,92	0,164	0,166	133	0,2266415
14,769	532,1	532,5	99,00	97,40	0,164	0,166	134	0,2288815
14,407	532,2	532,5	99,20	99,05	0,164	0,165	135	0,2235019
14,610	532,2	532,5	99,93	98,62	0,164	0,166	136	0,2266558
14,856	532,2	532,5	98,19	96,88	0,166	0,166	137	0,2304533
14,608	532,2	532,5	99,99	98,21	0,166	0,166	138	0,2266562
14,731	532,2	532,5	99,17	97,60	0,166	0,166	139	0,2285436
14,654	532,2	532,5	100,06	98,64	0,166	0,167	140	0,2273262
14,754	532,2	532,5	99,23	97,55	0,166	0,167	141	0,2288825
14,599	532,2	532,5	99,75	98,33	0,166	0,166	142	0,2266557
14,392	532,1	532,5	98,96	99,31	0,164	0,166	143	0,2235012
14,538	532,2	532,5	97,93	98,03	0,162	0,165	144	0,2257593
14,664	532,2	532,5	98,39	97,68	0,163	0,165	145	0,227719
14,811	532,1	532,5	96,27	96,30	0,163	0,165	146	0,2299889
14,720	532,1	532,4	96,97	97,19	0,162	0,165	147	0,2288328
14,527	532,0	532,4	100,35	98,64	0,164	0,166	148	0,2257592
14,706	532,0	532,4	97,26	97,08	0,164	0,166	149	0,2284391
14,352	532,1	532,4	101,32	100,12	0,164	0,166	150	0,223049
14,663	532,1	532,5	97,14	97,22	0,164	0,166	151	0,227772
14,568	532,2	532,5	100,17	98,86	0,164	0,166	152	0,2262078
14,636	532,2	532,5	99,76	97,94	0,166	0,166	153	0,2273264
14,710	532,2	532,5	98,04	97,28	0,165	0,166	154	0,2284336
14,767	532,2	532,5	98,74	97,60	0,165	0,166	155	0,2293257
14,590	532,2	532,5	97,42	97,72	0,164	0,166	156	0,2266561
14,559	532,1	532,4	98,25	97,89	0,162	0,165	157	0,2262077
14,727	532,1	532,4	98,72	97,51	0,164	0,166	158	0,2288556
14,797	532,1	532,5	96,59	96,75	0,164	0,166	159	0,2299878
14,695	532,1	532,4	96,66	97,15	0,162	0,166	160	0,2284374
14,748	532,1	532,4	98,96	96,89	0,164	0,166	161	0,2293256
14,718	532,1	532,4	98,61	97,67	0,166	0,166	162	0,2288418
14,708	532,0	532,4	96,21	96,68	0,164	0,166	163	0,2288821
14,686	532,0	532,3	96,73	97,40	0,162	0,166	164	0,2284391
14,690	532,0	532,4	98,18	97,35	0,163	0,166	165	0,2284388
14,609	532,0	532,3	97,21	97,31	0,163	0,166	166	0,2273262
14,559	531,9	532,3	97,77	97,53	0,162	0,165	167	0,2266555
14,721	532,0	532,4	99,15	97,17	0,165	0,166	168	0,2288822
14,538	532,0	532,4	99,85	98,30	0,166	0,166	169	0,2262075
14,639	532,0	532,4	99,80	97,64	0,166	0,166	170	0,2277716
14,610	532,0	532,4	97,45	97,94	0,165	0,166	171	0,2273268
14,636	532,0	532,4	97,10	97,41	0,162	0,166	172	0,2277719
14,457	532,0	532,4	100,41	98,54	0,164	0,166	173	0,2250841
14,631	532,0	532,3	97,05	97,53	0,164	0,166	174	0,2277715
14,670	532,0	532,3	99,22	97,36	0,164	0,166	175	0,2284389
14,624	531,9	532,3	99,19	97,40	0,166	0,166	176	0,2277716
14,493	531,9	532,3	99,97	98,34	0,166	0,166	177	0,2257596

14,717	531,9	532,3	95,86	96,55	0,164	0,166	178	0,2293262
14,580	531,9	532,2	99,13	97,24	0,164	0,165	179	0,2273275
14,608	531,8	532,2	98,55	97,68	0,165	0,166	180	0,2277714
14,692	531,8	532,2	98,03	96,84	0,165	0,166	181	0,2293255
14,655	531,9	532,2	96,68	96,55	0,164	0,166	182	0,228439
14,692	531,9	532,3	96,67	97,07	0,162	0,166	183	0,2288819
14,627	532,0	532,3	99,14	97,15	0,164	0,166	184	0,2277715
14,666	532,0	532,3	97,50	97,33	0,165	0,166	185	0,2284387
14,722	532,1	532,3	98,80	96,75	0,165	0,166	186	0,2293234
14,701	532,1	532,4	98,74	96,98	0,166	0,166	187	0,2288818
14,686	532,1	532,4	99,02	97,62	0,166	0,166	188	0,2284392
14,717	532,1	532,4	98,82	97,50	0,166	0,167	189	0,2288818
14,832	532,1	532,4	96,16	96,07	0,164	0,166	190	0,2304281
14,671	532,0	532,3	97,33	97,44	0,162	0,165	191	0,2277721
14,677	532,0	532,3	99,56	97,60	0,164	0,165	192	0,2277722
14,785	532,0	532,3	96,71	96,79	0,164	0,165	193	0,2293257
14,767	532,0	532,3	99,34	97,63	0,164	0,166	194	0,2288819
14,776	532,0	532,3	99,66	97,30	0,166	0,166	195	0,2288821
14,707	532,0	532,3	98,74	97,60	0,165	0,165	196	0,2277715
14,780	531,9	532,3	96,64	97,40	0,163	0,165	197	0,2288826
14,640	531,9	532,3	97,47	98,69	0,161	0,166	198	0,2266558
14,225	531,9	532,3	103,02	101,04	0,164	0,166	199	0,2203028
14,634	532,0	532,3	98,29	98,03	0,164	0,165	200	0,2266559
14,626	532,0	532,3	100,51	98,42	0,164	0,165	201	0,2262075
14,658	532,0	532,3	98,13	98,22	0,164	0,165	202	0,2266557
14,781	532,1	532,4	99,01	97,21	0,164	0,165	203	0,2284386
14,713	532,1	532,4	97,90	98,46	0,164	0,165	204	0,2273265
14,675	532,1	532,4	100,50	98,58	0,164	0,166	205	0,2266556
14,677	532,1	532,4	100,31	98,95	0,166	0,166	206	0,2266556
14,855	532,1	532,4	99,47	97,33	0,166	0,166	207	0,2293245
14,929	532,1	532,4	96,87	97,12	0,164	0,166	208	0,2304272
14,834	532,1	532,4	99,33	97,34	0,164	0,165	209	0,2288821
14,766	532,1	532,4	100,42	98,14	0,166	0,165	210	0,2277717
14,805	532,1	532,4	99,91	97,89	0,166	0,166	211	0,2284388
14,694	532,0	532,4	100,78	98,84	0,166	0,166	212	0,2266558
14,590	532,0	532,3	101,00	99,23	0,166	0,166	213	0,225084
14,634	532,0	532,3	100,86	99,41	0,166	0,166	214	0,225759
14,763	532,0	532,3	97,96	98,39	0,164	0,166	215	0,227772
14,809	532,0	532,3	100,11	98,04	0,164	0,166	216	0,2284394
14,767	532,0	532,3	98,23	98,03	0,165	0,166	217	0,2277716
14,680	532,0	532,3	98,64	99,08	0,163	0,166	218	0,2266528
14,804	532,0	532,4	98,22	97,96	0,163	0,166	219	0,2284395
14,773	532,1	532,4	98,03	98,95	0,163	0,166	220	0,227772
14,674	532,1	532,4	100,73	98,56	0,164	0,166	221	0,226208
14,823	532,2	532,4	98,73	98,08	0,165	0,165	222	0,2284388
14,781	532,2	532,4	99,92	97,93	0,165	0,165	223	0,2277717
14,830	532,2	532,4	97,45	97,96	0,164	0,165	224	0,2284391
14,531	532,2	532,4	102,08	99,81	0,164	0,165	225	0,2239553
14,856	532,2	532,5	97,12	98,50	0,164	0,166	226	0,2288818
14,785	532,2	532,5	97,93	98,98	0,162	0,167	227	0,2277715
14,755	532,2	532,5	97,76	98,76	0,162	0,166	228	0,2273262
14,682	532,2	532,5	100,41	99,01	0,163	0,166	229	0,226208
14,502	532,2	532,5	101,75	100,32	0,165	0,166	230	0,2235028
14,824	532,2	532,5	99,48	97,72	0,165	0,165	231	0,2284103
14,650	532,2	532,4	100,87	98,92	0,165	0,165	232	0,2257596
14,749	532,2	532,4	100,20	97,99	0,166	0,165	233	0,2273268
14,517	532,2	532,4	101,60	99,96	0,166	0,165	234	0,2239553
14,701	532,2	532,4	98,33	99,31	0,164	0,166	235	0,2266562
14,669	532,2	532,5	101,12	98,36	0,164	0,166	236	0,2262076
14,520	532,2	532,5	102,08	99,46	0,166	0,165	237	0,2239556
14,449	532,2	532,5	102,01	100,30	0,166	0,165	238	0,2230502

14,652	532,3	532,5	100,86	99,31	0,166	0,166	239	0,2257596
14,597	532,3	532,6	99,13	99,74	0,164	0,166	240	0,2250839
14,777	532,3	532,6	97,67	98,67	0,162	0,166	241	0,2277719
14,588	532,3	532,5	101,09	98,97	0,164	0,166	242	0,2250844
14,772	532,2	532,5	100,20	98,20	0,166	0,165	243	0,2277716
14,703	532,2	532,5	101,01	98,17	0,166	0,165	244	0,2266565
14,526	532,3	532,6	99,65	100,17	0,164	0,165	245	0,2239554
14,521	532,3	532,5	102,03	99,31	0,164	0,165	246	0,2238795
14,678	532,3	532,6	98,44	99,30	0,164	0,165	247	0,2262074
14,746	532,3	532,6	97,79	99,15	0,162	0,166	248	0,2273264
14,771	532,4	532,6	97,78	98,59	0,162	0,166	249	0,2277721
14,641	532,4	532,6	101,19	99,04	0,164	0,166	250	0,2257598
14,283	532,3	532,6	100,75	102,23	0,164	0,166	251	0,2203063
14,519	532,3	532,6	101,83	99,72	0,164	0,166	252	0,2239551
14,298	532,3	532,6	102,91	101,11	0,166	0,165	253	0,2207624
14,578	532,2	532,5	101,34	99,00	0,166	0,165	254	0,2250844
14,477	532,2	532,6	102,00	100,14	0,166	0,165	255	0,2235017
14,296	532,3	532,6	101,01	101,28	0,164	0,166	256	0,2207626
14,460	532,3	532,6	102,12	99,53	0,164	0,165	257	0,2235017
14,414	532,4	532,7	100,10	101,13	0,164	0,166	258	0,2223645
14,491	532,4	532,7	99,58	100,15	0,162	0,166	259	0,2235024
14,596	532,5	532,7	100,11	99,34	0,163	0,166	260	0,2250845
14,636	532,5	532,8	98,54	99,44	0,163	0,166	261	0,2257601
14,665	532,5	532,8	98,10	99,66	0,162	0,167	262	0,2262081
14,386	532,5	532,8	100,20	100,99	0,162	0,166	263	0,2219087
14,665	532,5	532,8	99,58	98,82	0,163	0,166	264	0,2262081
14,588	532,6	532,8	100,18	99,57	0,164	0,166	265	0,2250844
14,635	532,6	532,8	100,96	98,99	0,165	0,166	266	0,2257603
14,487	532,6	532,8	101,89	99,94	0,166	0,165	267	0,2235015
14,662	532,6	532,8	98,40	99,69	0,164	0,166	268	0,2262081
14,656	532,6	532,8	100,89	98,43	0,164	0,166	269	0,2262082
14,576	532,6	532,8	98,55	99,48	0,164	0,165	270	0,2250842
14,470	532,5	532,8	100,19	100,07	0,162	0,166	271	0,2235018
14,314	532,5	532,8	101,32	100,73	0,163	0,166	272	0,2212226
14,565	532,5	532,8	100,60	98,97	0,164	0,165	273	0,2250842
14,390	532,5	532,8	99,80	100,69	0,163	0,166	274	0,2223649
14,282	532,5	532,8	103,04	101,13	0,164	0,166	275	0,2207628
14,461	532,5	532,8	99,39	99,90	0,164	0,166	276	0,2235023
14,431	532,5	532,8	101,52	100,22	0,163	0,166	277	0,2230538
14,660	532,5	532,8	98,28	98,46	0,164	0,166	278	0,2266572
14,552	532,5	532,8	101,15	98,97	0,164	0,165	279	0,2251112
14,355	532,4	532,7	102,27	99,82	0,166	0,165	280	0,2223648
14,271	532,5	532,8	102,26	100,56	0,165	0,165	281	0,2207631
14,336	532,5	532,8	99,73	100,68	0,163	0,165	282	0,2219095
14,588	532,5	532,8	98,36	99,21	0,162	0,166	283	0,2257599
14,443	532,5	532,8	98,80	99,87	0,162	0,166	284	0,2235018
14,472	532,5	532,8	101,30	99,31	0,163	0,165	285	0,2239573
14,583	532,5	532,8	98,15	98,98	0,164	0,166	286	0,2258298
14,453	532,5	532,8	99,01	99,94	0,162	0,166	287	0,2239561
14,386	532,5	532,8	99,10	100,11	0,162	0,166	288	0,2230485
14,427	532,5	532,8	100,93	99,50	0,163	0,166	289	0,2235013
14,605	532,5	532,8	98,08	98,45	0,163	0,165	290	0,2262077
14,232	532,5	532,8	102,00	101,04	0,163	0,166	291	0,2207628
14,131	532,5	532,8	101,21	102,04	0,163	0,166	292	0,21915
14,445	532,5	532,8	99,36	99,26	0,162	0,166	293	0,2239508
14,628	532,6	532,8	100,09	98,00	0,164	0,165	294	0,226657
14,395	532,5	532,8	101,04	100,29	0,165	0,166	295	0,2230488
14,413	532,5	532,8	101,58	99,65	0,165	0,166	296	0,2235022
14,458	532,5	532,8	98,65	99,83	0,164	0,166	297	0,2239566
14,608	532,6	532,9	100,09	98,79	0,163	0,166	298	0,226203
14,436	532,6	532,8	99,26	99,99	0,164	0,166	299	0,2235022

14,527	532,5	532,8	98,82	99,32	0,162	0,166	300	0,225085
14,131	532,5	532,8	101,02	101,51	0,162	0,166	301	0,2191491
14,415	532,5	532,8	99,36	99,31	0,162	0,165	302	0,2235024
14,237	532,5	532,8	102,93	100,91	0,164	0,165	303	0,2207631
14,316	532,4	532,8	99,74	100,10	0,164	0,166	304	0,2219093
14,317	532,4	532,8	102,20	100,42	0,164	0,165	305	0,2219034
14,388	532,4	532,8	101,28	100,27	0,165	0,166	306	0,2230484
14,539	532,5	532,8	99,81	99,67	0,165	0,167	307	0,2250847
14,405	532,6	532,9	99,72	100,27	0,163	0,166	308	0,2230487
14,714	532,6	532,9	99,11	98,28	0,164	0,166	309	0,2277727
14,353	532,7	533,0	99,37	100,38	0,163	0,166	310	0,222366
14,539	532,7	533,0	99,87	99,27	0,163	0,166	311	0,2250851
14,451	532,8	533,0	98,41	99,50	0,163	0,166	312	0,2239566
14,429	532,9	533,1	99,13	99,43	0,161	0,165	313	0,2235034
14,535	532,9	533,1	98,11	99,02	0,162	0,165	314	0,2251124
14,461	533,0	533,1	99,32	99,89	0,162	0,166	315	0,2239573
14,446	533,1	533,2	100,25	99,74	0,163	0,166	316	0,2239702
14,428	533,2	533,3	101,28	99,41	0,165	0,166	317	0,2235038
14,380	533,3	533,3	101,65	99,85	0,165	0,165	318	0,2227038
14,429	533,3	533,4	100,38	100,28	0,165	0,166	319	0,2235048
14,573	533,4	533,4	100,12	99,12	0,165	0,166	320	0,2257629
14,637	533,4	533,5	99,92	98,36	0,165	0,166	321	0,2266596
14,635	533,5	533,5	100,01	98,33	0,165	0,166	322	0,2266601
14,640	533,6	533,5	99,66	98,66	0,165	0,166	323	0,2266605
14,714	533,6	533,6	99,61	97,70	0,165	0,166	324	0,2277743
14,642	533,7	533,7	97,57	98,10	0,164	0,165	325	0,226661
14,598	533,8	533,7	99,49	98,31	0,163	0,165	326	0,2259862
14,460	533,8	533,8	98,99	98,80	0,163	0,165	327	0,2239629
14,460	533,8	533,8	100,81	99,36	0,163	0,165	328	0,2239613
14,456	533,9	533,9	101,15	99,37	0,165	0,165	329	0,2239617
14,607	533,9	533,9	97,45	97,86	0,163	0,165	330	0,2262143
14,676	534,0	533,9	96,88	97,34	0,161	0,165	331	0,2273327
14,351	534,0	534,0	101,74	99,93	0,163	0,165	332	0,2223707
14,521	534,0	534,0	99,99	98,58	0,165	0,165	333	0,2250904
14,583	534,1	534,1	99,41	98,78	0,165	0,166	334	0,2262142
14,442	534,1	534,1	98,61	99,55	0,163	0,166	335	0,2239624
14,559	534,0	534,1	99,66	98,03	0,163	0,165	336	0,2257707
14,683	534,0	534,1	98,55	97,91	0,164	0,165	337	0,2277787
14,610	534,0	534,1	99,07	97,85	0,164	0,166	338	0,2266629
14,509	534,0	534,1	97,73	97,77	0,163	0,164	339	0,2250916
14,685	534,0	534,2	96,30	97,27	0,161	0,164	340	0,2277787
14,687	534,1	534,2	98,78	97,36	0,163	0,165	341	0,2277784
14,588	534,1	534,2	99,45	98,66	0,165	0,166	342	0,226215
14,382	534,1	534,2	99,06	99,59	0,163	0,166	343	0,2230538
14,414	534,1	534,2	100,25	99,42	0,163	0,165	344	0,2235088
14,413	534,1	534,2	98,09	98,76	0,162	0,165	345	0,2235085
14,524	534,1	534,2	97,69	98,22	0,161	0,164	346	0,2250908
14,261	534,1	534,3	100,07	99,92	0,161	0,165	347	0,2212547
14,692	534,1	534,3	96,94	97,19	0,162	0,165	348	0,2277793
14,390	534,2	534,3	98,59	99,59	0,161	0,165	349	0,2230514
14,392	534,2	534,3	100,89	99,96	0,163	0,166	350	0,2230563
14,696	534,2	534,3	96,21	97,45	0,162	0,165	351	0,2277798
14,698	534,2	534,3	96,31	97,09	0,160	0,165	352	0,2277799
14,601	534,2	534,4	99,41	98,40	0,162	0,165	353	0,2262168
14,671	534,3	534,4	96,34	97,14	0,162	0,165	354	0,2273348
14,429	534,3	534,4	98,04	98,79	0,160	0,164	355	0,2235097
14,535	534,3	534,4	100,18	98,96	0,162	0,165	356	0,2250924
14,637	534,3	534,5	99,16	98,19	0,164	0,165	357	0,2266649
14,680	534,3	534,5	98,94	97,92	0,164	0,165	358	0,227335
14,437	534,4	534,5	98,74	99,17	0,163	0,165	359	0,22351
14,531	534,4	534,5	97,95	98,44	0,161	0,165	360	0,225087

APPENDIX 3: Calibration data

TEST DATA PACKAGE

CLIENT	Laminox	PROJECT NUMBER	PI-20163
PRODUCT	Pellet Stove	SAMPLE ID#	QI_20236
MODEL	Jessika		
STANDARDS	EPA method 28R; ASTM E2779-10		

TEST EQUIPMENT

ITEM	EQUIPMENT TYPE	MANUFACTURER	EQUIPMENT #	CALIBRATION DUE DATE	COMPLIES WITH STANDARD REQUIREMENTS
1	Dessicator cabinet	Shop built	EG-014	Na	Y
2	Wood humidity chamber	Shop built	EG-034	Na	Y
3	Filter holder 47 mm in line(4)	Pall	EG-052	Na	Y
4	Filter holder 47 mm in line(4)	Pall	EG-053	Na	Y
5	Impiger train	Shop built	EG-054	Na	Y
6	Diaphragm Vacuum pump avec gauge	GAST	EG-055 / EG-056	Na	Y
7	Laboratory gas drying unit	Drierite	EG-061/ EG-062	Na	Y
8	Moisture meter	Delmhosrt	EM-003/	Verification before use	Y
9	Moisture meter Hammer	Delmhorst	EM-112	Verification before use	Y
10	Calibration block	Delmhorst	EM-191	2018 december	Y
11	Digital Manometer	Dwyer	EM-006	2019 March	Y
12	Digital Manometer	Dwyer	EM-007	2019 March	Y
13	Data aquisition System	Keithley	EM-012	2018 September	Y
14	analytical scale 200gr.	Ohaus	EM-232	2018-may	Y
15	Weight 2kg	na	EM-090	2018 nov.	Y
16	Pitot tube	Dwyer	EM-111	Verification before use	Y
17	Scale 0-1000lbs Rough Deck	Rice lake	EM-114	Sept 2018	Y
18	Gas analyzer	Siemen's	EM-118	Verification before use	Y
19	Vacuum gauge	Dwyer	EM-126	2019 March	Y
20	Vacuum gauge	Dwyer	EM-127	2019 March	Y
21	Calibration weight 100mg	Troemer	EM-128	2018 nov	y

TEST DATA PACKAGE

CLIENT	Laminox	PROJECT NUMBER	PI-20163
PRODUCT	Pellet Stove	SAMPLE ID#	QI_20236
MODEL	Jessika		
STANDARDS	EPA method 28R; ASTM E2779-10		

22	Calibration weight 200g	Troemer	EM-129	November 2018	Y
23	Reference Dry gas meter	American meter	EM-130	Oct. 2018	Y
24	Temperature humidity meter	Fluke	EM-136	March 2019	Y
25	Digital weight indicator	Rice lake	EM-020	Sept 2018	Y
26	Vane anemometer	Omega	EM-153	August 2019	Y
27	Measuring tape	Stanley	EM-224	Dec. 2018	Y
28	Chronometer	Extech	EM-175	December 2018	Y
29	Dry gas meter	Shinagwa corporation	EM-178	Oct. 2018	Y
30	Dry gas meter	Shinagwa corporation	EM-179	Oct. 2018	Y
31	Calibrabration gas	Praxair	EM-183	2021 oct	Y
32	Calibrabration gas	Praxair	EM-201	2021 oct	Y
33	Thermometer	Fluke	EM-001	March 2019-03- 06	Y
34	20 channel card	Keithley	EM-015	September 2018	Y
35	20 channel card	Keithley	EM-154	September 2018	Y
36	Filter holder	Pall	EG-086	na	Y
37	Barometer	Control Company	EM-266	Sept 2018	y



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

Report No: USR:W218-0099-01
Issue No: 1

Analytical Test Report

Client: POLYTESTS
 695-B Gaudette
 St-jean-sur-richelieu, QB
Attention: Danick Power
PO No: 100450

Signed: *Katy Mickelson*
 Katy Mickelson
 Senior Chemist
Date of Issue: 2/12/2018
THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details
Sample Log No: W218-0099-01 **Sample Date:**
Sample Designation: Pellet Sample **Sample Time:**
Sample Recognized As: Wood Pellets **Arrival Date:** 2/1/2018

Test Results			MOISTURE	AS
	METHOD	UNITS	FREE	RECEIVED
Moisture Total	ASTM E871	wt. %		4.44
Ash	ASTM D1102	wt. %	0.81	0.77
Volatile Matter	ASTM D3175	wt. %		
Fixed Carbon by Difference	ASTM D3172	wt. %		
Sulfur	ASTM D4239	wt. %	0.009	0.008
SO ₂	Calculated	lb/mmbtu		0.019
Net Cal. Value at Const. Pressure	ISO 1928	GJ/tonne	18.31	17.39
Net Cal. Value at Const. Pressure	ISO 1928	J/g	18311	17389
Gross Cal. Value at Const. Vol.	ASTM E711	J/g	19628	18756
Gross Cal. Value at Const. Vol.	ASTM E711	Btu/lb	8439	8064
Carbon	ASTM D5373	wt. %	49.12	46.94
Hydrogen*	ASTM D5373	wt. %	6.05	5.78
Nitrogen	ASTM D5373	wt. %	< 0.20	< 0.19
Oxygen*	ASTM D3176	wt. %	> 43.81	> 41.87
*Note: As received values do not include hydrogen and oxygen in the total moisture.				
Chlorine	ASTM D6721	mg/kg		
Fluorine	ASTM D3761	mg/kg		
Mercury	ASTM D6722	mg/kg		
Bulk Density	ASTM E873	lbs/ft ³		
Fines (Less than 1/8")	TPT CH-P-06	wt. %		
Durability Index	Kansas State	PDI		
Sample Above 1.50"	TPT CH-P-06	wt. %		
Maximum Length (Single Pellet)	TPT CH-P-06	inch		
Diameter, Range	TPT CH-P-05	inch		to
Diameter, Average	TPT CH-P-05	inch		
Stated Bag Weight	TPT CH-P-01	lbs		
Actual Bag Weight	TPT CH-P-01	lbs		

Comments



CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-015 05/03/18

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

SPÉCIFICATION DE L'INSTRUMENT			
Type d'instrument:	Enregistreur	Type d'entrée:	Temp
Manufacturier:	Keithley	Type de sortie:	Digitale
No. Model:	7700	Type de mesure:	Température
No. Série:	1213648	Gamme:	Divers
Emplacement:	N/A	No. Machine:	N.A.

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

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage	Incertitude Élargie	Commentaire
-190.0 °C	-190.0 °C	-190.7 °C	-0.7 °C	-190.7 °C	1.0 °C	Input#1TypeK
0.0 °C	0.0 °C	-0.3 °C	-0.3 °C	-0.3 °C	1.0 °C	Input#1TypeK
750.0 °C	750.0 °C	749.7 °C	-0.3 °C	749.7 °C	1.0 °C	Input#1TypeK
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#2 TypeK
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#3 TypeK
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	1.0 °C	Input#4 TypeK
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	1.0 °C	Input#5TypeK
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#6TypeK
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#7TypeK
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#8TypeK
100.0 °C	100.0 °C	99.8 °C	-0.2 °C	99.8 °C	1.0 °C	Input#9TypeK
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#10TypeJ
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#11TypeJ
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#12TypeJ
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#13 TypeJ
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#14TypeJ
100.0 °C	100.0 °C	99.8 °C	-0.2 °C	99.8 °C	1.0 °C	Input#15 TypeJ
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#16TypeJ
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#17TypeJ
100.0 °C	100.0 °C	99.8 °C	-0.2 °C	99.8 °C	1.0 °C	Input#18TypeJ
100.0 °C	100.0 °C	99.8 °C	-0.2 °C	99.8 °C	1.0 °C	Input#19TypeJ
100.0 °C	100.0 °C	99.9 °C	-0.1 °C	99.9 °C	1.0 °C	Input#20TypeJ
12.000 mA	12.000 mA	12.005 mA	+0.005 mA	12.005 mA	1.00 mA	Input#21
12.000 mA	12.000 mA	12.005 mA	+0.005 mA	12.005 mA	1.00 mA	Input#22

Conditions Environnementales: Température: 21 °C Humidité: 31 %RH



CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-015 05/03/18

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

SPÉCIFICATION DE CALIBRATION	
Procédure de service:	4IN9101
Précision requise:	+/- 2°C
Fréquence d'étalonnage: (jours)	365

SPÉCIFICATION DE L'INSTRUMENT			
Type d'instrument:	Enregistreur	Type d'entrée:	Temp
Manufacturier:	Keithley	Type de sortie:	Digitale
No. Model:	7700	Type de mesure:	Température
No. Série:	1213648	Gamme:	Divers
Emplacement:	N/A	No. Machine:	N.A.
Type d'Étalonnage: Test avec EM-012			

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

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

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
Conforme:	X	X
Non Conforme:		

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

Stéphane - Technicien

CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-154 05/03/18

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

SPÉCIFICATION DE L'INSTRUMENT			
Type d'instrument:	Enregistreur	Type d'entrée:	Temp
Manufacturier:	Keithley	Type de sortie:	Digitale
No. Model:	7700	Type de mesure:	Température
No. Série:	1306774	Gamme:	Divers
Emplacement:	N/A	No. Machine:	N.A.

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

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage	Incertitude Élargie	Commentaire
-17.000 mV	-17.000 mV	-16.985 mV	+0.015 mV	-16.985 mV	0.1 mV	Input#1
0.000 mV	0.000 mV	0.081 mV	+0.081 mV	0.081 mV	0.1 mV	Input#1
20.000 mV	20.000 mV	20.058 mV	+0.058 mV	20.058 mV	0.1 mV	Input#1
30.000 mV	30.000 mV	30.048 mV	+0.048 mV	30.048 mV	0.1 mV	Input#2
Input#3 Non-Conforme						
5.000 V.DC.	5.000 V.DC.	4.999 V.DC.	-0.001 V.DC.	4.999 V.DC.	0.1 V.DC.	Input#4
30.000 mV	30.000 mV	30.026 mV	+0.026 mV	30.026 mV	0.1 mV	Input#5
30.000 mV	30.000 mV	29.992 mV	-0.008 mV	29.992 mV	0.1 mV	Input#6
100.00 Ohms	100.00 Ohms	99.99 Ohms	-0.01 Ohms	99.99 Ohms	1.0 Ohms	Input#7
100.00 Ohms	100.00 Ohms	99.99 Ohms	-0.01 Ohms	99.99 Ohms	1.0 Ohms	Input#8
100.00 Ohms	100.00 Ohms	100.01 Ohms	+0.01 Ohms	100.01 Ohms	1.0 Ohms	Input#9
100.00 Ohms	100.00 Ohms	99.92 Ohms	-0.08 Ohms	99.92 Ohms	1.0 Ohms	Input#10
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	1.0 °C	Input#11 TypeT
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	1.0 °C	Input#12 TypeT
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#13 TypeJ
100.0 °C	100.0 °C	99.7 °C	-0.3 °C	99.7 °C	1.0 °C	Input#14 TypeJ
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	1.0 °C	Input#15 TypeJ
100.0 °C	100.0 °C	99.6 °C	-0.4 °C	99.6 °C	1.0 °C	Input#16 TypeJ
100.00 Ohms	100.00 Ohms	99.98 Ohms	-0.02 Ohms	99.98 Ohms	1.0 Ohms	Input#17
100.00 Ohms	100.00 Ohms	99.89 Ohms	-0.11 Ohms	99.89 Ohms	1.0 Ohms	Input#18
100.00 Ohms	100.00 Ohms	99.90 Ohms	-0.10 Ohms	99.90 Ohms	1.0 Ohms	Input#19
100.00 Ohms	100.00 Ohms	99.86 Ohms	-0.14 Ohms	99.86 Ohms	1.0 Ohms	Input#20
12.000 mA	12.000 mA	12.003 mA	+0.003 mA	12.003 mA	1.00 mA	Input#21
12.000 mA	12.000 mA	12.005 mA	+0.005 mA	12.005 mA	1.00 mA	Input#22

Conditions Environnementales: Température: 21 °C Humidité: 31 %RH



CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-154 05/03/18

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

SPÉCIFICATION DE CALIBRATION	
Procédure de service:	4IN9101
Précision requise:	+/- 2°C
Fréquence d'étalonnage: (jours)	365

SPÉCIFICATION DE L'INSTRUMENT			
Type d'instrument:	Enregistreur	Type d'entrée:	Temp
Manufacturier:	Keithley	Type de sortie:	Digitale
No. Model:	7700	Type de mesure:	Température
No. Série:	1306774	Gamme:	Divers
Emplacement:	N/A	No. Machine:	N.A.

Type d'Étalonnage:	Test avec EM-012
---------------------------	------------------

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

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

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
Conforme:	X	X
Non Conforme:		

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

Stéphane - Technicien

CERTIFICAT D'ÉTALONNAGE

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

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

Technicien:
Gatto, Angelo



David Llorens, Responsable Qualité

DESCRIPTION DU SERVICE:

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

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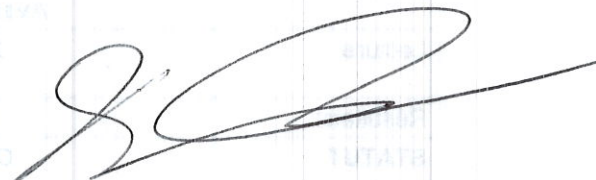
Note: Les conditions environnementales ne sont pas utilisées dans le calcul de l'incertitude.

CETTE BALANCE RENCONTRE LES SPÉCIFICATIONS SUIVANTES:

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

NOTES:

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



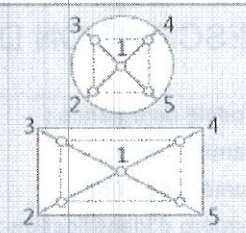
CERTIFICAT D'ÉTALONNAGE

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

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

TEST D'EXCENTRICITÉ:

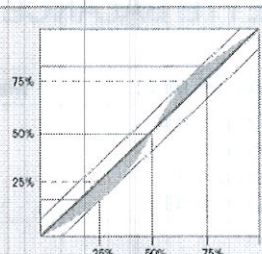
Poids Test: 100 g Tolérance 0.0004 g
(Note: Le Poids Test est taré au centre du plateau de pesée)

Position	Avant Ajustement	Après Ajustement	
1: Centre:	0.0000 g	---	
2: Avant Gauche:	0.0000 g	---	
3: Arrière Gauche:	0.0000 g	---	
4: Arrière Droit:	0.0000 g	---	
5: Avant Droit:	0.0000 g	---	
Résultats	0.0000 g	---	

STATUT **CONFORME** **N/A**

TEST DE LINÉARITÉ:

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

Pré-Charge	Avant Ajustement	Après Ajustement	
0.0000 g	49.9997 g	---	
50.0000 g	49.9997 g	---	
100.0000 g	49.9998 g	---	
150.0000 g	49.9997 g	---	
---	---	---	
---	---	---	
Résultats	0.00005 g	---	

STATUT **CONFORME** **N/A**

TEST DE SENSIBILITÉ:

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

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

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 :	142-492011-171-1649
Adresse :	695 B rue Gaudette St-Jean-sur-Richelieu, QC J3B7S7	Accréditation CCN n. :	668
		Certification CLAS n. :	2010-01
		Modèle de Balance :	AR2140
		Date d'étalonnage :	13-11-2017
Méthode :	ISO 17025	Date du prochain étalonnage :	13-11-2018

TEST DE RÉPÉTABILITÉ:

AVANT AJUSTEMENT:

Charge Utilisée:
100.0000 g

Tolérance:
0.00010 g

Résolution d'affichage:
0.0001 g

Moyenne:
99.99979 g

Écart-type:
0.00003 g

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

Statut : CONFORME

APRÈS AJUSTEMENT:

Charge Utilisée:

Tolérance:
0.00010 g

Résolution d'affichage:
0.0001 g

Moyenne:

Écart-type:

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

Statut : N/A

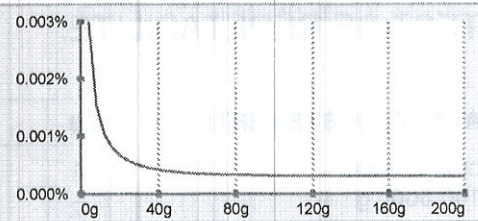
CERTIFICAT D'ÉTALONNAGE

INCERTITUDE AVANT AJUSTEMENT :

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

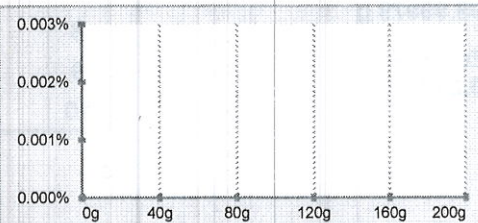
- u(cr) = Incertitude reliée à l'étalon utilisé
- Sp = Incertitude de l'écart-type
- u(l) = Incertitude associée à la linéarité
- u(dr) = Incertitude associée à résolution si Sp = 0
- u(s) = Incertitude liée à la sensibilité (span)

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



INCERTITUDE APRÈS AJUSTEMENT :

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



NOTES :

De ces valeurs d'incertitudes, seule la valeur surlignée est calculée selon ISO17025:2005, les autres étant estimées jusqu'au résultat de l'incertitude minimale. Dans le calcul de cette l'incertitude, l'écart-type utilisé est de 0,577d (où d est la précision d'affichage de la balance) lorsque cet écart-type est plus inférieure à 0,577d.

CERTIFICAT D'ÉTALONNAGE

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

RÉFÉRENCE

ENSEMBLE DE RÉFÉRENCE:

Référence	No de série	Fabricant	Date d'étalonnage
1mg-5kg	DK000A175	Dispersion	29-09-2017

INCERTITUDES:

Les incertitudes que nous retrouvons comprennent :

1. *L'incertitude associée à l'opération de pesage.*
2. *L'incertitude associée à l'écart-type.*
3. *L'incertitude associée à l'étalon utilisé.*
4. *L'incertitude associée à la résolution de l'appareil.*

L'incertitude de l'opération de pesage comprend la reproductibilité à long terme.

Les incertitudes précisées dans ce rapport sont des incertitudes élargies représentant un niveau de confiance d'approximativement 95 %, obtenu en multipliant ensemble l'incertitude-type composée par un facteur de couverture de $k = 2$. Pour de plus amples renseignements, veuillez consulter la publication GUM (Guide pour l'expression de l'incertitude de mesure, édition de 1995).

TRAÇABILITÉ

Le Service d'évaluation de laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et a certifié des capacités d'étalonnage spécifiques de ce laboratoire et leur traçabilité à des étalons nationaux de mesure reconnus et au Système international d'unités (SI). Ce certificat d'étalonnage est émis conformément aux conditions de certification accordées par CLAS et aux conditions d'accréditation accordées par le Conseil canadien des normes (CCN). Le CLAS pas plus que le CCN ne peut garantir l'exactitude des étalonnages individuels effectués par des laboratoires accrédités.

REMARQUES:

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CERTIFICAT D'ÉTALONNAGE # 7274

Date d'étalonnage : 2017-09-29

Date d'émission du certificat : 2017-09-29

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

Étalonnage d'un

Débitmètre volumétrique American Meter Company DTM-200A S/N : 99A274209

CONFORMITÉ AU PROGRAMME DE QUALITÉ

Tous les étalonnages sont effectués conformément au manuel d'assurance qualité de Polycontrols et sont conformes à la norme ISO/IEC 17025 – 2005, à la norme ISO 9001 – 2008 ainsi qu'à tout autre exigences de qualité définies dans la description d'achat des clients.

TRAÇABILITÉ

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

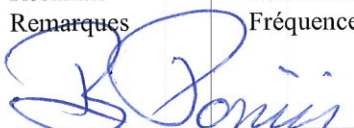
Le Service d'évaluation des laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et certifié la capacité d'étalonnage du laboratoire et la traçabilité au Système international d'unités (SI) ou à des étalons acceptables selon le CLAS. Le présent certificat d'étalonnage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


APTITUDE EN MATIÈRE DE MESURE ET D'ÉTALONNAGE - CMC

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

SOMMAIRE DES CONDITIONS DE L'INSTRUMENT EN TEST

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


Métrologiste


Responsable du laboratoire

Certificat d'étalonnage # 7274

Numero de série:	99A274209	Station de mesure:	3
Date d'étalonnage:	2017-09-29	Procédure:	POS-CAL-005
Identification de l'instrument:	EM-130		

Instrument de mesure de référence utilisé pour l'étalonnage final

Description	Modèle	# Série	Traçabilité	Date dû
DHI molbloc (120 slpm)	2E2-S	237	1500210395	2017-12-28
DHI molbloc (30 slpm)	3E4-VCR-V-Q	3444	1500218603	2018-06-05
DHI molbox1	Molbox1	755	1500215634	2018-04-18
RTD Mist	M22	1871501	2017002165	2018-04-20
Module 44.5 PSI avec Baro 163671	Module 30	160659	2017002162	2018-04-26

Spécifications finales de l'appareil

Condition d'étalonnage

Spécifications finales de l'appareil		Condition d'étalonnage	
Gaz	Air	Gaz	Air
Température d'opération		Température ambiante	24 °C
Pression à l'entrée		Pression ambiante	1010.52 mbar
Pression à la sortie		Orientation	Verticale
Température de référence		Élastomère	Viton
Pression de référence		Valve	Viton
Étendue d'échelle	0-200 ACFH		
Signaux Entrée/Sortie	-		
Alimentation			
Tolérance	±1 %O.R.		

Lectures finales

Débit du test ACFH	Instrument en test ft ³	Valeurs mesurées			Référence calculée ft ³	Erreur calculée ft ³	Tolérance acceptable ft ³	TUR
		Pression PSIA	Température °C	Référence ft ³				
41.7507	6.920	14.671	23.16	6.879	6.939	-0.019	0.069	2.92
70.7794	11.810	14.765	22.18	11.805	11.793	0.017	0.118	3.99
160.2473	26.690	14.870	22.27	26.906	26.697	-0.007	0.267	>4

Fact. cor : 1.00274566

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3 oct 2017

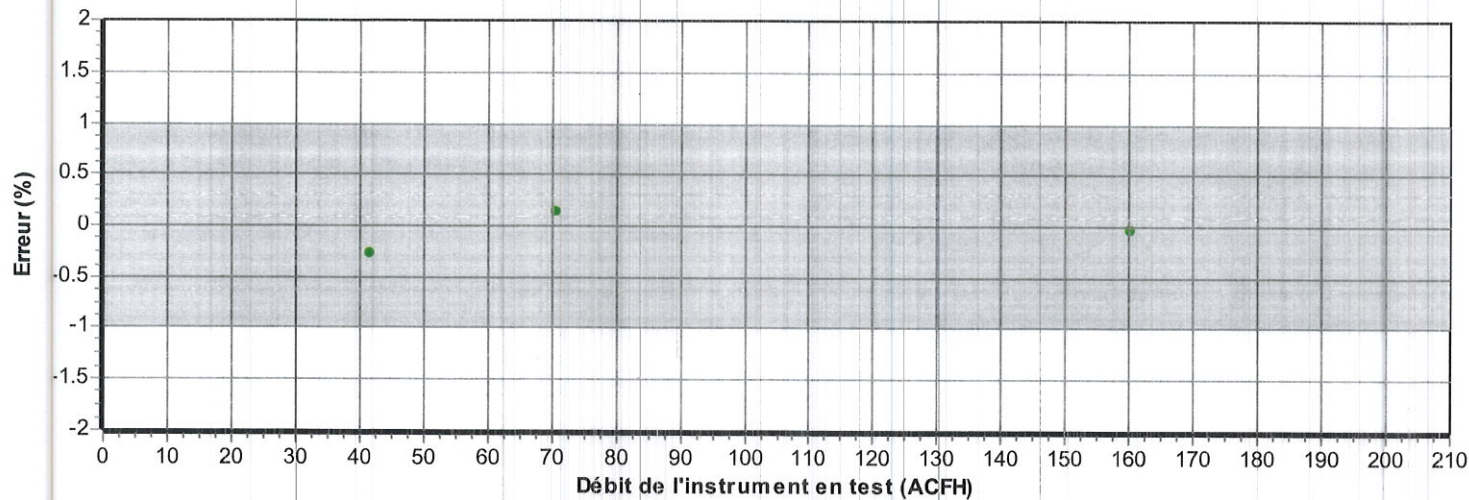
[Signature]
Signature

Bernard Poirier
Métrologiste

Certificat d'étalonnage # 7274

Numero de série:	99A274209	Station de mesure:	3
Date d'étalonnage:	2017-09-29	Procédure:	POS-CAL-005
Identification de l'instrument:	EM-130		

Résultats finaux



- La mesure (et son incertitude) se situe dans les tolérances
- La mesure (et son incertitude) se situe hors tolérance
- La mesure (et son incertitude) ne rencontre pas la marge de sécurité tel que spécifié dans le document G-8 de l'ILAC

[Signature]
3 oct 2017

[Signature]
Signature

CERTIFICAT D'ÉTALONNAGE # 8084

Date d'étalonnage : 2018-04-18

Date d'émission du certificat : 2018-04-18

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

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

CONFORMITÉ AU PROGRAMME DE QUALITÉ

Tous les étalonnages sont effectués conformément au manuel d'assurance qualité de Polycontrols et sont conformes à la norme ISO/IEC 17025 – 2005, à la norme ISO 9001 – 2008 ainsi qu'à tout autre exigences de qualité définies dans la description d'achat des clients.

TRAÇABILITÉ

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

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

APTITUDE EN MATIÈRE DE MESURE ET D'ÉTALONNAGE - CMC

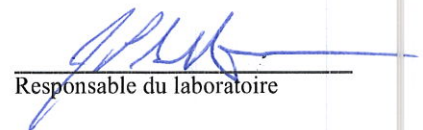
Les références utilisées pour l'étalonnage de débit ont une incertitude de $\pm 0.2\%$ de la lecture pour les mesures entre 5 SCCM à 10 SLPM, $\pm 0.3\%$ de la lecture pour les mesures entre 10 SLPM à 30 SLPM, $\pm 0.2\%$ de la lecture pour les mesures entre 30 SLPM à 3000 SLPM, $\pm 0.3\%$ de la lecture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

SOMMAIRE DES CONDITIONS DE L'INSTRUMENT EN TEST

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



Métrologue



Responsable du laboratoire

Certificat d'étalonnage # 8084

Numéro de série: 23544	Station de mesure: 3
Date d'étalonnage: 2018-04-18	Procédure: POS-CAL-005
Identification de l'instrument: EM-178	

Instrument de mesure de référence utilisé pour l'étalonnage final

Description	Modèle	# Série	Traçabilité	Date dû
DHI molbloc (30 slpm)	3E4-VCR-V-Q	2359	1500231794	2019-01-19
DHI molbox1	Molbox1	881	1500218459	2018-06-01
RTD Mist	M22	2208102	2018002234	2019-04-11
Module 44.5 PSI avec Baro 163671	Module 30	160659	2018002180	2019-04-12

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 $\pm 2\% \text{O.R.}$

Air

10-2000 ALH
-

Condition d'étalonnage

Gaz
Température ambiante
Pression ambiante
Orientation
Élastomère
Valve

Air
21 °C
999.612 mbar
Horizontale
Viton

Lectures finales

Débit du test ALH	Instrument en test L	Valeurs mesurées			Référence calculée L	Erreur calculée L	Tolérance acceptable L	TUR
		Pression PSIA	Température °C	Référence L				
363.7092	61.1300	14.5138	21.77	59.5417	60.4252	0.7048	1.2085	>4
609.9954	103.0400	14.5168	21.72	100.0904	101.5371	1.5029	2.0307	>4
1667.4809	282.0500	14.5361	21.62	274.0687	277.5684	4.4816	5.5514	>4

Fc.: 0,988470473

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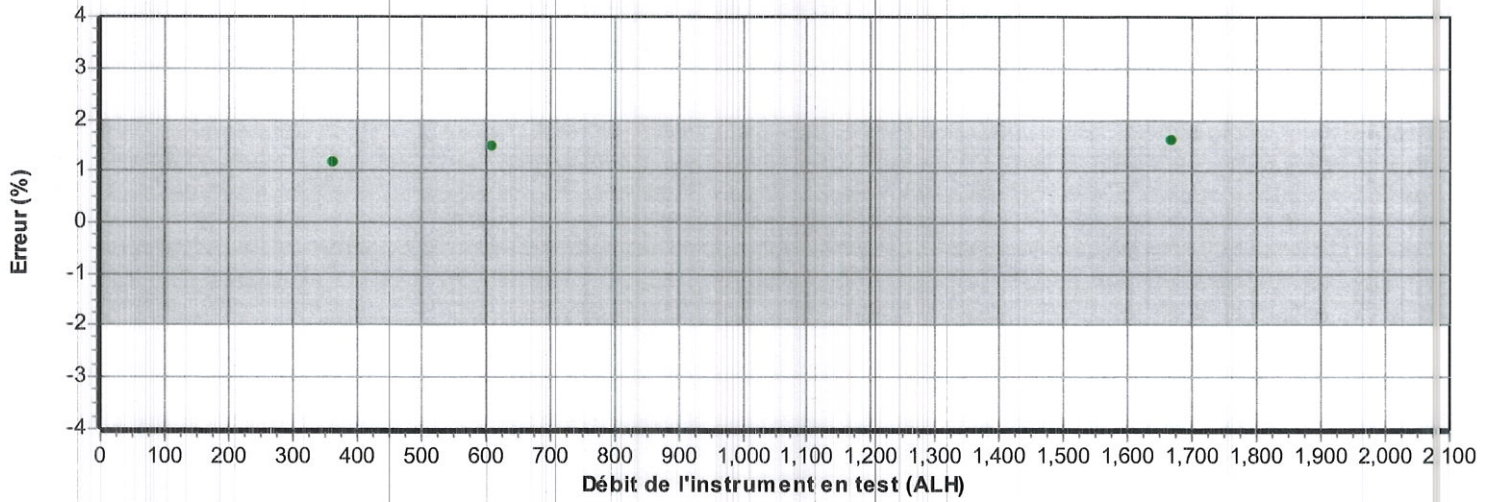


Signature

Certificat d'étalonnage # 8084

Numéro de série: 23544	Station de mesure: 3
Date d'étalonnage: 2018-04-18	Procédure: POS-CAL-005
Identification de l'instrument: EM-178	

Résultats finaux



- La mesure (et son incertitude) se situe dans les tolérances
- La mesure (et son incertitude) se situe hors tolérance
- La mesure (et son incertitude) ne rencontre pas la marge de sécurité tel que spécifié dans le document G-8 de l'ILAC

Bernard Poirier
Métrologue


Signature

CERTIFICAT D'ÉTALONNAGE # 8086

Date d'étalonnage : 2018-04-18

Date d'émission du certificat : 2018-04-18

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

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

CONFORMITÉ AU PROGRAMME DE QUALITÉ

Tous les étalonnages sont effectués conformément au manuel d'assurance qualité de Polycontrols et sont conformes à la norme ISO/IEC 17025 – 2005, à la norme ISO 9001 – 2008 ainsi qu'à tout autre exigences de qualité définies dans la description d'achat des clients.

TRAÇABILITÉ

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

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

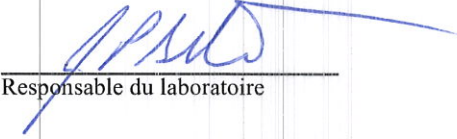
APTITUDE EN MATIÈRE DE MESURE ET D'ÉTALONNAGE - CMC

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

SOMMAIRE DES CONDITIONS DE L'INSTRUMENT EN TEST

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


Métrologue


Responsable du laboratoire

Certificat d'étalonnage # 8086

Numéro de série: 23543	Station de mesure: 3
Date d'étalonnage: 2018-04-18	Procédure: POS-CAL-005
Identification de l'instrument: EM-179	

Instrument de mesure de référence utilisé pour l'étalonnage final

Description	Modèle	# Série	Traçabilité	Date dû
DHI molbloc (30 slpm)	3E4-VCR-V-Q	2359	1500231794	2019-01-19
DHI molbox1	Molbox1	881	1500218459	2018-06-01
RTD Mist	M22	2208102	2018002234	2019-04-11
Module 44.5 PSI avec Baro 163671	Module 30	160659	2018002180	2019-04-12

Spécifications finales de l'appareil

Condition d'étalonnage

Spécifications finales de l'appareil		Condition d'étalonnage	
Gaz	Air	Gaz	Air
Température d'opération		Température ambiante	21 °C
Pression à l'entrée		Pression ambiante	1000.05 mbar
Pression à la sortie		Orientation	Horizontale
Température de référence		Élastomère	Viton
Pression de référence		Valve	
Étendue d'échelle	10-2000 ALH		
Signaux Entrée/Sortie	-		
Alimentation			
Tolérance	±2 %O.R.		

Lectures finales

Débit du test ALH	Instrument en test L	Valeurs mesurées		Référence L	Référence calculée L	Erreur calculée L	Tolérance acceptable L	TUR
		Pression PSIA	Température °C					
384.7785	64.6300	14.5124	21.72	63.1428	64.0745	0.5555	1.2815	>4
613.1464	103.1100	14.5145	21.66	100.6570	102.1054	1.0046	2.0421	>4
1707.3283	285.6900	14.5319	21.59	280.6440	284.2771	1.4129	5.6855	>4

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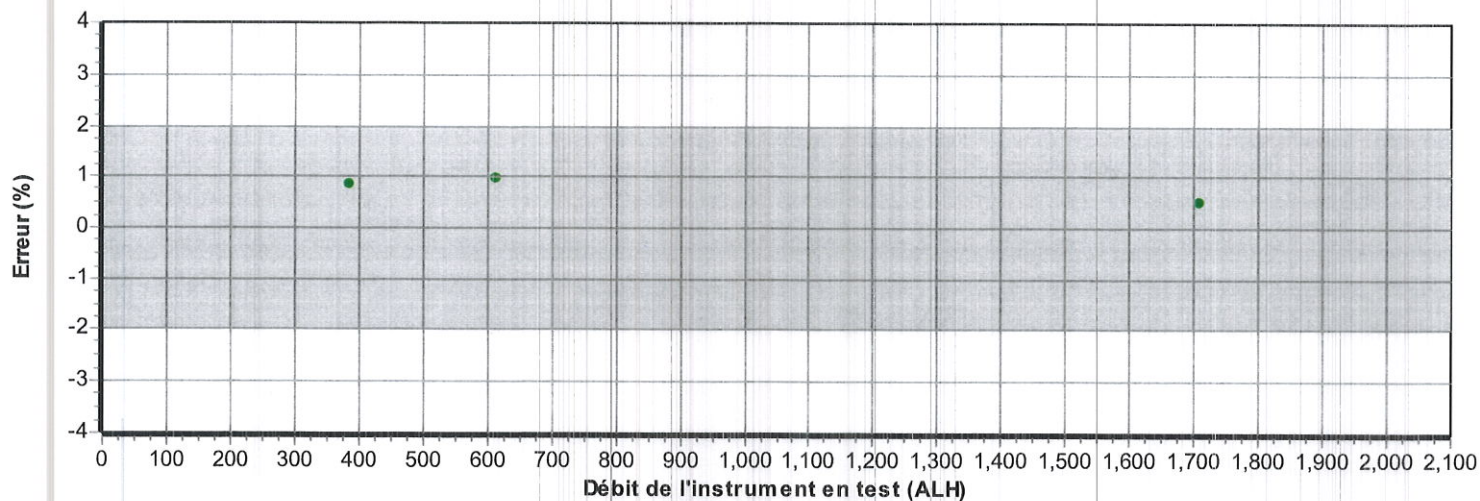
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Signature

Certificat d'étalonnage # 8086


Numero de série: 23543	Station de mesure: 3
Date d'étalonnage: 2018-04-18	Procédure: POS-CAL-005
Identification de l'instrument: EM-179	

Résultats finaux



- La mesure (et son incertitude) se situe dans les tolérances
- La mesure (et son incertitude) se situe hors tolérance
- La mesure (et son incertitude) ne rencontre pas la marge de sécurité tel que spécifié dans le document G-8 de l'ILAC

Bernard Poirier
Métrologiste


Signature



CERTIFICAT D'ÉTALONNAGE

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

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

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

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

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

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



CERTIFICAT D'ÉTALONNAGE

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

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

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

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

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

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

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
Conforme:	X	X
Non Conforme:		

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

Martin Langlais - Technicien



CERTIFICAT D'ÉTALONNAGE

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

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

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

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

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

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



CERTIFICAT D'ÉTALONNAGE

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

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

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

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

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

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

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
Conforme:	X	X
Non Conforme:		

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

Martin Langlais - Technicien



CERTIFICAT D'ÉTALONNAGE

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

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

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

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

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

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

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

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
Conforme:	X	X
Non Conforme:		

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

Stéphane - Technicien

CERTIFICAT D'ÉTALONNAGE

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

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:



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CERTIFICAT D'ÉTALONNAGE

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www.dispersion.ca 1.866.390.5066

BALANCES UTILISÉES

Pour l'étalonnage manuel :

> 5 kg à 25 kg :	Mettler Toledo XP32003L, SNR 1123271214, max. 32100 g, d = 0.005 g
> 1 kg à 5 kg	Mettler Toledo PR5003, SNR 1115311634, max. 5100 g, d = 0.001 g
> 300 g à 2 kg :	Mettler Toledo XP2004S, SNR B131185222, max. 2100 g, d = 0.1 mg
> 100 g à 200 g :	Mettler Toledo AT201 SNR BA1115230146, max. 205 g, d = 0.01 mg
> 5 g à 100 g :	Mettler Toledo AX106 SNR 1127063924, max. 111 g, d = 1 µg
1 mg à 5 g :	Mettler UMX5, SNR 1121103055, max. 5.1 g, d = 0.1 µg

Pour l'étalonnage automatisé :

> 200 g à 1 kg :	Mettler Toledo AX1005 SNR 1127063210, max. 1109 g, d = 0.01 mg
> 5 g à 100 g :	Mettler Toledo AX106 SNR 1120143015, max. 111 g, d = 1 µg
1 mg à 5 g :	Mettler UMX5, SNR 1125140561, max. 5.1 g, d = 0.1 µg

Les balances sont vérifiées selon notre procédure de contrôle périodique PDL-11-MG-001.

INCERTITUDES:

Les incertitudes que nous retrouvons comprennent :

1. L'incertitude associée à l'opération de pesage.
2. L'incertitude associée à la densité de l'air.
3. L'incertitude associée à l'étalon utilisé.
4. L'incertitude associée à la densité de la masse à être étalonnée.

L'incertitude de l'opération de pesage comprend la reproductibilité à long terme.

Les incertitudes précisées dans ce rapport sont des incertitudes élargies représentant un niveau de confiance d'approximativement 95 %, obtenu en multipliant ensemble l'incertitude-type composée par un facteur de couverture de $k = 2$. Pour de plus amples renseignements, veuillez consulter la publication GUM (Guide pour l'expression de l'incertitude de mesure, édition de 1995).

TRAÇABILITÉ

Le Service d'évaluation de laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et a certifié des capacités d'étalonnage spécifiques de ce laboratoire et leur traçabilité à des étalons nationaux de mesure reconnus et au Système international d'unités (SI). Ce certificat d'étalonnage est émis conformément aux conditions de certification accordées par CLAS et aux conditions d'accréditation accordées par le Conseil canadien des normes (CCN). Le CLAS pas plus que le CCN ne peut garantir l'exactitude des étalonnages individuels effectués par des laboratoires accrédités.

D.P

CERTIFICAT D'ÉTALONNAGE

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

RÉFÉRENCES UTILISÉES

Poids	No de série	Fabricant	Date d'étalonnage	Date due
20kg	69976	Troemner	30-05-2017	30-05-2018
5kg	129099	Mettler Toledo	02-09-2017	02-09-2018
5kg	96-0888-50-3	Denver Instrument Company	02-09-2017	02-09-2018
2kg	129098	Mettler Toledo	02-09-2017	02-09-2018
2kg	96-0888-50-3	Denver Instrument Company	02-09-2017	02-09-2018
300g	96-0888-50-2	Denver Instrument Company	02-09-2017	02-09-2018
1kg - 1mg	MT-01	Mettler Toledo	02-09-2017	02-09-2018

ÉTALONS CERTIFIÉS PAR LE CNRC(Référence NRC MS-2016-0021)

Poids	No de série	Fabricant	Date d'étalonnage	Date due
100g	95170	Mettler Toledo	17-10-2016	17-10-2018
10kg	129100	Mettler Toledo	17-10-2016	17-10-2018
1kg	95171	Mettler Toledo	17-10-2016	17-10-2018

RÉFÉRENCES DE LA STATION ROBOTISÉE

Poids	No de série	Fabricant	Date d'étalonnage	Date due
1kg - 1mg	DK000A132	Laboratoire Dispersion	01-08-2017	01-08-2018

DP



CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-126 06/03/18

CLIENT		SPÉCIFICATION DE CALIBRATION	
Compagnie:	Services Polytests Inc	Procédure de service:	4IN9106
Adresse:	695 B rue Gaudette	Précision requise:	+/- 1"Hg
	St-Jean-sur-Richelieu, Québec, J3B 7S7	Fréquence d'étalonnage: (jours)	365

SPÉCIFICATION DE L'INSTRUMENT			
Type d'instrument:	Manomètre	Type d'entrée:	Pression
Manufacturier:	Dwyer	Type de sortie:	Digitale
No. Model:	DPG200	Type de mesure:	Pression
No. Série:	N.A.	Gamme:	0-28"Hg
Emplacement:	N.A.	No. Machine:	N.A.

SPÉCIFICATION DE L'ÉTALON			
Étalon Utilisé:	Crystal XP2i	No. du certificat d'étalonnage:	2017004083
No. Série:	258139	Dernière date d'étalonnage:	4-Jul-17
Certificat fait par:	Alpha Controls	Prochaine date d'étalonnage:	4-Jul-18
Commentaire:			

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage	Incertitude Élargie	Commentaire
0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	1 "Hg	Vérification indicateur
-7.50 "Hg	-7.50 "Hg	-7.61 "Hg	-0.11 "Hg	-7.61 "Hg	1 "Hg	Vérification indicateur
-15.00 "Hg	-15.00 "Hg	-15.23 "Hg	-0.23 "Hg	-15.23 "Hg	1 "Hg	Vérification indicateur
-22.50 "Hg	-22.50 "Hg	-22.85 "Hg	-0.35 "Hg	-22.85 "Hg	1 "Hg	Vérification indicateur
-28.00 "Hg	-28.00 "Hg	-28.45 "Hg	-0.45 "Hg	-28.45 "Hg	1 "Hg	Vérification indicateur
0.00 "Hg	10.0000 V.DC.	10.0516 V.DC.	+0.0600 V.DC.	10.0600 V.DC.	0.5 V.DC.	Vérification sortie analogique
-7.50 "Hg	8.0000 V.DC.	8.0377 V.DC.	+0.0377 V.DC.	8.0377 V.DC.	0.5 V.DC.	Vérification sortie analogique
-15.00 "Hg	6.0000 V.DC.	6.0080 V.DC.	+0.0080 V.DC.	6.0080 V.DC.	0.5 V.DC.	Vérification sortie analogique
-22.50 "Hg	4.0000 V.DC.	3.9666 V.DC.	-0.0333 V.DC.	3.9666 V.DC.	0.5 V.DC.	Vérification sortie analogique
-28.00 "Hg	2.5333 V.DC.	2.4615 V.DC.	-0.0718 V.DC.	2.4615 V.DC.	0.5 V.DC.	Vérification sortie analogique
Conditions Environnementales:			Température: 20 °C	Humidité: 33 %RH		
Type d'Étalonnage:						

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

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

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
Conforme:	X	X
Non Conforme:		

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

Stéphane - Technicien



CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-127 06/03/18

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

SPÉCIFICATION DE CALIBRATION	
Procédure de service:	4IN9106
Précision requise:	+/- 1"Hg
Fréquence d'étalonnage: (jours)	365

SPÉCIFICATION DE L'INSTRUMENT			
Type d'instrument:	Manomètre	Type d'entrée:	Pression
Manufacturier:	Dwyer	Type de sortie:	Digitale
No. Model:	DPG200	Type de mesure:	Pression
No. Série:	N.A.	Gamme:	0-28"Hg
Emplacement:	N.A.	No. Machine:	N.A.

SPÉCIFICATION DE L'ÉTALON			
Étalon Utilisé:	Crystal XP2i	No. du certificat d'étalonnage:	2017004083
No. Série:	258139	Dernière date d'étalonnage:	4-Jul-17
Certificat fait par:	Alpha Controls	Prochaine date d'étalonnage:	4-Jul-18
Commentaire:			

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage	Incertitude Élargie	Commentaire
0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	0.00 "Hg	1 "Hg	Vérification indicateur
-7.50 "Hg	-7.50 "Hg	-7.52 "Hg	-0.03 "Hg	-7.52 "Hg	1 "Hg	Vérification indicateur
-15.00 "Hg	-15.00 "Hg	-15.05 "Hg	-0.05 "Hg	-15.05 "Hg	1 "Hg	Vérification indicateur
-22.50 "Hg	-22.50 "Hg	-22.60 "Hg	-0.10 "Hg	-22.60 "Hg	1 "Hg	Vérification indicateur
-28.00 "Hg	-28.00 "Hg	-28.11 "Hg	-0.11 "Hg	-28.11 "Hg	1 "Hg	Vérification indicateur
0.00 "Hg	10.0000 V.DC.	10.0048 V.DC.	+0.0048 V.DC.	10.0048 V.DC.	0.01 V.DC.	Vérification sortie analogique
-7.50 "Hg	8.0000 V.DC.	8.0156 V.DC.	+0.0156 V.DC.	8.0156 V.DC.	0.01 V.DC.	Vérification sortie analogique
-15.00 "Hg	6.0000 V.DC.	6.0141 V.DC.	+0.0141 V.DC.	6.0141 V.DC.	0.01 V.DC.	Vérification sortie analogique
-22.50 "Hg	4.0000 V.DC.	3.9973 V.DC.	-0.0027 V.DC.	3.9973 V.DC.	0.01 V.DC.	Vérification sortie analogique
-28.00 "Hg	2.5333 V.DC.	2.5129 V.DC.	-0.0204 V.DC.	2.5129 V.DC.	0.01 V.DC.	Vérification sortie analogique
Conditions Environnementales:			Température: 20 °C	Humidité: 33 %RH		
Type d'Étalonnage:						

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

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

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
Conforme:	X	X
Non Conforme:		

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

Stéphane - Technicien

CERTIFICAT D'ÉTALONNAGE

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

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:


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CERTIFICAT D'ÉTALONNAGE

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www.dispersion.ca 1.866.390.5066

BALANCES UTILISÉES

Pour l'étalonnage manuel :

> 5 kg à 25 kg :	Mettler Toledo XP32003L, SNR 1123271214, max. 32100 g, d = 0.005 g
> 1 kg à 5 kg	Mettler Toledo PR5003, SNR 1115311634, max. 5100 g, d = 0.001 g
> 300 g à 2 kg :	Mettler Toledo XP2004S, SNR B131185222, max. 2100 g, d = 0.1 mg
> 100 g à 200 g :	Mettler Toledo AT201 SNR BA1115230146, max. 205 g, d = 0.01 mg
> 5 g à 100 g :	Mettler Toledo AX106 SNR 1127063924, max. 111 g, d = 1 µg
1 mg à 5 g :	Mettler UMX5, SNR 1121103055, max. 5.1 g, d = 0.1 µg

Pour l'étalonnage automatisé :

> 200 g à 1 kg :	Mettler Toledo AX1005 SNR 1127063210, max. 1109 g, d = 0.01 mg
> 5 g à 100 g :	Mettler Toledo AX106 SNR 1120143015, max. 111 g, d = 1 µg
1 mg à 5 g :	Mettler UMX5, SNR 1125140561, max. 5.1 g, d = 0.1 µg

Les balances sont vérifiées selon notre procédure de contrôle périodique PDL-11-MG-001.

INCERTITUDES:

Les incertitudes que nous retrouvons comprennent :

1. L'incertitude associée à l'opération de pesage.
2. L'incertitude associée à la densité de l'air.
3. L'incertitude associée à l'étalon utilisé.
4. L'incertitude associée à la densité de la masse à être étalonnée.

L'incertitude de l'opération de pesage comprend la reproductibilité à long terme.

Les incertitudes précisées dans ce rapport sont des incertitudes élargies représentant un niveau de confiance d'approximativement 95 %, obtenu en multipliant ensemble l'incertitude-type composée par un facteur de couverture de $k = 2$. Pour de plus amples renseignements, veuillez consulter la publication GUM (Guide pour l'expression de l'incertitude de mesure, édition de 1995).

TRAÇABILITÉ

Le Service d'évaluation de laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et a certifié des capacités d'étalonnage spécifiques de ce laboratoire et leur traçabilité à des étalons nationaux de mesure reconnus et au Système international d'unités (SI). Ce certificat d'étalonnage est émis conformément aux conditions de certification accordées par CLAS et aux conditions d'accréditation accordées par le Conseil canadien des normes (CCN). Le CLAS pas plus que le CCN ne peut garantir l'exactitude des étalonnages individuels effectués par des laboratoires accrédités.



CERTIFICAT D'ÉTALONNAGE

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

RÉFÉRENCES UTILISÉES

Poids	No de série	Fabricant	Date d'étalonnage	Date due
20kg	69976	Troemner	30-05-2017	30-05-2018
5kg	129099	Mettler Toledo	02-09-2017	02-09-2018
5kg	96-0888-50-3	Denver Instrument Company	02-09-2017	02-09-2018
2kg	129098	Mettler Toledo	02-09-2017	02-09-2018
2kg	96-0888-50-3	Denver Instrument Company	02-09-2017	02-09-2018
300g	96-0888-50-2	Denver Instrument Company	02-09-2017	02-09-2018
1kg - 1mg	MT-01	Mettler Toledo	02-09-2017	02-09-2018

ÉTALONS CERTIFIÉS PAR LE CNRC(Référence NRC MS-2016-0021)

Poids	No de série	Fabricant	Date d'étalonnage	Date due
100g	95170	Mettler Toledo	17-10-2016	17-10-2018
10kg	129100	Mettler Toledo	17-10-2016	17-10-2018
1kg	95171	Mettler Toledo	17-10-2016	17-10-2018

RÉFÉRENCES DE LA STATION ROBOTISÉE

Poids	No de série	Fabricant	Date d'étalonnage	Date due
1kg - 1mg	DK000A132	Laboratoire Dispersion	01-08-2017	01-08-2018



Certificat d'Étalonnage / Certificate of Calibration

CLIENT :
 SERVICES POLYTESTS INC.
 695-B GAUDETTE
 ST-JEAN-SUR-RICHELIEU, QUEBEC

Description: VÉRIFICATEUR D'HUMIDITÉ / MOISTURE METER
Fabricant/ Manufacturer: DELMHORST
Modèle/ Model : MCS-1 REFERENCE STANDARD
No série / Serial no : N/A
Inventaire / Asset # : EM-191

CERTIFICAT No / Certificate No: 227990

PROCÉDURE / Procedure :
 TRESCAL - DELMHORST_MCS-1 REFERENCE STANDARD

Date étalonnage/ Calibration Performed : 2017-12-22

Echéance/ Due Date : 2018-12-22

Conditions de mesure / Measurement conditions

TEMPÉRATURE / Temp. : 22°C
 HUMIDITÉ / Humidity : 22%RH



Type de résultat / Results type :	As-Found = As-Left
Résultats d'essais / Test results :	Conforme / In Tolerance
Usage restreint/ Restricted use :	<input type="checkbox"/>
Réparation effectuée / Repair performed :	<input type="checkbox"/>
Ajustement effectué / Adjustment performed :	<input type="checkbox"/>

ÉTALONS UTILISÉS/ Standards Used:

Identification	Manuf.	Model	Description	Ser. #	Étalonné/ Cal.	Echéance/ Due
PR0661	FLUKE	8508A	REFERENCE MULTIMETER	389272208	2017-06-19	2018-06-19

Les spécifications mentionnées comme limites de tolérances d'essai sont celles établies par le fabricant, sauf indication contraire.
Test tolerance limits are based on manufacturers specifications unless stated otherwise.

NOTES :


 2018-01-11
Technicien / Technician

 A. GAUDETTE

Le système qualité de la société est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour le processus d'étalonnage sont retraçables au SI par l'entremise du CNRC et/ou du NIST.
Our quality system complies with the requirements of ISO 17025 and the standards used for the calibration are traceable to SI through NRC and/or NIST.

LE DROIT D'AUTEUR DE CE CERTIFICAT APPARTIENT À TRESCAL / PRIMO INSTRUMENT INC. CE CERTIFICAT NE PEUT ÊTRE REPRODUIT AUTREMENT QU'EN ENTIER ET AVEC LE CONSENTEMENT PRÉALABLE ÉCRIT DU GROUPE TRESCAL.
 TRESCAL / PRIMO INSTRUMENT INC. OWN COPYRIGHT OF THIS CERTIFICATE. THE CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN CONSENT OF THE TRESCAL GROUP.

CLIENT / Customer :

DESCRIPTION / Description :

MANUFACTURIER / Manufacturer :

MODÈLE / Model :

227990

SERVICES POLYTESTS INC.

VÉRIFICATEUR D'HUMIDITÉ / MOISTURE METER

DELMHORST

MCS-1 REFERENCE STANDARD

	DESCRIPTION Description	LIMITES Limits	LECTURES Readings	LIMITES Limits
DOUGLAS-FIR @ 80°F				Déviaton Mohms
	Nominal			
12 %	120 MOhms		116.5	3.5
22 %	1.10 MOhms		1.095	0.005

SP

Rapport d'étalonnage No. 520501-772-092517

Mettler Toledo

Service Business Unit Industrial

1900 Polaris Parkway

Columbus, Ohio 43240

1-800-METTLER

METTLER TOLEDO

ISO 9001 Registered

ANSI/NCSL Z540-1 Accrédité



Accrédité par l'American Association for
Laboratory Accreditation (A2LA)

CERT.CALIBRATION #1902.02

Certificat d'étalonnage

Client

Société : Services Polytests
Adresse : 695-B Rue Gaudette
Ville : Saint-Jean-Sur-Richelieu *État/Province :* Quebec
Code postal : J3B 7S7 *Astea Customer ID:* 301288671

Instrument

Constructeur : RICE LAKE *Modèle de terminal :* IQ+355
Modèle : 4 X 4HP-10K *# série du terminal:* 164851
No de série : C18395 *# série de l'imprimant* N/A
Capacité : 400 kg *N/A*
Résolution : 0.05 kg *Nbre de Divisions:* 8000
Classe : III *Procédure utilisée :* NIST Handbook 44
No./ID d'inventaire: EM-137
Procédure: Le présent certificat est émis conformément aux conditions de certification accordées par l'A2LA, en vertu de la norme ISO/IEC 17025. A2LA a évalué la capacité de mesure du laboratoire et la traçabilité des normes nationales reconnues.

Date de calibrage : 25-sept-2017 *Date, prochaine Cal.* 30-sept-2018
Signataire autorisé (A2LA) : Stephane Poisson *Signature:* ELECTRONIC SIGNATURE

Étalons de travail

Retracabilité: Les poids de test utilisés se réfèrent au National Institute of Standards and Technology.

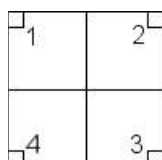
<i>Jeu de poids no :</i>	<i>Traçabilité NIST No.:</i>	<i>Classe ASTM/OIML</i>	<i>Date d'étalonnage :</i>	<i>Date proch. étalonnage</i>
S	1412405	M1	9-mai-2017	9-mai-2018
BE10	M16-0725	M1	28-févr-2017	28-févr-2018

Résultats de mesure

La température : 24 °C

Les conditions ambiantes ont été vérifiées afin d'assurer l'exactitude de l'étalonnage.

Test de variation



Poids Appliqués	Position	Avant Réglage	Après Réglage
		Valeur lue	Valeur lue
1: 100.00 kg	Position 1	99.90 kg	100.00 kg
2: 100.00 kg	Position 2	99.75 kg	100.00 kg
3: 100.00 kg	Position 3	99.85 kg	100.00 kg
4: 100.00 kg	Position 4	99.90 kg	100.00 kg
Erreur maximum :		0.25 kg	0.00 kg
Max Erreur Admissible :		0.10 kg	0.1 kg

Linéarité

	Avant réglage					
	Poids Appliqués	Valeur lue	Erreur		Erreur admissible	Dans la Tolérance
Zero 1	0.00 kg	0.00 kg	0.00 kg	0 d	1 d	OUI
2	100.00 kg	99.90 kg	-0.10 kg	2 d	2 d	OUI
Max 3	200.00 kg	199.75 kg	-0.25 kg	5 d	3 d	NON
4	100.00 kg	99.90 kg	-0.10 kg	2 d	2 d	OUI
Zero 5	0.00 kg	0.05 kg	0.05 kg	1 d	1 d	OUI

 Méthode de substitution utilisée

Commentaires : 153,95 + 200 kg = 353,85 kg

	Après réglage					
	Poids Appliqués	Valeur lue	Erreur		Erreur admissible	Dans la Tolérance
Zero 1	0.00 kg	0.00 kg	0.00 kg	0 d	1 d	OUI
2	100.00 kg	100.00 kg	0.00 kg	0 d	2 d	OUI
Max 3	200.00 kg	200.05 kg	0.05 kg	1 d	3 d	OUI
4	100.00 kg	100.00 kg	0.00 kg	0 d	2 d	OUI
Zero 5	0.00 kg	-0.05 kg	-0.05 kg	1 d	1 d	OUI

Méthode de substitution utilisée

Commentaires : 154,10 + 200 kg = 354,30 kg

Un réglage de la balance a été requis

Si non, les résultats "avant réglage" correspondent aux résultats tel que laissé.

OUI

NON

Répétabilité

Poids appliqués : 100.00 kg

	Chargé	Vide	Différence
1	99.95 kg	0.00 kg	99.95 kg
2	99.95 kg	0.00 kg	99.95 kg
3	99.95 kg	0.00 kg	99.95 kg
	Erreur maximale :	0.05 kg	1.0 d
	Tolérance :	0.10 kg	2 d

Incertitude

Mesure de l'incertitude = 0,029 kg

L'incertitude de mesure représente les incertitudes étendues selon un facteur de sécurité K=2 générant un niveau de confiance approximatif de 95 %. Des dispositions doivent être prises en matière d'environnement au lieu d'étalonnage, d'incertitude induite par l'article en étalonnage et d'effets indésirables causés par le transport du matériel d'étalonnage. Ces facteurs pourraient entraîner une incertitude plus grande que le CMC.

Remarques

Vous pourriez gagner en précision avec des cellules Mettler.



CERTIFICAT D'ÉTALONNAGE

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

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

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

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

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



CERTIFICAT D'ÉTALONNAGE

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

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

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

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

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

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

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
Conforme:	X	X
Non Conforme:		

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

Stéphane - Technicien



CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-136 06/03/18

CLIENT		SPÉCIFICATION DE CALIBRATION	
Compagnie:	Services Polytests Inc	Procédure de service:	ISL-004
Adresse:	695 B rue Gaudette	Précision requise:	+/-2°C +/-3%RH
	St-Jean-sur-Richelieu, Québec, J3B 7S7	Fréquence d'étalonnage: (jours)	365

SPÉCIFICATION DE L'INSTRUMENT			
Type d'instrument:	Hygromètre	Type d'entrée:	Temp/%RH
Manufacturier:	Fluke	Type de sortie:	Digitale
No. Model:	971	Type de mesure:	Temp/humidité
No. Série:	10610850	Gamme:	5-95%RH -20a60°C
Emplacement:	N.A.	No. Machine:	N.A.

SPÉCIFICATION DE L'ÉTALON			
Étalon Utilisé:	Vaisala Portable 1	No. du certificat d'étalonnage:	2017004428
No. Série:	U4840010/U4920031	Dernière date d'étalonnage:	19-Jul-17
Certificat fait par:	Alpha Controls	Prochaine date d'étalonnage:	19-Jul-18
Commentaire:			

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage	Incertitude Élargie	Commentaire
25.0 °C	25.0 °C	25.2 °C	+0.2 °C	25.2 °C	1.0 °C	
40.0 °C	40.0 °C	40.1 °C	+0.1 °C	40.1 °C	1.0 °C	
33.0 %RH	33.0 %RH	32.5 %RH	-0.5 %RH	32.5 %RH	3.0 %RH	
50.0 %RH	50.0 %RH	49.1 %RH	-0.9 %RH	49.1 %RH	3.0 %RH	
80.0 %RH	80.0 %RH	79.2 %RH	-0.8 %RH	79.2 %RH	3.0 %RH	
Conditions Environnementales: Température: 21 °C Humidité: 29 %RH						
Type d'Étalonnage:						

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

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

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
Conforme:	X	X
Non Conforme:		

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

Stéphane - Technicien

CERTIFICATE OF NIST TRACEABLE CALIBRATION

Calibration Certificate No: 63484

Customer Information

Customer: Services Polytests, Inc.
Address : 695-B Gaudette
St-Jean-sur-richelieu
J3B 7S7
Customer PO #: 100431



LABORATORY ACCREDITATION BUREAU
a division of A-S-B
ACCREDITED ISO/IEC 17025
Certificate # L2115-1 Calibration

Calibration Procedure Information

Procedure ID: GTP AIRVEL

Revision #: 6

Revision Date: 1/6/2013

Calibration Standards Information

<u>Graffel ID</u>	<u>Manufacturer</u>	<u>Model #</u>	<u>Description</u>	<u>CAL Due</u>
10017	Hart Scientific/Burns	1502A/3925	Thermometer	2/18/2018
10086	Furness Controls	FC0332	DP Transmitter	6/6/2018
10100	Graffel	n/a	Temperature	10/29/2019
10155	HOBO	UX100-011	RH/Temp logger	11/15/2017
10171	Furness	FC0332-2W	0 - .4" H2O	11/10/2017
10187	Vaisala	PTB210	Barometric Pressure Gauge	12/6/2017

Sensor Information

Manufacturer: Omega

Description: Anemometer

Method Used: Pitot Tube

Model #: HHF143

Rated Accuracy: \pm See Attachment

Accuracy Specified By: Omega

Instrument ID#: EM153

Range: 40 to 7800 fpm

Condition: Functional

Serial #: 1015949

Comments: Calibration Date: 08/22/2017 *Limited calibration up to 5000 fpm
Calibration Due: 08/22/2018

The instruments(s) listed on this certificate have been calibrated against standards traceable to the National Institute of Standards & Technology (NIST) or compared to nationally or internationally recognized consensus standards. The reported calibration uncertainty has a confidence level of 95% ($k=2$). A calibration uncertainty ratio of 4:1 was maintained unless required uncertainty is supported by analysis. Graffel, LLC. Quality Assurance System complies with applicable requirements of ISO/IEC-17025-2005, ANSI/NCCL Z540-1-1994 and ISO 9001: 2008. All results contained within this certificate relate only to item(s) calibrated. This certificate shall not be reproduced except in full and with the written consent of Graffel, LLC. Acceptance Criteria per Simple Acceptance Rule: Measurement Uncertainty is not applied to the measured value when in/out of tolerance statement is made.

Performed By:

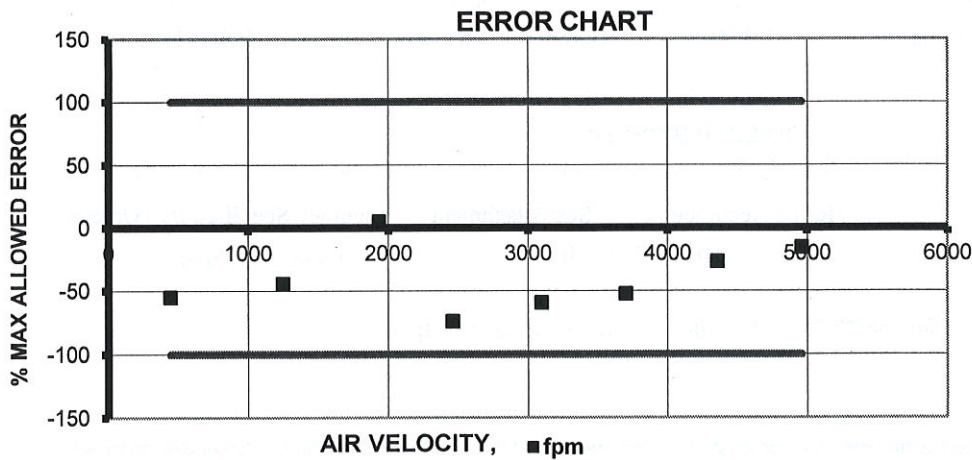
Date: 8/22/2017

D. Paras
Calibration Technician

**ATTACHMENT TO CALIBRATION CERTIFICATE 63484
AS FOUND/AS LEFT DATA**

Page 2 of 2

Reading From Standard,	Lower Limit of Meter Reading,	Measured Reading From Meter,	Upper Limit of Meter Reading,	Error,	Measurement Uncertainty,	STATUS
Actual Air Velocity						
fpm	fpm	fpm	fpm	fpm	fpm	
446	441	443	451	-3	2.23	Pass
1249	1236	1243	1262	-6	6.25	Pass
1932	1912	1933	1952	1	9.66	Pass
2459	2433	2440	2485	-19	12.30	Pass
3096	3064	3077	3128	-19	15.48	Pass
3701	3663	3681	3739	-20	18.51	Pass
4361	4316	4349	4406	-12	21.81	Pass
4960	4909	4952	5011	-8	24.8	Pass



INSTRUMENT SPECIFICATIONS		
Test Fluid	Air	
Lower Range	40	fpm
Upper Range	7800	fpm
Rated Accuracy	+/- 1% reading +/-1 digit	
LABORATORY AMBIENT CONDITIONS		
Pressure	14.42	psia
Humidity	51.10	% RH
Temperature	78.65	F



Flow - Humidity - Temperature - Pressure - Design - Consulting - Engineering

NIST Traceable Calibration Data Sheet

Graftel, LLC. 870 Cambridge Drive, Elk Grove Village, IL 60007
P. 847-364-2600 F. 847-364-2899

www.graftel.com

[Signature]
sept 5th 2017



Certificat d'Étalonnage / Certificate of Calibration

CLIENT :
SERVICES POLYTESTS INC.
695-B GAUDETTE
ST-JEAN-SUR-RICHELIEU, QUEBEC

Description: CHRONOMÈTRE / STOPWATCH TIMER
Fabricant/ Manufacturer: EXTECH
Modèle/ Model : 365510
No série / Serial no : 131636
Inventaire / Asset # : EM-175

CERTIFICAT No / Certificate No: **227991**

PROCÉDURE / Procedure :
TRESICAL - EXTECH_365510

Date étalonnage/ Calibration Performed : **2017-12-28**

yyyy-mm-dd

Echéance/ Due Date : **2018-12-28**

Type de résultat / Results type : **As-Found = As-Left**

Conditions de mesure / Measurement conditions

Résultats d'essais / Test results : **Conforme / In Tolerance**

TEMPÉRATURE / Temp. : **22°C**

Usage restreint/ Restricted use :

HUMIDITÉ / Humidity : **23%RH**

Réparation effectuée / Repair performed :

Ajustement effectué / Adjustment performed :


ÉTALONS UTILISÉS/ Standards Used:

Identification	Manuf.	Model	Description	Ser. #	Étalonné/ Cal.	Echéance/ Due
PR0313	H-P	53132A	UNIVERSAL COUNTER	3546A03142	2017-06-20	2018-06-20
PR0392	AGILENT	33250A	FUNCTION/ARBITRARY WAVEFORM GENERATOR	MY40008014	2017-06-19	2019-06-19

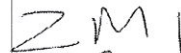
Les spécifications mentionnées comme limites de tolérances d'essai sont celles établies par le fabricant, sauf indication contraire.

Test tolerance limits are based on manufacturers specifications unless stated otherwise.

NOTES :


2018-01-11

Technicien :
Technician


M. ZAIDI

Le système qualité de la société est conforme aux exigences de la norme ISO 17025 et les étalons utilisés pour le processus d'étalonnage sont traçables au SI par l'entremise du CNRC et/ou du NIST.

Our quality system complies with the requirements of ISO 17025 and the standards used for the calibration are traceable to SI through NRC and/or NIST.

LE DROIT D'AUTEUR DE CE CERTIFICAT APPARTIENT À TRESICAL / PRIMO INSTRUMENT INC. CE CERTIFICAT NE PEUT ÊTRE REPRODUIT AUTREMENT QU'EN ENTIER ET AVEC LE CONSENTEMENT PRÉALABLE ÉCRIT DU GROUPE TRESICAL.
TRESICAL / PRIMO INSTRUMENT INC. OWN COPYRIGHT OF THIS CERTIFICATE. THE CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN CONSENT OF THE TRESICAL GROUP.



CLIENT / Customer :

DESCRIPTION / Description :

MANUFACTURIER / Manufacturer :

MODÈLE / Model :

227991

SERVICES POLYTESTS INC.

CHRONOMÈTRE / STOPWATCH TIMER

EXTECH

365510

DESCRIPTION Description	LIMITES Limits	LECTURES Readings	LIMITES Limits
----------------------------	-------------------	----------------------	-------------------

Temps écoulé, chronomètre sous test / Elapsed time on test stopwatch			Min	Comptes / Counts Chronomètre/timer	Max
Minutes	Seconds	1/100 sec		165115	
27	31	15			
Total au compteur / Reference timer:				165114.0	comptes/counts
(Δt) Deviation (1/100sec): 1.00 Deviation Par jour/ Per day (%): 0.0006 % Deviation Par jour/ Per day (sec): 0.52 sec			* Secondes -3.00	Deviation 24hrs 0.52	* Secondes 3.00
* Tolérances basées sur une déviation maximale de 3 sec/jour * Tolerances based on a 3 sec/day maximum deviation					
Incertitude/ Uncertainty: ±37 ms					
Lorsque fournies dans le rapport, les incertitudes de mesure sont des incertitudes élargies représentant un niveau de confiance d'approximativement 95% , obtenu en multipliant l'incertitude-type composée par un facteur de couverture de k=2. When supplied in the report, the measurement uncertainties are expanded uncertainties representing a confidence level of approximately 95% , obtain by multiplying the combined standard uncertainty by a coverage factor of k=2.					



EM-183

Airgas USA, LLC
325 McCausland Court
Cheshire, CT 06410
(203) 250-6820
(203) 272-1584 (FAX)

CERTIFICATE OF ANALYSIS

Grade of Product: **CERTIFIED STANDARD-SPEC**

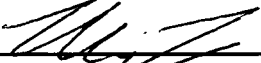
Part Number:	X04NI79C15A2VF3	Reference Number:	37-400238139-1
Cylinder Number:	SG9140147	Cylinder Volume:	151.0 CF
Laboratory:	ANE - Cheshire (SAP) - CT	Cylinder Pressure:	2015 PSIG
Analysis Date:	Aug 16, 2013	Valve Outlet:	590
Lot Number:	37-400238139-1		

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration (Mole %)	Analytical Uncertainty
CARBON MONOXIDE	1.000 %	1.031 %	+/- 2%
CARBON DIOXIDE	10.00 %	9.968 %	+/- 2%
OXYGEN	10.00 %	9.995 %	+/- 2%
NITROGEN	Balance		

Notes:



 Approved for Release



Airgas USA, LLC
325 McCausland Court
Cheshire, CT 06410
(203) 250-6820
(203) 272-1584 (FAX)

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Part Number:	X04NI77C15A0004	Reference Number:	37-400429255-1
Cylinder Number:	CC46789	Cylinder Volume:	144.0 CF
Laboratory:	ANE - Cheshire (SAP) - CT	Cylinder Pressure:	1862 PSIG
Analysis Date:	Sep 29, 2014	Valve Outlet:	350
Lot Number:	37-400429255-1		

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration (Mole %)	Analytical Uncertainty
OXYGEN	2.000 %	1.989 %	+/- 2%
CARBON MONOXIDE	3.000 %	2.971 %	+/- 2%
CARBON DIOXIDE	18.00 %	17.87 %	+/- 2%
NITROGEN	Balance		



Approved for Release

CERTIFICAT D'ÉTALONNAGE

No.Certificat: CE-EM-224 06/03/18

CLIENT		SPÉCIFICATION DE CALIBRATION	
Compagnie:	Services Polytests Inc	Procédure de service:	ISL-022
Adresse:	695 B rue Gaudette	Précision requise:	+/- 1/32"
	St-Jean-sur-Richelieu, Québec, J3B 7S7	Fréquence d'étalonnage: (jours)	365

SPÉCIFICATION DE L'INSTRUMENT			
Type d'instrument:	Ruban à mesurer	Type d'entrée:	Mesure
Manufacturier:	Stanley	Type de sortie:	N/A
No. Model:	Leverlock 12'	Type de mesure:	Inch
No. Série:	N/A	Gamme:	0 à 12'
Emplacement:	Portable	No. Machine:	N/A

SPÉCIFICATION DE L'ÉTALON			
Étalon Utilisé:	Ruban à mesurer	No. du certificat d'étalonnage:	1
No. Série:	1	Dernière date d'étalonnage:	1-Sep-17
Certificat fait par:	Marco Miron	Prochaine date d'étalonnage:	1-Sep-19
Commentaire: sert à titre indicatif seulement			

RÉSULTAT D'ÉTALONNAGE						
Entrée Source	Valeur Donnée	Valeur Actuelle	Erreur de Déviation	Valeur après Étalonnage		Commentaire
1.00 "	1.00 "	1.00 "	0.00 "	1.00 "		
36.00 "	36.00 "	36.00 "	0.00 "	36.00 "		
72.00 "	72.00 "	72.00 "	0.00 "	72.00 "		
108.00 "	108.00 "	108.00 "	0.00 "	108.00 "		
132.00 "	132.00 "	132.00 "	0.00 "	132.00 "		
Conditions Environnementales: Température: 21 °C Humidité: 28 %RH						
Commentaire:						

Instrumentation St-Laurent Inc. Certifie que l'instrument ci-haut, rencontre ou excède les spécifications établies par le fabricant. Les étalons utilisés pour effectuer l'étalonnage est retraçable au CNRC et/ou au NIST.

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

CONFORMITÉ D'ÉTALONNAGE		
	Avant	Après
Conforme:	X	
Non Conforme:	X	



Stéphane - Technicien

APPENDIX 4: Unit pre burn

Temps acquisition de données	Flue	scale
	temp °F	lbs

10	155,72	13,92
20	286,94	13,62
30	404,29	13,31
40	485,14	12,86
50	532,21	12,36
60	537,67	11,96
70	565,31	11,51
80	384,61	11,21
90	339,13	11,26
100	246,44	19,17
110	409,24	18,87
120	519,33	18,32
130	578,13	17,72
140	621,56	17,12
150	637,37	16,52
160	641,69	15,92
170	642,77	15,37
180	640,39	14,77
190	633,05	14,17
200	622,86	13,62
210	607,78	13,12
220	580,69	12,61
230	558,94	12,16
240	526,73	11,76
250	499,11	11,41
260	470,31	11,11
270	440,07	10,81
280	409,30	10,56
290	394,72	10,36
300	371,85	10,11
310	376,22	9,91
320	375,27	9,66
330	341,08	9,51
340	325,65	9,31
350	287,76	9,21
360	268,67	9,06
370	256,30	8,96
380	250,87	8,86
390	237,08	8,76
400	217,92	8,66
410	198,76	8,56
420	114,79	17,57
430	249,61	17,32
440	400,72	16,92
450	429,43	16,57
460	483,90	16,12
470	499,82	15,72
480	527,07	15,27
490	533,05	14,82
500	528,29	14,42
510	524,15	14,02
520	541,22	13,52
530	539,71	13,12
540	532,10	12,67
550	529,00	12,26
560	533,74	11,81
570	527,87	11,36
580	534,44	10,91
590	517,92	10,51
600	514,84	10,11
610	498,55	9,71
620	499,67	9,31
630	494,34	8,96
640	498,16	8,56
650	487,98	8,16
660	481,98	8,01
670	466,55	7,46
680	445,91	7,16
690	429,06	6,81
700	407,96	6,56
710	393,51	6,31
720	367,76	6,06
730	353,03	5,86
740	338,17	5,66
750	323,60	5,51
760	308,23	5,36
770	296,28	5,21
780	285,66	5,06
790	279,49	17,32
800	275,79	17,22
810	263,96	17,07
820	249,44	16,97
830	251,74	16,87
840	243,44	16,72
850	244,60	25,27
860	243,58	16,47
870	225,57	16,97
880	207,57	17,47
890	86,07	15,52

2018-01-23 AGING MODEL JESSIKA naturel

900	145,27	15,42
910	143,66	15,37
920	160,73	15,27
930	160,33	15,22
940	170,18	15,17
950	162,55	15,07
960	138,76	15,02
970	124,87	15,02
980	196,86	14,97
990	213,61	14,82
1000	204,47	14,72
1010	184,26	14,67
1020	152,58	14,67
1030	133,83	14,62
1040	124,30	14,62
1050	256,90	14,52
1060	246,77	14,37
1070	232,22	14,27
1080	219,59	14,21
1090	212,70	14,11
1100	208,01	14,01
1110	204,39	13,92
1120	201,11	13,86
1130	194,33	13,76
1140	184,33	13,72
1150	190,52	13,62
1160	184,25	13,56
1170	185,22	13,47
1180	187,43	13,41
1190	187,16	13,31
1200	168,25	13,27
1210	151,40	13,27
1220	140,25	13,21
1230	127,01	13,21
1240	116,46	13,21
1250	108,79	13,21
1260	103,14	13,16
1270	98,58	13,16
1280	94,01	13,16
1290	334,73	12,87
1300	445,17	12,42
1310	496,44	12,02
1320	515,24	11,56
1330	490,75	11,21
1340	474,28	10,91
1350	439,67	10,61
1360	420,84	10,36
1370	394,98	10,11
1380	357,58	9,96
1390	346,24	9,76
1400	340,71	9,61
1410	327,78	9,41
1420	306,51	9,26
1430	321,24	9,11
1440	323,57	8,91
1450	323,84	8,71
1460	292,66	8,61
1470	246,21	8,51
1480	199,11	8,46
1490	152,02	8,41
1500	80,95	16,07
1510	232,05	15,89
1520	351,12	15,57
1530	463,29	14,97
1540	528,11	14,46
1550	556,01	13,97
1560	571,92	13,41
1570	562,69	13,01
1580	577,86	12,51
1590	570,82	12,06
1600	571,55	11,56
1610	539,74	11,16
1620	486,70	10,86
1630	476,66	10,51
1640	437,89	10,21
1650	430,49	9,96
1660	422,99	9,71
1670	417,10	9,41
1680	412,02	9,16
1690	407,37	8,86
1700	403,59	8,61
1710	396,33	8,36
1720	402,83	8,11
1730	387,80	7,86
1740	402,20	7,56
1750	371,92	7,36
1760	367,70	7,11
1770	385,95	6,86
1780	363,12	6,66
1790	357,10	6,46
1800	347,52	6,26
1810	361,34	6,01
1820	350,89	5,81
1830	345,53	5,61

2018-01-23 AGING MODEL JESSIKA naturel

1840	336,97	5,41
1850	339,95	5,21
1860	336,88	26,86
1870	325,74	18,62
1880	340,37	18,42
1890	332,50	18,22
1900	347,16	18,02
1910	332,14	17,82
1920	322,60	17,67
1930	337,65	17,42
1940	330,10	17,22
1950	345,80	17,02
1960	351,13	16,82
1970	339,21	16,62
1980	347,12	16,42
1990	336,55	16,22
2000	343,18	16,02
2010	334,56	15,82
2020	325,10	15,62
2030	353,46	15,42
2040	355,62	15,17
2050	334,99	15,02
2060	329,98	14,82
2070	340,98	14,62
2080	325,17	14,42
2090	328,63	14,27
2100	325,41	14,07
2110	333,63	13,81
2120	337,53	13,62
2130	335,77	13,47
2140	307,67	13,27
2150	273,09	13,16
2160	238,51	13,06
2170	70,62	12,96
2180	146,13	11,21
2190	302,41	10,86
2200	423,45	10,46
2210	492,37	10,01
2220	524,63	9,51
2230	555,08	9,01
2240	561,24	8,51
2250	563,99	8,01
2260	574,09	7,51
2270	567,72	7,01
2280	566,34	6,51
2290	572,95	6,01
2300	570,46	5,51
2310	567,80	5,01
2320	554,28	4,56
2330	549,39	4,11
2340	547,57	3,51
2350	492,32	3,16
2360	534,59	2,66
2370	537,99	2,21
2380	529,82	1,76
2390	530,74	1,31
2400	537,66	0,86
2410	528,55	0,41
2420	519,44	0,00
2430	509,01	12,61
2440	499,90	12,26
2450	500,85	11,81
2460	497,82	11,41
2470	481,51	11,06
2480	473,53	10,71
2490	465,97	10,36
2500	483,98	10,01
2510	470,45	9,61
2520	474,54	9,26
2530	477,15	8,86
2540	470,59	8,51
2550	464,92	8,16
2560	483,04	7,71
2570	466,34	7,36
2580	458,31	7,01
2590	464,17	6,71
2600	470,04	6,31
2610	464,14	5,96
2620	460,37	5,61
2630	462,50	5,26
2640	463,42	4,91
2650	454,65	4,61
2660	467,07	4,21
2670	460,80	3,86
2680	460,39	3,56
2690	452,65	3,21
2700	454,09	2,86
2710	457,22	2,51
2720	475,31	2,16
2730	470,37	1,81
2740	459,85	17,07
2750	443,76	16,77
2760	452,31	16,42
2770	449,41	16,12

2780	458,49	15,77
2790	460,14	15,42
2800	473,83	15,02
2810	466,72	14,67
2820	448,94	14,36
2830	423,68	14,11
2840	404,19	13,86
2850	385,01	13,62
2860	366,13	13,41
2870	347,86	13,21
2880	321,31	13,06
2890	308,76	12,91
2900	286,15	12,76
2910	276,88	12,61
2920	259,19	12,51
2930	248,15	12,41
2940	247,00	12,31
2950	237,69	12,21
2960	220,96	12,11
2970	205,61	12,06
2980	186,78	11,96
2990	172,34	11,91
3000	149,24	11,91

APPENDIX 5: Participants

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

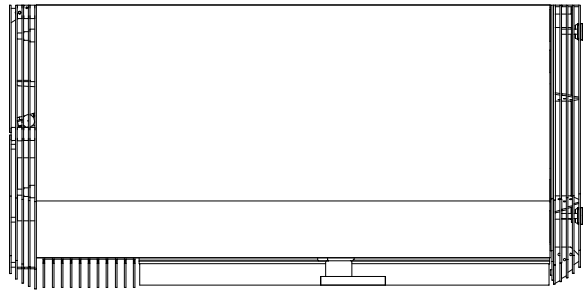
Maxime Martin
Technicien
Services Polytests inc.
450.741.3636
www.polytests.com

APPENDIX 6: Drawings and specifications

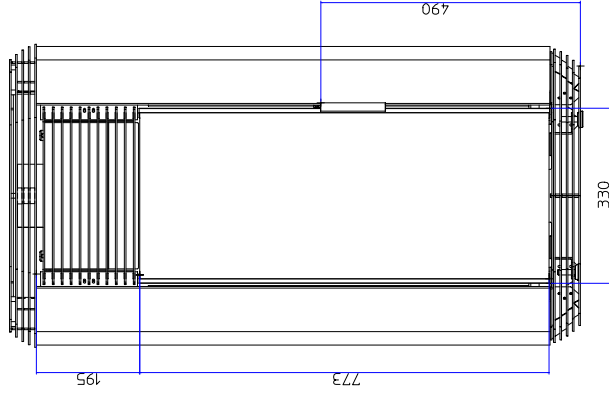
Disegni **Jessica Natural**

01	Assieme stufa
02	Top superiore
03	Base pedana
04	Fiancata
05	Griglia frontale
06	Convogliatore calotta
07	Sportello
08	Griglia cenere
09	Maniglia Sportello
10	Gancio maniglia
11	Cassetto cenere
12	Serbatoio pellet
13	Meccanismo di apertura serbatoio
14	Valvola aria primaria
15	Valvola rotativa
16	Corpo valvola pellet
17	Brucciato
18	Movimento turbolatori
19	Uscita fumi
20	Imbuto pellet
21	Schienale posteriore
22	Diaframma calore
23	Vetri
24	Posizione maniglia
25	Struttura
26	Passaggio fumi
27	Passaggio aria convettiva
28	Passaggio aria comburente
29	Angolare orizzontale
30	Angolare verticale
31	Porta turbolatori
32	Turbolatore 23x170
33	Turbolatore 23x330

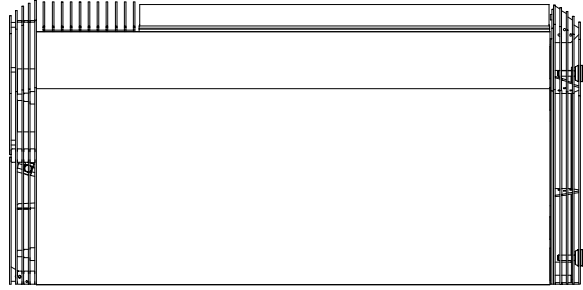
VISTA LATERALE DESTRA



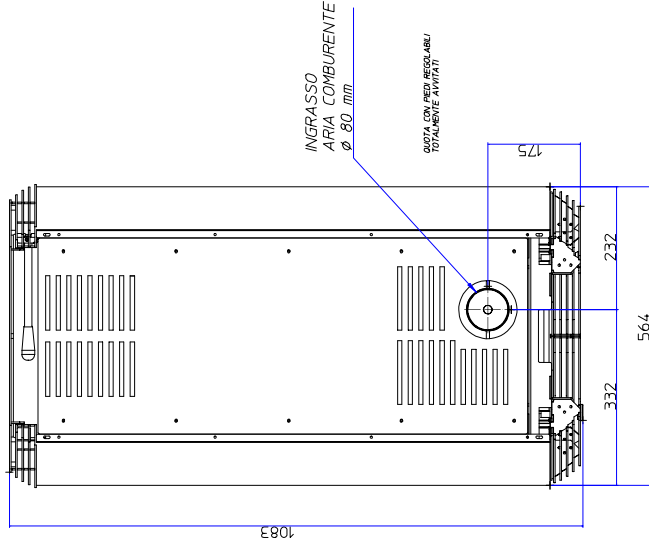
VISTA FRONTALE



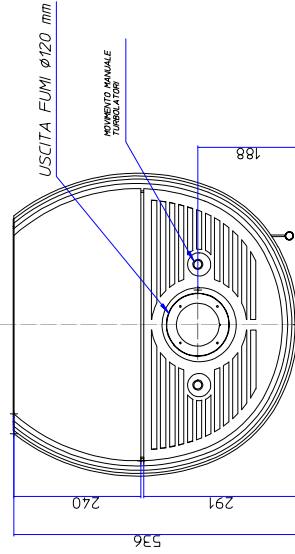
VISTA LATERALE SINISTRA



VISTA POSTERIORE




VISTA SUPERIORE



SCHEMA ATTACCHI

JESSICA NATURAL 9KW

VER 1.0

Articolo	JESSICA NATURAL			N° progetto :	
Gruppo	Quantità	Scala	Sezione Dis.		
Particolare	Dis.	Data	Approvato		
 <p>16-0733-67622 Zona Industriale COSTA S. PIETRO 61014/IT</p>			Codice :		
			Disegno N° :	001	

APPENDIX 7: Operator's manual



USE AND MAINTENANCE INSTRUCTIONS

PELLET STOVE WITH NATURAL DRAFT

Jessica Natural

Veronica Natural

SAVE THIS INSTRUCTIONS

WARNING: Please read this entire manual before installation and use of this pellet fuel-burning room heater.

Failure to follow these instructions could result in property damage, bodily injury or even death

CAUTION: Contact local building or fire official about restrictions and installation inspection requirement in your area

Dear Customer, Thank you for choosing one of our products, which is a result of technological expertise and our continuous quest for superior products in terms of safety, reliability and performance. This manual contains all the information and helpful tips for using your product with maximum safety and efficiency.

IMPORTANT INFORMATION

This manual has been prepared by the manufacturer and is an integral and essential part of the product. In the event of sale or transfer of the product, always ensure the presence of the manual as the information it contains is addressed to the purchaser and to all those various people involved in the installation, use and maintenance of the product. Carefully read the instructions and information contained in this manual before installation, operation and maintenance of the product. The instructions contained in this instruction manual guarantee the safety of persons and property and ensure efficient operation and a longer service life. The manufacturer declines all responsibility for damage caused by failure to observe instructions regarding installation, use and maintenance listed in the instruction manual, for unauthorised modifications or non-original replacement parts. Product installation and use must be carried out in accordance with the manufacturer's instructions and in compliance with European, national and local regulations. Installation, electrical connection, functional testing, maintenance and repairs are operations that must be performed by qualified and licensed personnel who must have appropriate knowledge of the product. Product installation must not be carried out close to walls made of wood or combustible material. For proper installation, you must observe the following "Safety distances" section. Verify the exact flatness of the floor where you will install the product. When handling the steel parts of the cladding, use clean cotton gloves to avoid leaving difficult to remove fingerprints for the first cleaning. Stove installation must be performed by at least two people. Connect the stove to the mains only after proper professional connection to the chimney flue. The power cable plug must remain accessible after installation of the stove. Only operate the stove with regulation wood pellets (refer to the "FUEL" chapter). Never use liquid fuels to operate the pellet stove or to stoke the embers present. Provide adequate ventilation in the installation area throughout the year. In the presence of operation failures, fuel supply will be interrupted. Re-start the unit after removing the cause of the failure. Discontinue use of the product in the event of failure or malfunction. Do not remove the safety guard located in the pellet tank. Any accumulated unburned pellets in the burner as a result of repeated "failed ignitions must be removed prior to ignition." Pellet stove operation can cause very hot heating of the handles, the chimney flue and glass surfaces. Only touch these parts during operation when wearing protective clothing or with adequate aids. Because of the creation of heat on the glass, make sure that no persons unfamiliar with stove operation stand in the installation area. Inform children of the precautions to be observed during product operation and of possible dangers. In the event of problems or misunderstanding of the instructions manual, contact your dealer. Placing objects which cannot withstand heat on the stove or within the minimum required safety range is prohibited. Do not open the door during operation or operate the stove with its glass broken. For product terms, limitations and exclusions, please refer to the warranty included with the product. In order to pursue a policy of constant product development and renewal, the manufacturer may make changes to it as deems appropriate without notice. This document is the property of the manufacturer and cannot be disclosed in whole or in part to any third party without the written consent of the company, which reserves all rights to the rigor of the law.

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1 GENERAL STANDARDS

1.1 Fireplace or Chimney flue

Each device must have a vertical duct, called a chimney flue, for outside release of combustion fumes produced by a natural draft.

The chimney flue must meet the following requirements:

- It should not be connected to any other fireplace, stove, boiler, or hood of any kind (Fig. 1).
- It must be properly spaced from combustible or flammable materials through an air gap or suitable insulating material.
- The internal section must be uniform, preferably circular: the square or rectangular sections must have rounded corners, curves must be regular and seamless, deviations from the axis no greater than 45° (Fig-2).
- Each device must have its own chimney flue with a section equal to or greater than the diameter of the fume exhaust pipe of the stove and a height no less than the one stated (see table 2).
- Never use two stoves, a fireplace and a stove, a stove and a wood stove, etc. in the same room since the draft of one could damage the draft of the other. In addition, collective ventilation ducts that can cause a vacuum in the installation environment are not permitted, even if installed in adjacent rooms and communicating with the installation room.
- Creating fixed or mobile apertures on the chimney flue to connect equipment other than auxiliary devices is prohibited.
- Passing other air supply channels and piping for utilities through the chimney flue, however large, is prohibited.
- The chimney flue should be equipped with a collection chamber for solid materials and any condensate, located below the mouth of the flue, so as to be easily opened and inspected from an airtight door.
- Whenever using parallel output chimneys, it is advisable to raise a bracing element. (Fig.3)

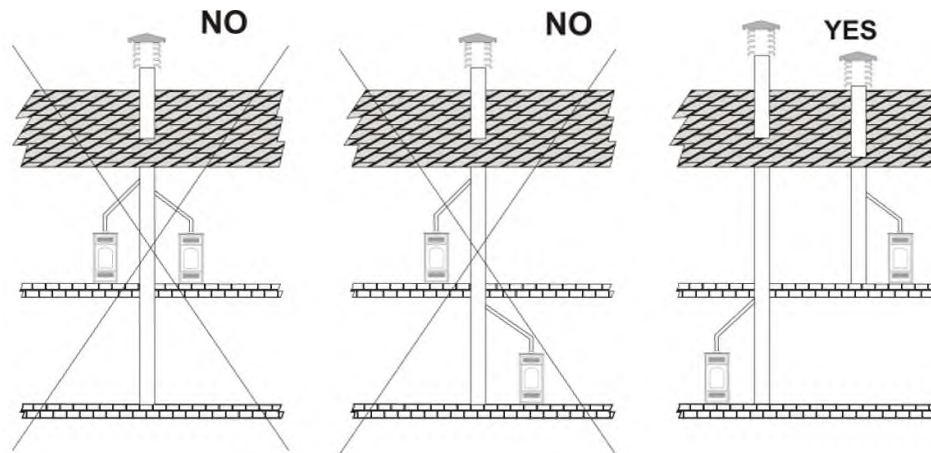


Fig 1

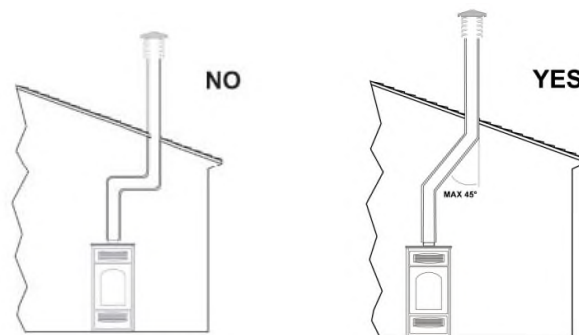


Fig 2

1.2 Chimney cap

The top of the chimney flue must be equipped with a device, called a chimney cap, which facilitates dispersion into the atmosphere of combustion products.

The chimney cap must meet the following requirements:

- Its internal section and shape must be equivalent to that of the chimney flue.
- Have a useful outlet section no less than double that of the chimney flue.
- Chimney caps that emerges from the roof or which remain in contact with the outside (for example in the case of an open loft), must be covered with brick elements and well isolated. It must be constructed so as to prevent penetration into the flue of rain, snow, or foreign bodies and so that, in the event of winds in any direction and at any angle, it assures the discharge of combustion products (windproof chimney cap).
- The chimney cap must be positioned so as to guarantee an adequate dispersion and dilution of combustion products and, in any case, outside the zone of reflux. This zone can be different sizes and shapes depending on the angle of slope of the roof, so it is necessary to adopt the minimum heights shown in Fig.3 and Fig.4.
- The chimney cap must be of windproof and exceed the height of the ridge, Fig.3 and Fig.4.
- Any buildings or other obstacles that exceed the height of the chimney cap must not be close to the chimney cap itself (Fig.3).

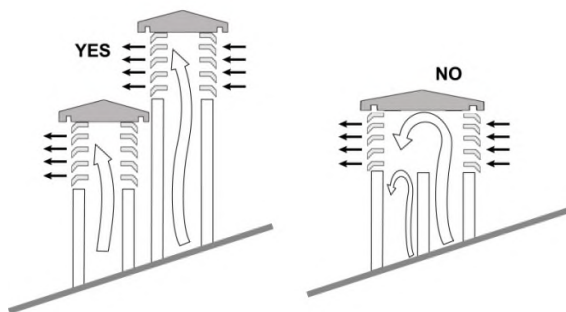


Fig.3

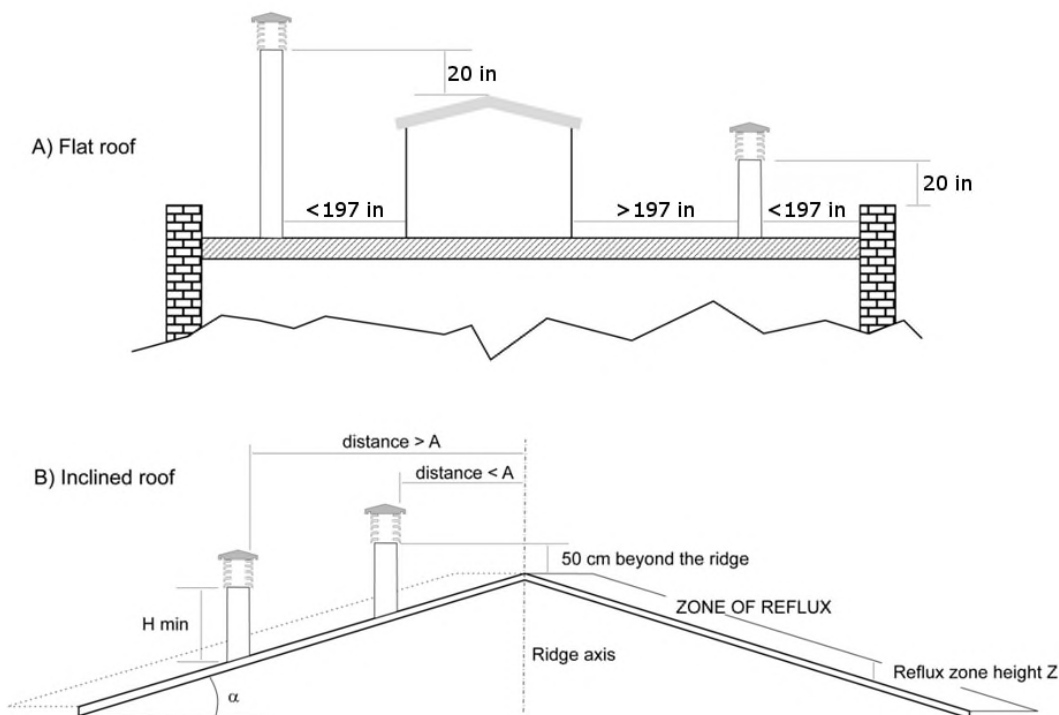


Fig.4

Roof pitch ? [°]	Horizontal width of the zone of reflux from the axis of the ridge A	Minimum height of the outlet from the roof	Height of the reflux zone Z
15	6 feet (1.85m)	3 feet (1.00m)	1 feet (0.50m)
30	5 feet (1.50m)	4 feet (1.30m)	2 feet (0.80m)
45	4 feet (1.30m)	6 feet (2.00m)	5 feet (1.50m)
60	4 feet (1.20m)	8 feet (2.60m)	7 feet (2.10m)

Table 2

1.3 External air intake vent

- The stove must have the air necessary to ensure smooth combustion operation and good environmental well-being.
- Make sure that the room where the stove is installed offers sufficient ventilation and install an air supply duct from the outside with the recommended minimum section of 15 in².
- The air intake vent must communicate directly with the installation room of the stove, positioned so as to prevent it from being blocked and protected with a permanent non-lockable grid or other suitable protection provided that it does not reduce the minimum section.
- Air flow can also be obtained from a room adjacent to the installation room, provided that this flow can be carried out freely through permanent, non-closable openings communicating with the outside.
- With respect to the installation room, the adjacent room should not be put under vacuum with respect to the external environment as a result of a reverse draft caused by the presence in this space of another utility device or suction device. The room adjacent to the permanent openings must meet the requirements set out in the paragraphs above. The adjacent room cannot be used as a garage, for storage of combustible material or for activities involving a risk of fire.

1.4 Connection to the chimney flue

(see paragraph 4.5)

1.5 Preventing house fires

Installation and use of the stove must be in accordance with the manufacturer's instructions and with local habitability regulations.

CAUTION: when a fume exhaust pipe passes through a wall or ceiling, particular installation methods must be applied (protection, thermal insulation, distances from heat sensitive materials, etc.).

- The fireplace connecting tube must never pass through a combustible surface.
- Do not connect this unit to a chimney flue already being used by another device.
- It is also advisable to maintain all combustible elements or flammable material such as beams, wooden furniture, curtains, flammable liquids, etc. outside the radiation area of the furnace and at a distance of at least 3 feet from the heating block. .
- In the event that the surrounding space has coverings in combustible or heat-sensitive material, a protective membrane made of non-combustible insulating material must be interposed. If the flooring is made of combustible material, a non-combustible protective material must be provided at the mouth of the furnace.
- For further information, refer to local requirements.

2 SPECIFICATIONS AND TECHNICAL DATA

2.1 Specifications

Stoves and pellet stoves are devices built to work with good quality wood pellets only (see par. 3 fuel).

2.2 Compliance status

The heaters described in this manual meet the 2020 U.S. Environmental Protection Agency's wood pellet emission limit for wood heaters sold after may 15th 2015.

	Emission Rate (g/hr)	Heating Efficiency (% Overall)	1st hour Emission Rate (g/hr)	CO emission (gr/h)
Jessica Natural Air	1,2	60,8	1,36	10,2
Veronica Natural Air	1,2	60,8	1,36	10,2

2.3 Technical data

Model of type	Jessica Natural Air	Veronica Natural Air
Pellet hourly consumption (min/max)	1,17-2,95 lb/h	1,17-2,95 lb/h
Efficiency	68%	68%
Hopper capacity	26 lb	26 lb
Smoke outlet ø	3.94 in	3.94 in
Weight	242 lb	238 lb
Dimension (DxWxH)	22,5x21,1,42,5 in	22,5x21,1,42,5 in

**Pellet size may effect actual rate of fuel feed and burn times. Fuel feed rates may vary by as much as 20%. Use PFI listed fuel for best results.*

2.4 Product identification data (see attached sheet)

The technical label shows device data and performance. Tampering with, removing or lack of a technical label makes installation and maintenance operations difficult, due to the lack of product identification. In the event of damage, request a duplicate from our service centre. Given the importance of the data label, we recommend installing the stove at a distance at which it is always visible.

3 FUEL

3.1 General notes

The pellet stove is designed to burn wood pellets only.

Wood pellets are a fuel obtained from the pressing of sawdust timber, extracted from the processing and transformation residues of dried wood material. The compactness of the product over time is guaranteed by a natural origin substance contained in the wood: lignin. The typical small cylinder form is obtained by extrusion.

Various types of pellets with quality and characteristics that vary depending on the processing and type of wood species used are available on the market.

CAUTION: Always use certified quality wood pellets: i.e. DIN, DIN PLUS, ÖM 7135, Pellet Gold, Catas etc. The company does not guarantee proper stove functioning with the use of low quality pellets.

Stoves and heating stoves are tested and programmed to ensure good performance and perfect quality operation with specific characteristic pellets:

components:	wood
length:	< 30 mm
diameter:	6-6.5 mm
lower calorific value:	≥ 4.8 kWh/kg (≥7500 BTU/lb)
humidity rate:	< 8 %
residual ash:	< 0.5 %

GOOD QUALITY pellets are smooth, shiny, slightly dusty and with regular length.

LOW QUALITY pellets are of varied lengths, dusty with vertical and horizontal splits.

Since pellet characteristics and quality greatly influence the autonomy, efficiency and proper operation of the stove, we recommend:

AVOID using pellets with dimensions different from that described by the manufacturer.

AVOID using low quality pellets or pellets containing dispersed sawdust powder, resins or chemicals, additives or adhesives.

AVOID using moist pellets.

The use of unsuitable pellets causes:

- clogging of the brazier and fume discharge ducts
- increased consumption of fuel
- decreased efficiency
- no guarantee of normal stove operation
- dirtying of glass
- production of unburned granules and heavy ash

The presence of moisture in pellets increases the volume of the capsules and crumbles, causing

- feeding system malfunctions
- poor combustion

Pellets should be stored in a dry and sheltered place. Particular attention should be given to the handling of the bags to prevent their crushing, resulting in the formation of sawdust.

Stove operation parameters may have to be altered when using quality pellets with dimensional and calorific characteristics different from those indicated. Contact an authorised service centre if necessary.

THE USE OF POOR QUALITY PELLETS NOT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS NOT ONLY DAMAGE THE STOVE AND COMPROMISE PERFORMANCE BUT MAY RESULT IN FORFEITURE OF THE WARRANTY AND COMPANY LIABILITY.

4 INSTALLATION

4.1 General notes

WARNING: DO NOT INSTALL IN SLEEPING ROOM

CAUTION: THE STRUCTURAL INTEGRITY OF THE MANUFACTURED HOME FLOOR, WALL, AND CEILING/ROOF MUST BE MAINTAINED

The stove requires a UL listed pellet vent. So the venting system shall be approved for pellet stoves by a certified testing Laboratory

4.1.1 Installation in the presence of several appliances.

The presence of several appliances powered with different fuels, as well as hoods with or without extractor, must be evaluated during preventive checks and during the start up test in order to detect any variation compared to the design conditions or any aspect that cannot be detected during the design phase. The room must be well-ventilated according to the instructions of every single device. The external air intake vent must meet the requirements of paragraphs 1.3 and 4.4

The stove must not be used simultaneously with other generators that collect air from the environment even if installed in adjoining or communicating rooms

4.1.2 Suitability of the installation rooms

- Installing the device inside garage, store for combustible materials or rooms at risk of fire is prohibited.
- If the flooring is made of wood, provide a floor protection surface in compliance with current national standards
- Outdoor installation is prohibited, as well as exposure to atmospheric agents or humid areas.
- Locating the stove in a room with an explosive atmosphere is prohibited

4.1.3 Fume discharge system

Every device must be connected to a fume discharge system, which ensures dispersion of combustion products into the atmosphere.

The combustion products must be discharged from the roofs. Direct wall discharge or towards closed spaces, even in open air, is prohibited.

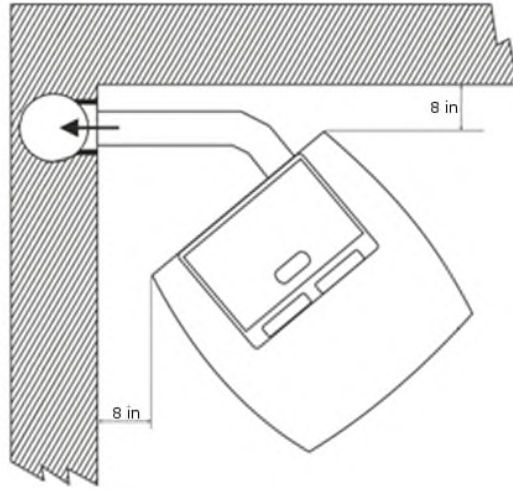
The components must be made of material with A1 fire reaction class. In particular, the use of metal extendible and flexible hoses is prohibited.

CAUTION: ensure that the plug for electrical connection remains accessible after the stove installation.

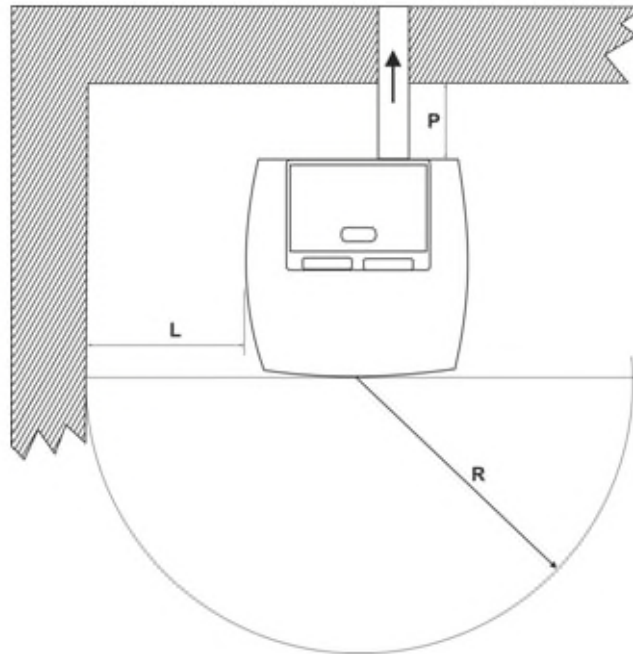
4.2 Minimum safety distances

The following figures show the minimum safety distances, which must always be guaranteed.

4.2.1 Corner installation



4.2.2 Wall installation



Safety distances from flammable material:

Minimum distance in air from the flammable rear wall

P = 8 in

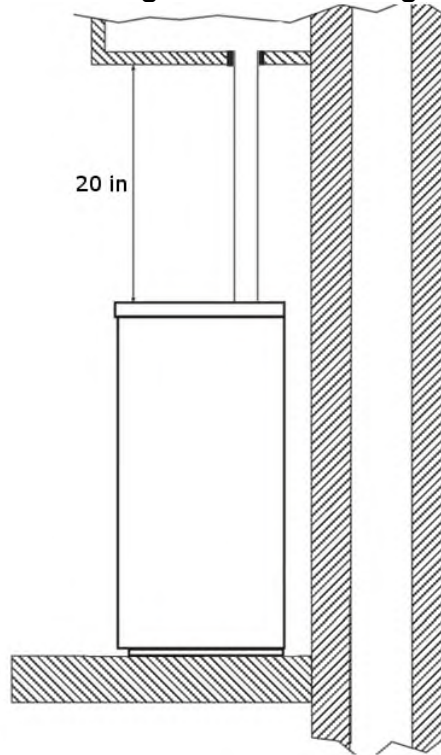
Minimum distance in air from the flammable side wall

L = 8 in

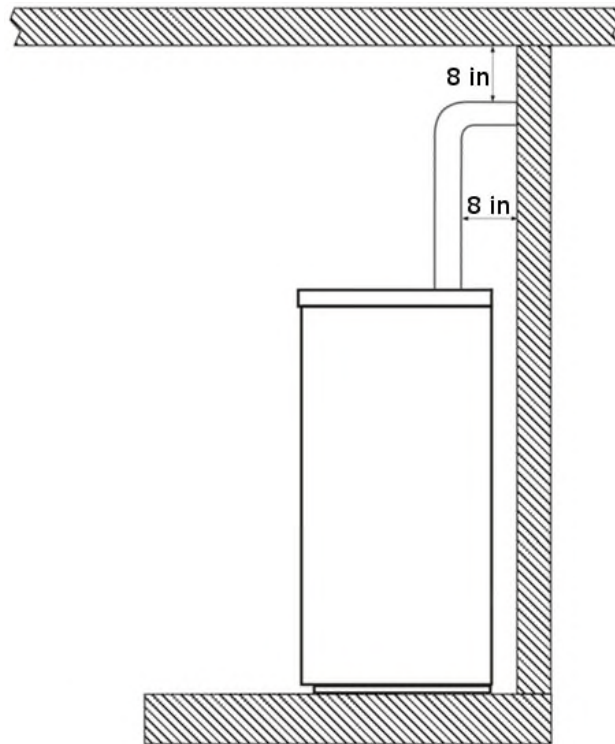
Frontal distance from flammable material

R = 40 in

4.2.3 Distance from flammable ceilings and false ceilings



4.2.4 Distance of fume exhaust system from flammable walls



4.3 Flooring protection

In the event of valuable flooring or flooring that is sensitive to heat, moisture or is flammable, a floor protection must be used (i.e. sheet steel, marble or tile slabs). Whichever type of protection selected, it must protrude at least 12 in from the front, at least 6 in from the sides of the stove, must withstand the weight of the stove and have a thickness of at least 2 mm (Fig. 5 and 6).

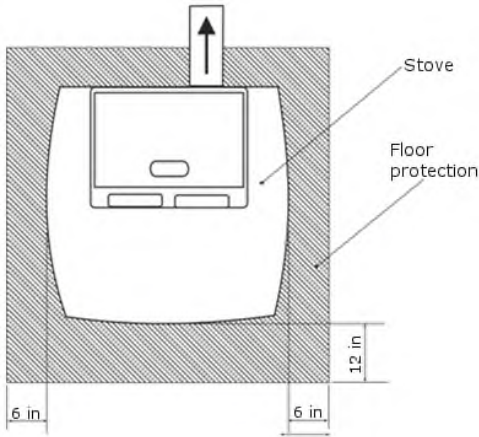


Fig. 5

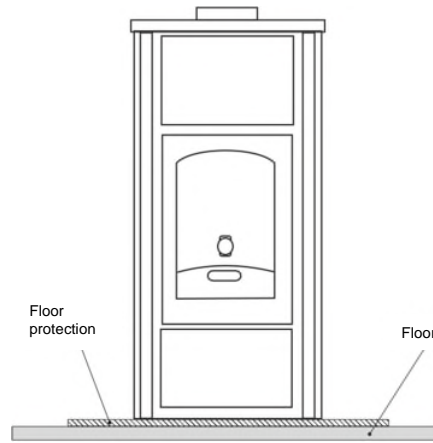


Fig. 6

4.4 Minimum distances for positioning air intake vents

Pellet stove combustion air intake vents cannot be connected to an air distribution system or directly to a wall-mounted air intake vent.

Correct and safe positioning of the air intake vent must comply with the measures and requirements described in paragraph 1.3.

There are distances to be respected in order to avoid that combustion air be removed by another source; for example, a window opening can suck the air outside, making it miss the stove.

The air intake vent must be located at least:		
5 feet (1.5 m)	Under	Doors, windows, fume exhaust outlets, air gaps, etc.
5 feet (1.5 m)	Horizontally away	
1 feet (0.3 m)	Over	
5 feet (1.5 m)	Away from	Fume output

4.5 Vent exhaust duct

4.5.1 General notes

The stove requires a UL listed pellet vent, so the venting system shall be approved for pellet stoves by a certified testing Laboratory

DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE

INSTALL VENT AT CLEARANCES SPECIFIED BY THE VENT MANUFACTURER

CAUTION: the pellet stove is not like other stoves. Fume draft is forced thanks to a fan that maintains the pressure in the combustion chamber and slight pressure around the exhaust duct. Therefore, you must verify that the latter is completely watertight and properly installed, both from the point of view of function and safety.

Construction of the exhaust duct must be done by specialised personnel or companies, as reported in the following manual. Always create the exhaust system so that periodic cleaning is assured without having to dismantle any parts.

Tubes must **ALWAYS** be sealed with silicone (**no cementing**) that maintains resistance and elasticity characteristics at high temperature (480°F).

4.5.2 Tubes and maximum usable lengths

Painted aluminised steel tubes, stainless steel tubes (Aisi 316) or porcelain tubes.

Flexible hoses are permitted if they fall within the limits prescribed by law (in stainless steel with smooth inner wall).

TYPE OF SYSTEM	WITH DOUBLE-WALL TUBE
Minimum length	10 feet (3 m)
Maximum length (with 3 90° curves)	26 feet (8 m)
Maximum number of curves	2

NOTE: load losses of a 90° curve can be equated with those of 1 metre of tube; the serviceable T- connection is to be considered as a 90° curve.

4.5.3 Holes for exhaust tube passage on walls or roof

Once the location of the stove has been decided (section 4.1), you will have to drill the hole for passage of the fume exhaust tube. This varies depending on the type of installation (therefore on the exhaust tube diameter, see 4.5.2) and on the type of wall or roof to be crossed (table 3).

The insulator must be of mineral origin (rock wool, ceramic fibre) with a nominal density greater than 80 kg/m³.

	Insulation thickness	Diameter of holes to be created [mm]
Wooden wall, or wall which is flammable or has flammable parts	4 in	12 in
Concrete wall or roof	2 in	9 in
Brick wall or roof	1,5 in	7 in

4.5.4 Using a traditional type chimney flue

If you wish to use an already existing chimney flue, it is advisable to have it checked by a professional chimney sweep to ensure that it is watertight. This is because fumes, being slightly pressurised, could infiltrate cracks in the chimney flue and invade living spaces. If an inspection finds that the chimney flue is not perfectly intact, it is advisable to intubate it with new material. If the existing chimney is large, we recommend inserting a tube with a maximum diameter of 6 in.

It is also advisable to insulate the vent exhaust duct. Figs. 7 and 8 demonstrate the solutions to adopt if you want to use an existing chimney flue.

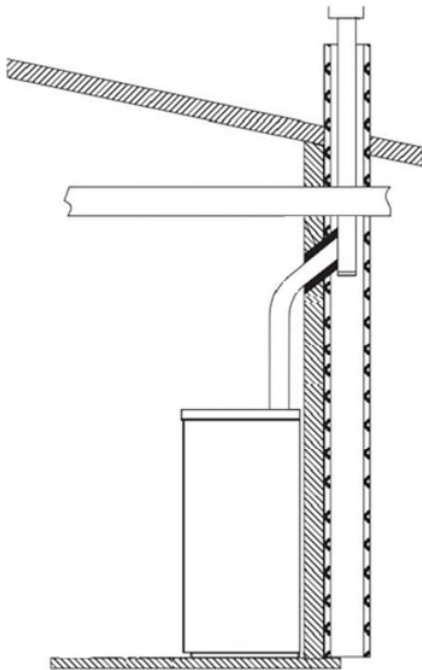


Fig. 7

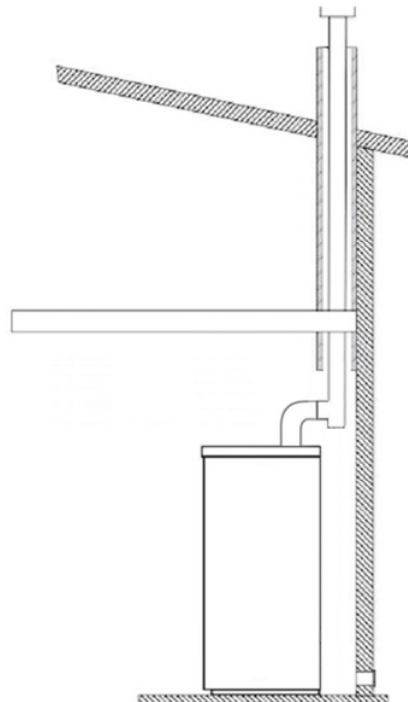


Fig. 8

4.6 Using an external fume duct

An external fume duct can be used only if it meets the following requirements:

- Only insulated tubes (double wall) in stainless steel, secured to the building (Fig.9) should be used.
- An inspection area should be created at the base of the duct for performing periodic checks and maintenance.
- It should be equipped with a windproof chimney cap and observe the distance "d" from the ridge of the building as described in par. 1.2.
- Fig. 9 shows the solution to be utilised when using external fume ducts.

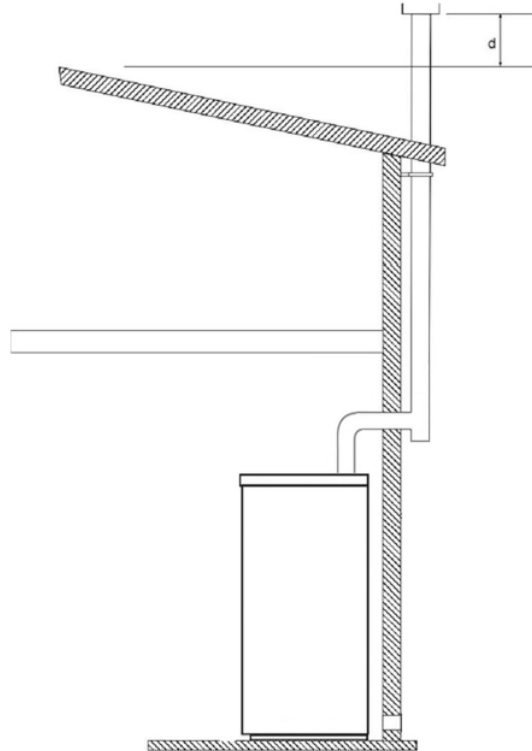


Fig. 9

5 ASSEMBLY

5.1 *General notes*

Here are some general recommendations to follow in order to prevent accidents or damage to the product:

- Unpacking and installation must be performed by at least two people.
- **All handling operations must be carried out using appropriate means and in full compliance with safety regulations.**
- The positioning of the packed product must be maintained in accordance with the guidelines supplied by pictograms and written on the packaging.
- If using ropes, straps, chains, etc., make sure they are suitable for the weight to be unloaded and are in good condition.
- When moving the package, move with slow and continuous movements to avoid tearing the ropes, chains, etc.
- Do not tilt excessively in order to avoid overturning.
- Do not stand within range of the loading/unloading means (forklifts, cranes, etc.).

5.2 *Unpacking*

Unpack the product being careful not to damage or scratch it. Remove the accessory package and any pieces of polystyrene or cardboard used to block removable parts, etc. from the stove furnace. Also remember not to leave packaging components (plastic bags, polystyrene, etc.) within the reach of children, as they could be potential sources of danger. Dispose of them according to regulations.

6 USE

- All local regulations, must be observed when installing the unit.
- Improper installation or use of the device can result in forfeiture of the warranty.
- Do not use the unit as an incinerator or in any other way other than that for which it was designed. No other fuel besides wood pellets must be used.
- Do not use liquid fuels.
- The device, especially the external surfaces, gets very hot to the touch when in use. Handle with care to avoid burns.
- Do not make any unauthorised modifications to the device.
- Only use original replacement parts recommended by the manufacturer.
- This wood heater has a manufacturer-set minimum low burn rate that must not be altered. It is against federal regulation to alter this setting or otherwise operate this wood heater in a manner inconsistent with operating instruction in this manual
- Flues gases contain carbon monoxide (CO), it is recommended to install smoke monitors and CO monitors for areas that are expected to generate CO. Inspect the chimney to minimize visible emissions.
- Soot and Flyash: Formation and Need for Removal—The products of combustion will contain small particles of flyash. The flyash will collect in the exhaust venting system and restrict the flow of the flue gases. Incomplete combustion, such as occurs during startup, shutdown, or incorrect operation of the room heater will lead to some soot formation which will collect in the exhaust venting system. The exhaust venting system should be inspected at least once every year to determine if cleaning is necessary.

In general

- Make sure that the room where the stove is to be installed offers sufficient ventilation (see section 1.3 “External air intake vent”).
- Make sure that all exhaust system joints are hermetically sealed with silicone (no cementing), are resistant to heat (480 ° F) and are not damaged.
- Periodically check (or have someone check) the cleanliness of exhaust fumes.
- **CAUTION: keep all flammable products well away from the stove when it operating (MINIMUM: 40 feet from the front wall).**
- **CAUTION: to prevent the escape of fumes, the combustion chamber must be kept closed except during cleaning operations, to be carried out with the stove off.**
- **CAUTION: removing the safety guard inside the tank is strictly prohibited.**
- **CAUTION: in the event of pellet supply while the stove is on, make sure that pellets are not finished and that the flame remains present in the brazier. Also avoid the fuel sack from coming into contact with hot surfaces.**
- **CAUTION: remove any residue of unburned pellets caused by failed ignitions before you start the stove again.**
- **CAUTION: if during the ignition phase, the stove does not start and you notice a lot of smoke in the combustion chamber, immediately turn off the stove and replace pellets in use, as these may be too high in moisture. Forcing ignition could make your stove a hazard.**
- **CAUTION: if during cleaning, you find traces of spongy or hard (though not ash) pellets, replace the pellets being used as this residue may come from scraps of low quality sawdust not usable in this type of stove. Forcing ignition can cause a fire or strong production of fumes in the chimney.**
- **CAUTION: monitor proper combustion of the pellets in the brazier. If you should detect accumulations of unburned pellets, IMMEDIATELY TURN OFF the stove and contact the service centre.**
- **CAUTION: exercise extreme caution in the presence of children, to prevent them from standing in front of the stove.**

6.1 Components

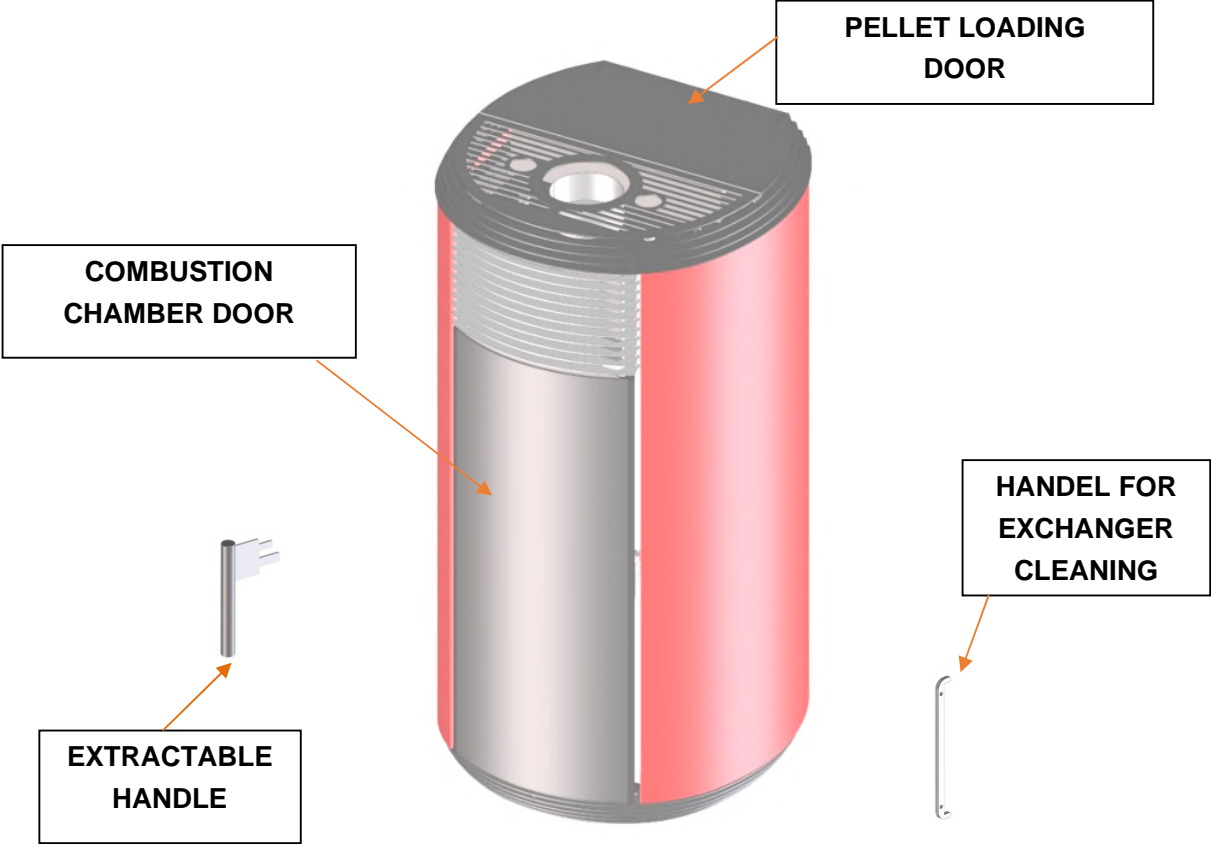


Fig. 10

6.2 Filling up the tank

Raise the lid **A** and move the pellet loading lever to position 1 (fig. 11); move lid **B**, using the handle, towards position open (fig. 12); raise the lid **B** and put the pellet in the tank (fig. 13). Lower the lid **B** and move the handle towards the "closed" position (fig. 14).

You can load pellet also when the stove is working.

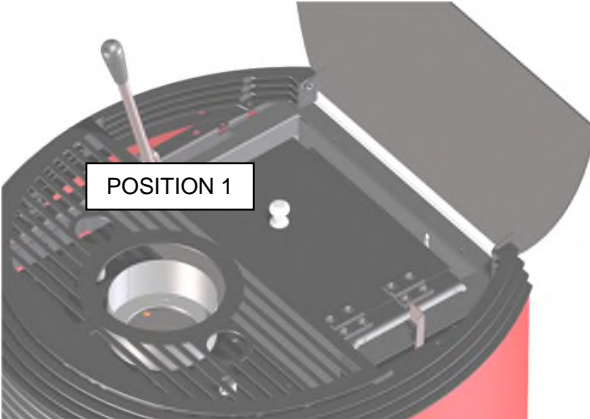


Fig. 11

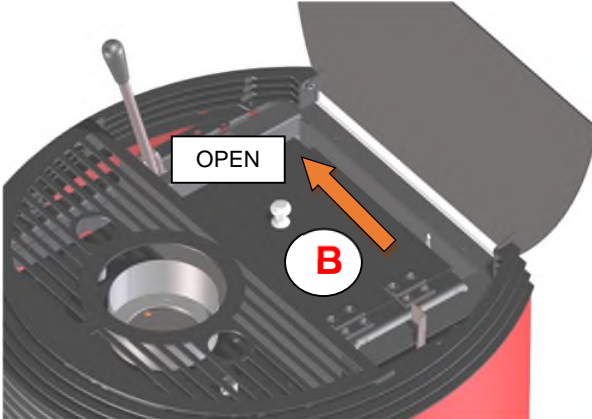


Fig. 12

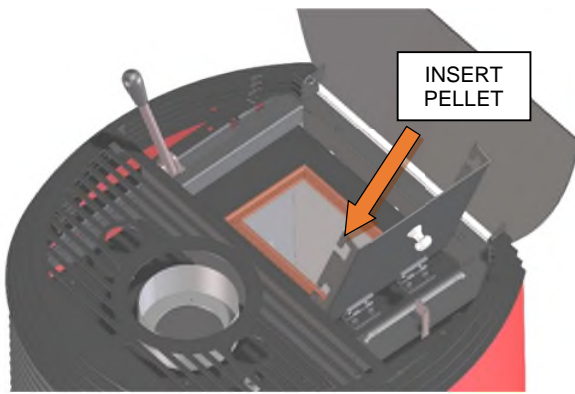


Fig. 13

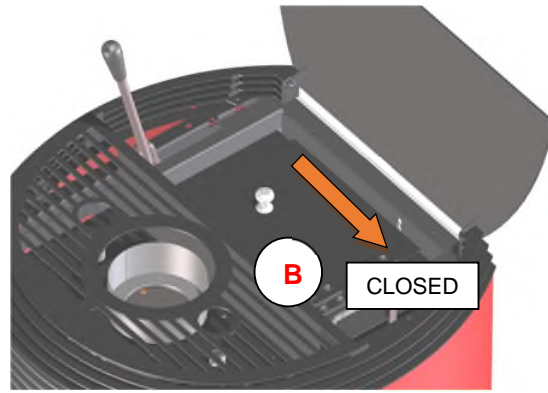


Fig. 14

6.3 Ignition

Once the tank has been filled up, the stove is ready to be turned on.

Put the lever in position 2 (fig. 15) and lower it to the rest position (fig. 16); the pellets will fall down until the brazier is full; now you can open the main door (fig. 17) and position a solid or gel-like ignited on top of the pellets in the brazier and light it using a flame (fig. 18); leave the door ajar for a couple of minutes or even longer (this depends on the room temperature and on the chimney flue). Close the door only when the flame reaches a minimum height of about 3 inches, so as to lick the holes located in the rear wall (fig. 19). Now the stove is turned on.

CAUTION: always clean the brazier prior to each ignition to avoid false starts , if there is little ash residue, clean it by means of the shaker ; in case of hard-to-clean ash residue, take out the brazier and manually shake it.

CAUTION: always carry out this operation with the stove switched off and cooled down.

CAUTION: RISK OF BURNS.

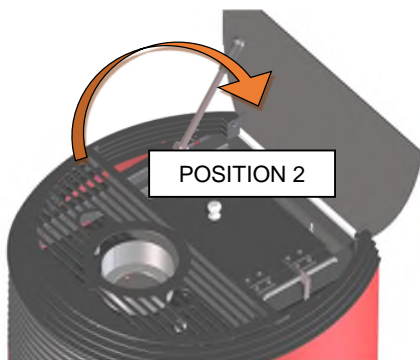


Fig. 15



Fig. 16

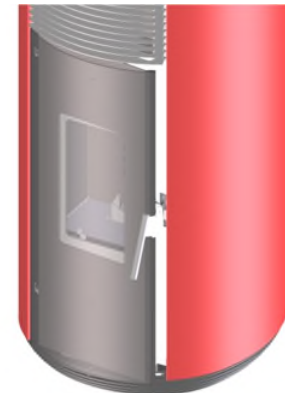


Fig. 17



Fig. 18

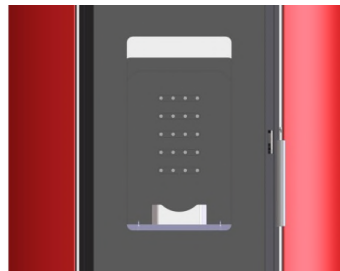


Fig. 19

6.4 Combustion mode

You can chose between 2 types of power Maximum and Minimum
Maximum power position **Max**
Minimum power position **Min**

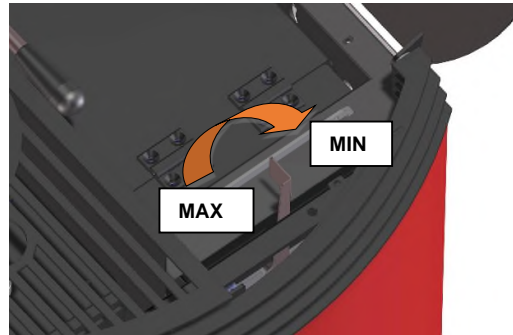


Fig. 20

6.5 Shutdown

By moving the lever in position 1 (fig. 21), the fall of pellet into the brazier will stop; combustion will continue for about 10 minutes, after which the stove will switch off.

To switch it back on, move the lever in position 2, place a solid or gel-like igniter on top of the pellets and light it up with a flame

CAUTION: *to prevent burns wait at least 15 minutes before switching the stove back on.*



Fig. 21

CAUTION: RISK OF BURNS.

CAUTION: *do not touch the brazier after switching off the stove.*

CAUTION: *do not touch the door with bare hands while the stove is working.*

6.6 Cleaning the exchanger

Hook the handle (fig. 22) on the pin **A** (fig. 23) and lift it up repeatedly causing the internal springs to shake and consequently the ash to fall into the combustion chamber; repeat this operation on pin **B**.

The exchanger must be cleaned at least once a week; if the stove is used a lot (more than 8 hours a day), it is recommended to clean it every 3 days.

It is recommended to carry out this operation when the stove is cold to avoid getting burned; however, it can also be done while the stove is working, provided that utmost attention is paid to hot surfaces.

Do not leave the handle hooked up to the pin after cleaning the stove while it is working; put it away in the special compartment.

CAUTION: RISK OF BURNS.

CAUTION: *Do not touch the pin with bare hands while the stove is working to avoid getting burned*



Fig. 22

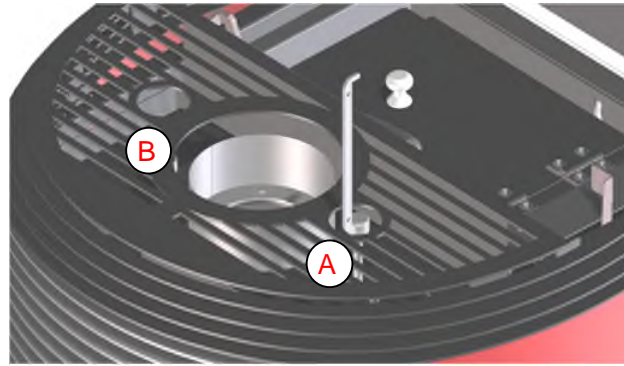


Fig. 23

6.7 Cleaning the brazier with the shaker

Hook the handle (fig. 24) on the ring **A** (fig. 25), then pull it towards you in order to compress the internal spring and suddenly release the handle (fig. 26). The rod will hit the brazier, causing it to shake and make the ash residue fall into the drawer underneath. Repeat the operation if necessary.

During normal stove operation, it is recommended to carry out this operation every 3-4 hours to keep the fire going strong.

CAUTION RISK OF BURNS.

CAUTION: *When the stove is switched on, do not touch the rod with your bare hands; use the special handle instead*



Fig. 24

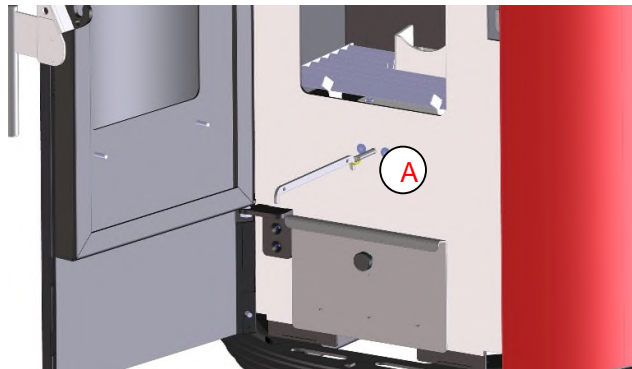


Fig. 25

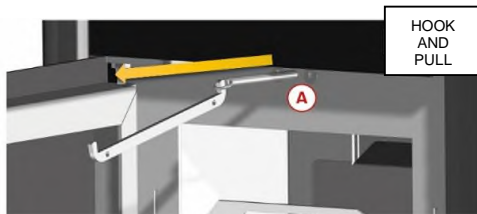


Fig. 26

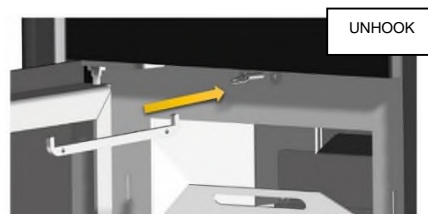


Fig. 27

7 WARNINGS AND MAINTENANCE



WARNING

The maintenance and care must be carried out only with cold device.

You should only use spare parts approved and supplied by laminox idro srl please contact your specialized retailer if you require spare parts. You must not make any changes to the device!!!

The periodic maintenance, as indicated in this Installation and Operating Instruction, must be performed with the utmost care after reading the instructions, procedures and frequency described in this manual. Check the external air intake, by cleaning it, at least once a year. The flue must be regularly swept by the chimney sweeper. Let your chimney sweeper in charge of your area check the regular installation of the device, the connection to the flue and the aeration.

All maintenance operations (cleaning, replacements, etc.) should be carried out when the fire is out and the stove is cold. In addition, do not use any abrasive substances.

CAUTION: FAILURE TO CLEAN AFFECTS SAFETY

7.1 Opening the door

The door must remain closed during operation. The door should be opened only with the stove off and cooled down to perform maintenance and routine cleaning.

7.2 Ashes cleaning and disposal

Check the ash drawer every two days to see if it needs emptying

The ash collection compartment must be emptied regularly so as to impede combustion residue from arriving at the brazier support.

CAUTION: ashes keep embers on for a long time!!!



WARNING

Ashes should be placed in a metal container with a tight-fitting lid. The closed container of ashes should be placed on a noncombustible floor or on the ground, well away from all combustible materials, pending final disposal. 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.

7.3 Brazier cleaning

When the flame becomes a red colour or is weak accompanied by black smoke, it may mean that there are ash deposits or incrustations which are not allowing correct stove operation and which must be removed.

Every two days, remove the brazier by simply lifting it from its housing, then clean it of ash and any incrustations which could have formed, with particular attention to freeing clogged holes using a pointed tool.

This operation is necessary in particular the first few ignitions, especially when using different quality pellets. The timing of this operation is determined by the frequency of use and the choice of fuel. It is advisable to also check the brazier support, emptying it of any ashes.

CAUTION: before igniting the stove, check that the brazier is properly inserted and pushed back toward

7.4 Ash drawer cleaning

Check the ash drawer every two days to see if it needs emptying

The ash collection compartment must be emptied regularly so as to impede combustion residue from arriving at the brazier support.

CAUTION: ashes keep embers on for a long time!!!

⚠ WARNING

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Fig. 28



Fig. 29

7.5 Combustion chamber cleaning

Clean the combustion chamber weekly, removing ashes accumulated in the chamber using a vacuum cleaner.

Note: Use a vacuum cleaner designed for the suction of ashes for this type of cleaning.

Once a week, open the front grille and pull the cleaner rod knob towards you at least 3 times.

7.6 Smoke chamber cleaning

Generally, clean the smoke chamber once a year (preferably at the beginning of the season) for best stove operation. The frequency of this operation depends on the type of pellet used and the frequency of use. Contact a Technical Assistance Centre for this type of cleaning.

7.7 Exhaust system cleaning

Until you are reasonably experienced regarding operating conditions, it is advisable to perform this service at least monthly. Remove the T-fitting cap and proceed with duct cleaning. If necessary, at least the first few times, request assistance from a qualified technician.

7.8 Cleaning metal and ceramic parts

Use a soft cloth moistened with water to clean metal stove parts.

Never clean metal or ceramic parts with alcohol, thinners, petrol, ketones or other degreasers.

Use of these substances frees the company from all liability. Discolouration of metal parts can be the result of improper use of the stove.

7.9 Pellet slide cleaning

With the scraper A (Fig. 30), clean the pellet slide B (Fig. 31) from any incrustations that can slow down or block the pellets' descent to the brazier.

It is recommended to do out this operation every 10 days in order to maintain the correct functioning.



Fig. 30

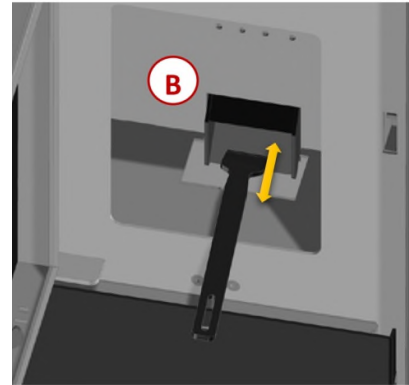



Fig. 31


7.10 Cleaning glass

Door glass must be clean (cold). Prevent corrosive substances from coming into contact with the paint on the stove as these can cause damage. Do not use any material that can scratch or damage the glass.

 WARNING
<p>The cleaning of glass must be carried out only and exclusively with cold device to avoid the explosion of the same glass.</p>
<p>For the cleaning, it is possible to use specific products or a wet newspaper paper ball passed in the ash to rub it. Do not use cloths, abrasive or chemically aggressive products by cleaning the hearth glass</p>

7.11 Broken glass

The stove is equipped with 5 mm ceramic glass that is resistant to a thermal shock of 1350°F. This glass can break only due to a strong impact or misuse. Do not slam the door or hit the glass. In case of breakage, replace with an original replacement part only. (See paragraph 7.15)

 WARNING
<p>Break of glasses: ceramic-based glasses can resist up to a heat shock of 1350°F, therefore they are not affected by thermal shock issues. Their break can be caused by mechanic shocks, such as striking or slamming shut of the door. Therefore, their replacement is not included in the warranty</p>
<p>Do not operate this unit with broken glasses</p>
<p>Broken or damaged glass components shall be removed and reinstalled taking care about using proper gaskets, cushioning devices and other accessories, maintaining edge clearances (See paragraph 7.15)</p>
<p>Replace glass only with glass supplied from the manufacturer or distributor of this appliance</p>

7.12 Stove inactivity

At the end of the season, perform the following operations:

- Remove all pellets from the tank and from the feed screw.
- Thoroughly clean the brazier, the support brazier, the combustion chamber and the ash drawer.
- Thoroughly clean the smoke exhaust system: contact a professional chimney sweep for this purpose.
- Clean all dust, spider webs, etc. from the area behind the panels of the inner cladding once a year.
- Clean fans thoroughly.

7.13 Routine and special maintenance

These operations should be programmed ANNUALLY with a Technical Assistance Centre and are necessary to ensure the maintenance of product efficiency and ensure safe operation.


- Thoroughly clean the combustion chamber and the heat exchanger.
- Smoke motor, dismantling and cleaning of the smoke exhaust duct, new silicone where required.
- Inspection and verification of gaskets, springs and replacement and application of the silicone where required.
- Tank, emptying and cleaning.
- Check and replacement, if necessary, of components that are subject to wear: brazier, ash drawers, etc.

7.14 Routine maintenance performed by qualified technicians

Using wood as solid fuel, the generator requires annual routine maintenance, which must be performed by a qualified technician, using only original spare parts.

Failure to comply can jeopardise the safety of the appliance and make the warranty null and void.

Respecting the frequencies of cleaning reserved for the user described in the use and maintenance manual, the generator is guaranteed correct combustion over time, preventing any anomalies and/or malfunctioning that could require more interventions of the technician. Requests for routine maintenance are not contemplated in the product warranty.

 WARNING
Routine maintenance must be performed at least once a year.
The annual routine maintenance must be performed by a qualified technician.
Using only original spare parts. Failure to comply can jeopardise the safety of the appliance and make the warranty null and void.

7.15 Glass and Gaskets replacement

Use only ceramic type glass

The gaskets guarantee the tightness of the product and its consequent good functioning. They must be controlled periodically. They must be replaced immediately if they are worn or damaged. These operations must be carried out by a qualified technician.

Ceramic Glass dimensions: 306 x239 mm (12" x 9,4"); Thickness 5 mm

Door tricovet gasket: Diam. 10 mm (0,39"); L. 1570 mm / (62")

8 GUARANTEE

8.1 Certificate of guarantee

The purchaser are invited to: - examine the instructions for the installation, use and maintenance of the stove.

- examine the conditions of guarantee shown below

8.2 Condition of guarantee

The limited guarantee covers defects of manufacturing materials, on condition that the product has not been broken due to an incorrect use, carelessness, wrong connections or errors of installation.

The following are not covered by guarantee:

- vermiculite (Firex 600);

- the glass of the door;

- the fibre gaskets;

- the painting;

- the fire pot;

- the cast majolica;

- any damage caused by inappropriate installation and/or handling of the stove and/or shortcomings by the consumer

. The use of poor quality pellets or of any other material could damage components of the stove causing the termination of their guarantee and the annexed responsibility of the manufacturer.

The pellets which meet the requisites listed in the chapter on them should be used.

All damage caused by transport are not acknowledged, therefore please carefully check the goods on receipt, immediately advising the dealer of any damage.

All the manufacturer's guarantees are shown here and no complaint may be made to the manufacturer according to any other guarantee, report or request.

For guarantee claims and instructions for return shipments please refer to your local dealer.

8.3 Information and problems

For any information or problems, please contact your dealer or service centre, the only people who can meet any request you may have end, if necessary, who can intervene directly

REFERENCES STANDARDS:

ASTM E1509

UL 1482

ULC S627

UL 181

UL 641

ULC S609

Manufactured home and safety standard (HUD), cfr 3280, part 24

NFPA (Fire) 211

Laminox S.r.l. reserves the right to change the characteristics and data reported in the following document at any time and without warning in order to improve their products. This manual, therefore, cannot be considered as a contract with third parties.
Updated manuals and drawings are available at website www.laminox.com.

PLEASE CONTACT YOUR DEALER FOR ANY SERVICE OR QUESTION

Appliance information:

SERIAL NUMBER _____

DATE PURCHASED _____

DATE INSTALLED _____



Laminox S.r.l. Hydro Division
Zona Industriale Callarella, 261/263 – 62028 SARNANO (MC) Italy Tel.
+39 0733.657.622 – Fax +39 0733.657.494
www.laminox.com e-mail: idro@laminox.com

Listed Solid Fuel Room Heater/Pellet Type Insert. Also suitable for Mobile Home Installation. This appliance has been tested and listed for use in Manufactured Homes in accordance with OAR 814-23-9000 through 814-23-909.

Appareil de chauffage inséré de combustible solide/de type de boulettes. Accepté dans l'installation dans les maisons mobiles. Cet appareil a été testé et enregistré pour l'usage dans les Maisons Mobiles en accord avec OAR 814-23-9000 jusqu'à 814-23-909.

Tested to: ASTM E1509, ORD-C-1482-M1990 Room Heating Pellet Burning Type, APFI, (UM) 84-HUD FOR USE ONLY WITH PELLETIZED WOOD OR SHELLD FIELD CORN FUEL.

Testé à: ASTM #1509-95, ORD-C 1482-M1990 Room Heating. Pellet Burning Type, APFI, (UM) 84-HUD POUR USAGE AVEC LES BOULETTES DE BOIS OU DE COMBUSTIBLE DE MAÏS ÉCOSSÉ DES CHAMPS.

Route power cord away from unit. Do not route cord under or in front of appliance.

Éloignez le fil électrique de l'appareil. Ne pas faire passer le fil électrique au dessus ou en dessous de l'appareil.

Replace glass only with 5mm ceramic available from your dealer. To start, set thermostat above room temperature, the stove will light automatically. To shutdown, set thermostat to below room temperature. For further instruction refer to owner's manual. Keep viewing and ash removal doors tightly closed during operation.

Remplacez la vitre seulement avec une vitre céramique de 5 mm disponible chez votre fournisseur. Pour allumer, monter la température du thermostat au dessus de la température de la pièce, le poêle s'allumera automatiquement. Pour éteindre, descendre la température du thermostat en dessous de la température de la pièce. Pour des instructions supplémentaires, référez vous au manuel du propriétaire. Gardez la porte d'ouverture et la porte des cendres fermées hermétiquement durant l'opération.

PREVENT HOUSE FIRES

Install and use only in accordance with manufacturer's installation and operating instructions. Contact local building or fire officials about restrictions and inspection in our area.

PRÉVENTION DES FEUX DE MAISON

Installez et utilisez en accord avec les instructions d'installation et d'opération du fabricant. Contactez le bureau de la construction ou le bureau des incendies au sujet des restrictions et des inspections d'installation dans votre voisinage. Ne pas obstruez l'espace en dessous de l'appareil.

WARNING - FOR MOBILE HOMES: Do not install appliance in a sleeping room. An outside combustion air inlet must be provided. The structural integrity of the mobile home floor, ceiling and walls must be maintained. Refer to manufacturer's instructions and local codes for precautions required for passing chimney through a combustible wall or ceiling. Inspect and clean vent system frequently in accordance with manufacturer's instructions.

AVIS - Pour Les Maisons Mobiles: Ne pas installer dans une chambre à coucher. Un tuyau extérieur de combustion d'air doit être installé et ne doit pas être obstrué lorsque l'appareil est en usage. La structure intégrale du plancher, du plafond et des murs de la maison mobile doit être maintenue intacte.

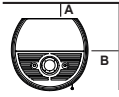
DO NOT CONNECT THIS UNIT TO A CHIMNEY SERVING ANOTHER APPLIANCE.

Référez vous aux instructions du fabricant et des codes locaux pour les précautions requises pour passer une cheminée à travers un mur ou un plafond combustibles, et les compensations maximums.

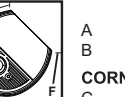
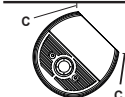
Use a 3" or 4" diameter type "L" or "PL" venting system.

Inspectez et nettoyez la cheminée fréquemment. Ne pas connecter cet appareil à une cheminée servant un autre appareil. Utilisez système de ventilation "L" ou "P" diamètre 76mm ou 102mm.

MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS / ESPACES LIBRES MINIMUM DES MATÉRIAUX COMBUSTIBLES:



"B" is to Cast Top ("B" du haut)



- A Back Wall to stove / Mur Arrière du poêle 8"/200mm
- B Side Wall to Cast Top / Mur De Côté du haut 20"/500mm

CORNER INSTALLATION / INSTALLATION DU COIN :

- C Side Wall / Mur De Côté 8"/200 mm

VERTICAL 3" - 6" ADAPTER KIT (PART 812-3570) INSTALLATION:

UN ASSEMBLAGE POUR ADAPTEUR 3" - 6" (PIÈCE 812-3570) POUR INSTALLATION VERTICALE:

- D Back Wall to Flue Pipe / Mur Arrière tuyau rigide 21"/550mm
- E Side Wall to Cast Top / Mur De Côté du haut 20"/500mm

CORNER INSTALLATION WITH VERTICAL ADAPTER KIT:

INSTALLATION DU COIN AVEC UN ASSEMBLAGE D'ADAPTEUR VERTICAL:

- F Side Wall / Mur De Côté 8"/200mm

ALCOVE INSTALLATION / INSTALLATION DE L'ALCÔVE:

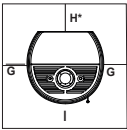
- Min. Alcove Height: / Une hauteur minimum de l'alcôve 43"/1092mm
- Min. Alcove Side Wall: / Une hauteur minimum mur de côté de l'alcôve 6"/152mm
- Max. Alcove Depth: / La profondeur maximum de l'alcôve 36"/914mm

Note 1: In residential installations, when using Parts 811-0890, (3" - 3" Top Vent Adapter) and 812-3570 (3" - 6" Offset Adapter), 24 gauge 6" single wall flue connector may be used.

Note 1: Dans les installations résidentielles, lorsque les pièces 811-0890, (dessus de l'adaptateur de ventilation 3" - 3") et 812-3570 (le ressaut de l'adaptateur 3" - 6"), un tuyau connecteur de 6" pour mur simple de calibre 24 peut être utilisé.

Note 2: In manufactured home installation, when using Part 811-0890, (3" - 3" Top Vent Adapter) and 812-3570 (3" - 6" Offset Adapter), use listed double wall flue connector. An Outside Air Kit (Part 811-0872), must be used with manufactured home installation.

Note 2: Pour l'installation dans les maisons préfabriquées, lorsque les pièces 811-0860, (dessus de l'adaptateur de ventilation 3" - 3") et 812-3570 (le ressaut de l'adaptateur 3" - 6"), utilisez un tuyau connecteur enregistré pour mur double. Un assemblage d'air extérieur (pièce 811-0872), doit être utilisé pour l'installation dans les maisons préfabriquées.



G = 8"/200mm
H* = 8"/200mm
I = 40"/1000mm

Mfg by: Fabriqué par:

FLOOR PROTECTION / PROTECTION DU SOL

*Non-combustible floor protection must extend beneath the flue pipe when installed with horizontal venting or under the Top Vent Adapter with vertical installation.

*Un protecteur incombustible de plancher doit s'étendre sous le conduit de cheminée pour une installation de ventilation horizontale ou sous un adaptateur de ventilation de dessus pour une installation verticale. **ÉTATS-UNIS - RECOMMANDÉ; CANADA - REQUIREMENT**

RECOMMENDED IN USA; REQUIRED IN CANADA

Floor protector must be noncombustible material, extending beneath heater and to the front/sides/rear as indicated. Measure front distance (I) from the surface of the glass door.

Le poêle doit être placé sur une assise non combustible s'étendant tout autour de lui, comme les schémas l'indiquent. Mesurez la distance du devant (I) de la surface de la porte vitrée.

U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using pellet wood

2018	2019	2020	Jan.	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DO NOT REMOVE THIS LABEL / NE PAS ENLEVER L'ÉTIQUETTE **Made in Italy**

U.S. ENVIRONMENTAL PROTECTION AGENCY

Certified to comply with 2020 particulate emission standards using pellet wood.

Emission Rate (g/hr)	Heating Efficiency (% Overall)	1st hour Emission Rate (g/hr)	CO emission (g/hr)
1,2	60,8	1,36	10,2

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AVIS - Pour Les Maisons Mobiles: Ne pas installer dans une chambre à coucher. Un tuyau extérieur de combustion d'air doit être installé et ne doit pas être obstrué lorsque l'appareil est en usage. La structure intégrale du plancher, du plafond et des murs de la maison mobile doit être maintenue intacte.

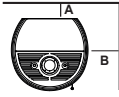
DO NOT CONNECT THIS UNIT TO A CHIMNEY SERVING ANOTHER APPLIANCE.

Référez vous aux instructions du fabricant et des codes locaux pour les précautions requises pour passer une cheminée à travers un mur ou un plafond combustibles, et les compensations maximums.

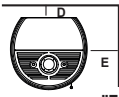
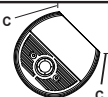
Use a 3" or 4" diameter type "L" or "PL" venting system.

Inspectez et nettoyez la cheminée fréquemment. Ne pas connecter cet appareil à une cheminée servant un autre appareil. Utilisez système de ventilation "L" ou "P" diamètre 76mm ou 102mm.

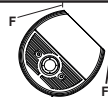
MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS / ESPACES LIBRES MINIMUM DES MATÉRIEAUX COMBUSTIBLES:



"B" is to Cast Top ("B" du haut)



"E" is to Cast Top ("E" du haut)



- A Back Wall to stove / Mur Arrière du poêle 8"/200mm
- B Side Wall to Cast Top / Mur De Côté du haut 20"/500mm

- CORNER INSTALLATION / INSTALLATION DU COIN :**
- C Side Wall / Mur De Côté 8"/200 mm

- VERTICAL 3" - 6" ADAPTER KIT (PART 812-3570) INSTALLATION:**
- UN ASSEMBLAGE POUR ADAPTEUR 3" - 6" (PIÈCE 812-3570) POUR INSTALLATION VERTICALE:**
- D Back Wall to Flue Pipe / Mur Arrière tuyau rigide 21"/550mm
- E Side Wall to Cast Top / Mur De Côté du haut 20"/500mm

- CORNER INSTALLATION WITH VERTICAL ADAPTER KIT:**
- INSTALLATION DU COIN AVEC UN ASSEMBLAGE D'ADAPTEUR VERTICAL:**
- F Side Wall / Mur De Côté 8"/200mm

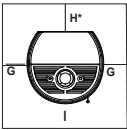
- ALCOVE INSTALLATION / INSTALLATION DE L'ALCÔVE:**
- Min. Alcove Height: / Une hauteur minimum de l'alcôve 43"/1092mm
- Min. Alcove Side Wall: / Une hauteur minimum mur de côté de l'alcôve 6"/152mm
- Max. Alcove Depth: / La profondeur maximum de l'alcôve 36"/914mm

Note 1: In residential installations, when using Parts 811-0890, (3" - 3" Top Vent Adapter) and 812-3570 (3" - 6" Offset Adapter), 24 gauge 6" single wall flue connector may be used.

Note 1: Dans les installations résidentielles, lorsque les pièces 811-0890, (dessus de l'adaptateur de ventilation 3" - 3") et 812-3570 (le ressaut de l'adaptateur 3" - 6"), un tuyau connecteur de 6" pour mur simple de calibre 24 peut être utilisé.

Note 2: In manufactured home installation, when using Part 811-0890, (3" - 3" Top Vent Adapter) and 812-3570 (3" - 6" Offset Adapter), use listed double wall flue connector. An Outside Air Kit (Part 811-0872), must be used with manufactured home installation.

Note 2: Pour l'installation dans les maisons préfabriquées, lorsque les pièces 811-0860, (dessus de l'adaptateur de ventilation 3" - 3") et 812-3570 (le ressaut de l'adaptateur 3" - 6"), utilisez un tuyau connecteur enregistré pour mur double. Un assemblage d'air extérieur (pièce 811-0872), doit être utilisé pour l'installation dans les maisons préfabriquées.



G = 8"/200mm
H* = 8"/200mm
I = 40"/1000mm

FLOOR PROTECTION / PROTECTION DU SOL
*Non-combustible floor protection must extend beneath the flue pipe when installed with horizontal venting or under the Top Vent Adapter with vertical installation.

*Un protecteur incombustible de plancher doit s'étendre sous le conduit de cheminée pour une installation de ventilation horizontale ou sous un adaptateur de ventilation de dessus pour une installation verticale. **ÉTATS-UNIS - RECOMMANDÉ; CANADA - REQUIREMENT**

RECOMMENDED IN USA; REQUIRED IN CANADA
Floor protector must be noncombustible material, extending beneath heater and to the front/sides/rear as indicated. Measure front distance (I) from the surface of the glass door.

Le poêle doit être placé sur une assise non combustible s'étendant tout autour de lui, comme les schémas l'indiquent. Mesurez la distance du devant (I) de la surface de la porte vitrée.

Mfg by: Fabriqué par:

U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using pellet wood

2018	2019	2020	Jan.	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DO NOT REMOVE THIS LABEL / NE PAS ENLEVER L'ÉTIQUETTE **Made in Italy**

U.S. ENVIRONMENTAL PROTECTION AGENCY
Certified to comply with 2020 particulate emission standards using pellet wood.

Emission Rate (g/hr)	Heating Efficiency (% Overall)	1st hour Emission Rate (g/hr)	CO emission (g/hr)
1,2	60,8	1,36	10,2

DO NOT REMOVE THIS LABEL / NE PAS ENLEVER L'ÉTIQUETTE **Made in Italy**

APPENDIX 8: Photographs of test set up

Dilution picture Dia 6 no. EG-030

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



Velocity ports at 90 degrees and tunnel temperature sensor location

Particulate sample extraction ports located 48 inches under (requirement $4D=24$ inches minimum) velocity ports and 16 inches above downstream Tee. (Requirement $2D=12$ inches minimum)

Adjustable damper for flow adjustments

Extraction blower



Last elbow from horizontal run

6 inches diameter stainless steel pipe

Velocity ports located 132 inches downstream of the last elbow (requirement $8D=48$ inches minimum) and 48 inches upstream of the sampling ports (requirement $4D=24$ inches minimum)

Total length between hood and sampling port : 22 feet.



60 inches horizontal run between two elbows. Mixing section, No mixing baffle. 6 inches diameter pipe

Two 6 inches elbow with horizontal mixing section.

Hood diameter 32 (requirement $4D=24$ inches minimum) inches and height of 24 inches (requirement $3D=18$ inches minimum)

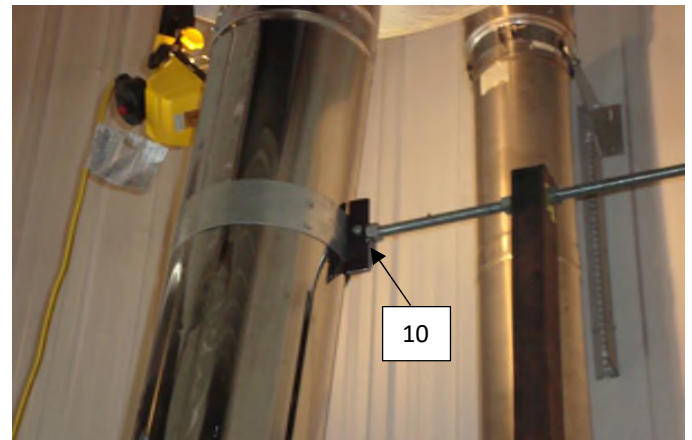
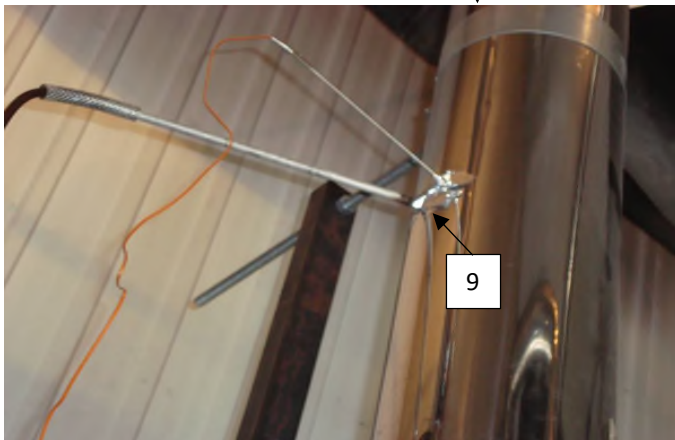
All pipe joints are sealed.

Stack sampling



Gas analysis and temperature probe

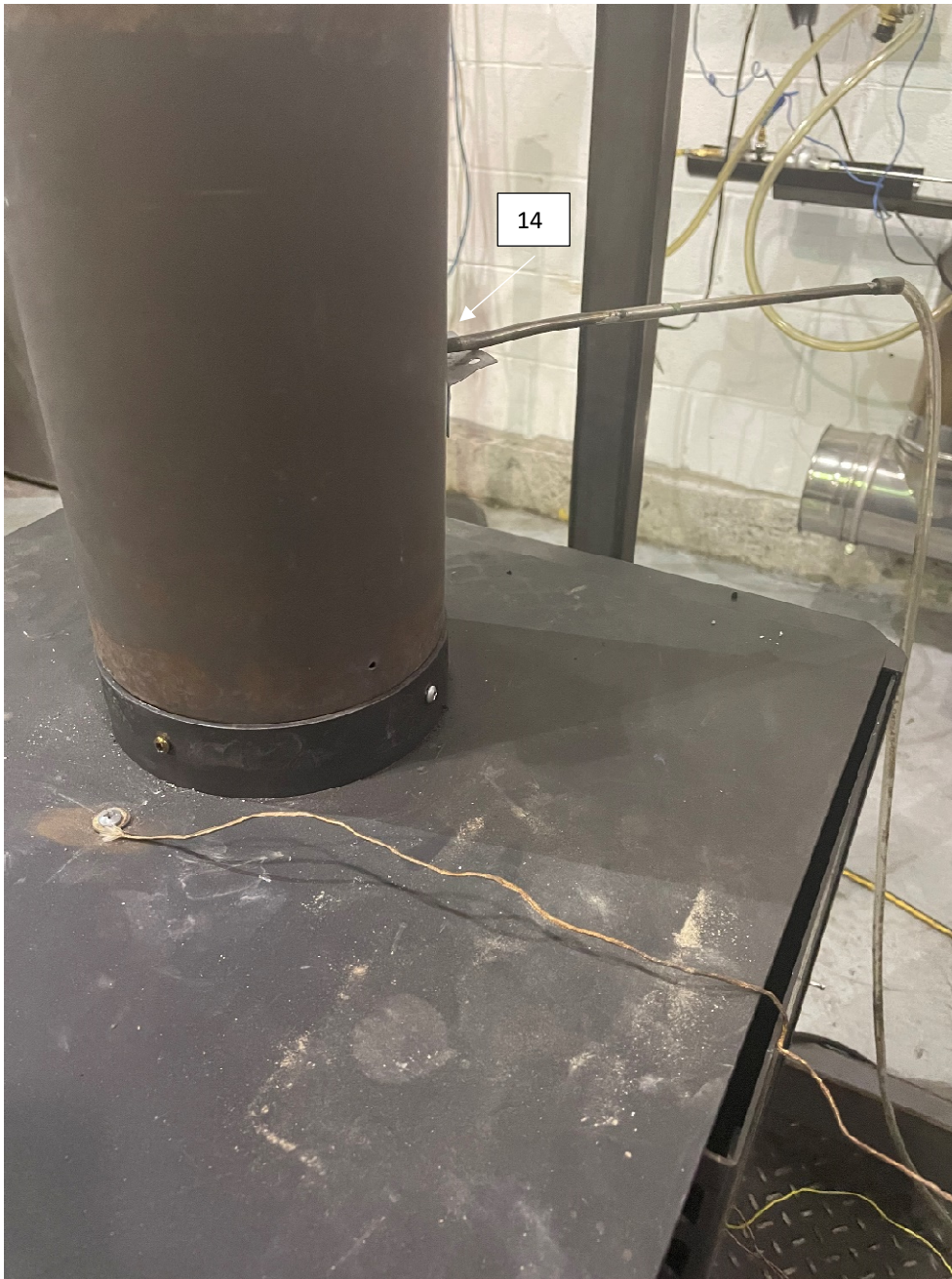
chimney support



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

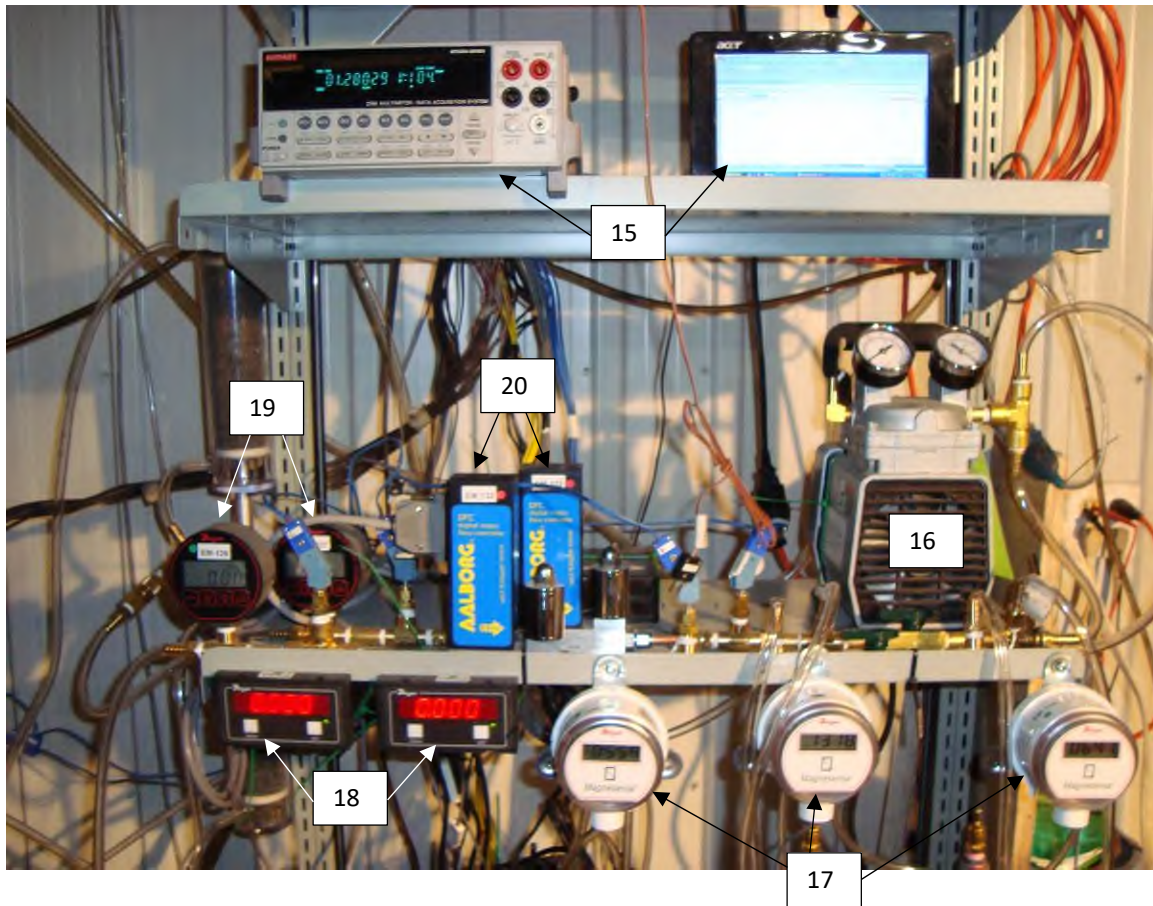
10 : Exhaust system support bracket

Draft sampling



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

Equipment's

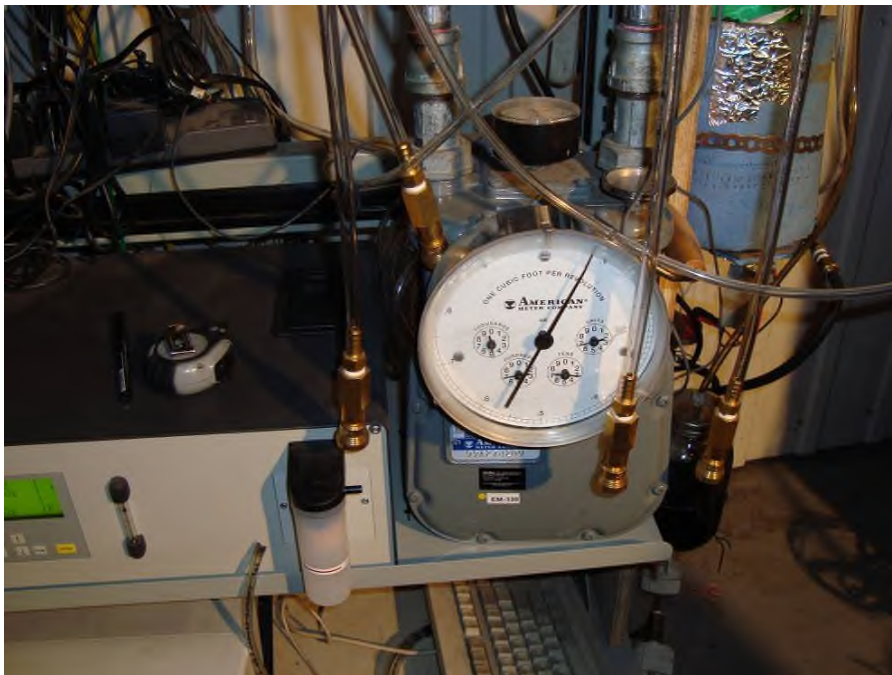


- 15 : Acquisition system
- 16 : Vacuum pump
- 17 : Digital manometer
- 18 : Digital read out for mass flow meter
- 19 : Digital vacuum gage
- 20 : Mass flow meter

Gaz analyser



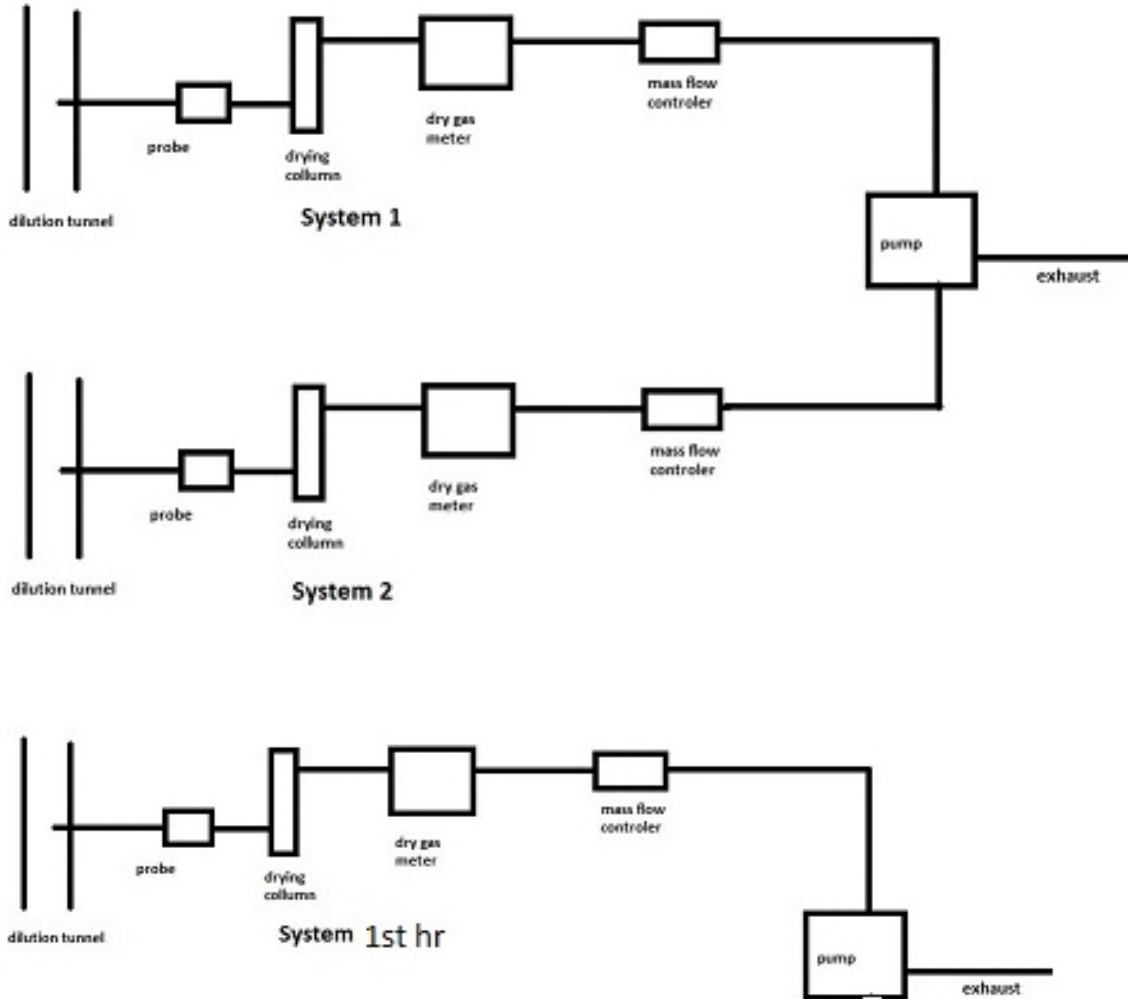
Reference dry gas meter



Dry gas meter for train 1, train 2 and room filter.



Dilution tunnel sample system



Dilution tunnel

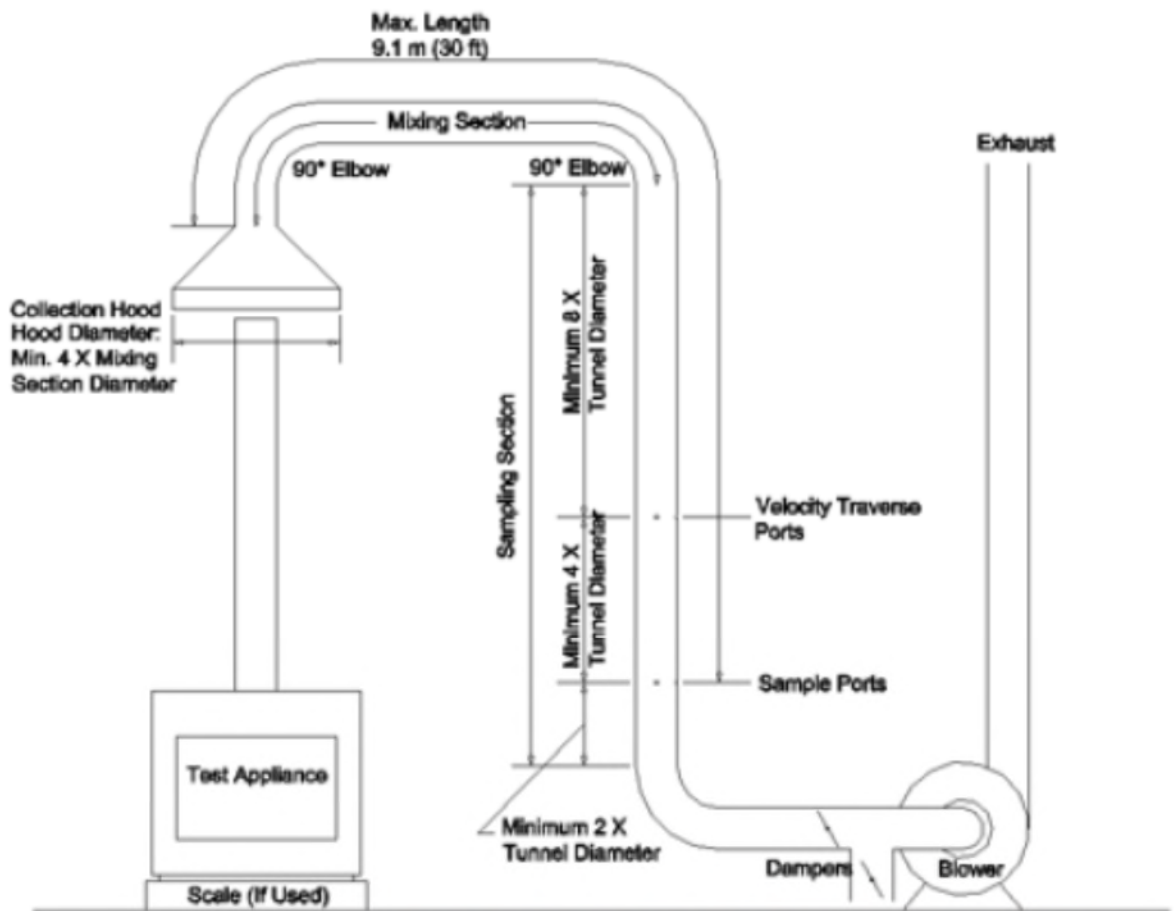


FIG. 3 Steel-Constructed Dilution Tunnel Apparatus

APPENDIX 9: Test load photographs

Run 1



APPENDIX 10: Laboratory Operating Procedures

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SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

INTRODUCTION

This document provides a step by step guide for the technician conducting tests to EPA standard requirements. Procedures outlined here, when followed, will result in tests in conformance with EPA Methods 28R, ASTM E2780, ASTM E2515, ASTM E2618, Method 28WHH, Method 28 PTS.

The primary measurements to be made are particulate emissions rates. The technician's duties include the following steps.

1. Incoming inspection of test units.
2. Set-up of test units.
3. Preliminary testing to establish unit operating procedures and familiarity with operating controls.
4. Calibration of test equipment.
5. Set-up, checking and operation of sampling apparatus.
6. Conduct of tests including complete record keeping and data recording for non-automated functions.
7. Operation of hardware and software included in automatic data acquisition system.
8. Review and analysis of data at test completion to ensure test validity.

The technician running this test must be familiar with the following documents, which are to be kept in the laboratory at all, times.

EPA METHODS

1. EPA Methods 28R
2. ASTM E2780
3. ASTM E2515
4. ASTM E2618
5. Method 28WHH
6. Method 28 PTS

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I. APPLIANCE INSPECTION AND SET-UP

A. INCOMING INSPECTION

1. Check for completeness of unit including parts, accessories, installation and operating instructions, drawings and specifications etc. Note any discrepancies or missing parts or information.
2. Check for shipping damage. If damage has occurred, notify the laboratory manager. In some cases, repairs may be made, provided the manufacturer and laboratory manager concur that repairs will not affect the unit's performance. If damage is irreparable, a new unit will need to be obtained.
3. Note whether unit is catalytic or non-catalytic.
4. Mark unit with manufacturer's name, model number, work order number and date received.
5. If unit is safety listed, note label data including listing agency and serial number. If unit is not listed, mark all data sheets "UNLISTED". Test results will not be released until unit passes safety tests without modification unless authorized by laboratory manager.

B. UNIT SET-UP

1. All new units must be operated for a breaking in period as follows.
 - a) Non-catalytic units: Ten (48) hours at medium burn rate with Douglas Fir scrap or cordwood.
 - b) Catalytic units: Fifty (50) hours at medium burn rate with Douglas Fir scrap or cordwood.

During these break-in runs the unit may be connected to a lab chimney and fuel additions noted into the corresponding data acquisition file. For catalytic units, a thermocouple must be installed in the catalyst.

Record catalyst temperature at 1-hour intervals or on chart recorder. Operating should continue until data shows at least fifty (50) hours of operation with catalyst temperature in excess of 800 degrees Fahrenheit (active range).

For non-catalytic units a stack thermocouple should be installed and stack temperature recorded at 1-hour intervals. Fourty-eight (48) hours minimum burn time with a stack temperature of at least 250 degrees Fahrenheit is required.

2. Once break-in is completed, allow unit to cool. Clean unit thoroughly.

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3. Unit is to be placed on scale for testing. Prior to proceeding with verification process, scale should be turned on and allowed to warm up for one (1) hour minimum. Zero scale and check calibration with standard weights. One (1) 1 kg weight and one (1) 2 kg weight are provided for this purpose. Use scale verification test form no. EPA-7-TP to record results. If scale fails to reproduce weights within tolerance, check with laboratory manager before proceeding.
 4. If scale checks out, place unit on scale and align so chimney will be centered in hood.
 5. Attach chimney connector and chimney. Be sure all joints are sealed below sampling points. Chimney and connector should be cleaned with a wire brush. Be sure chimney connector terminates and chimney starts at proper level above scale platform. Chimney must be supported from scale so that it does not touch test enclosure or hood walls.
 6. Thermocouples should be attached to surfaces of unit prior to testing. EPA requires a thermocouple on the bottom of the firebox. This must be installed prior to putting the unit on the scale. In some cases, the required thermocouple locations will be inaccessible on finished units. These units should have thermocouples installed by the manufacturer during construction. Check with the laboratory manager if problems are encountered in proper thermocouple attachment.
 7. Measure firebox dimensions and record on data forms nos. EPA-2-TP. Make a three dimensional sketch of the firebox including firebrick, baffles and obstructions. Calculate firebox volume in cubic feet with both addition and subtraction methods using forms nos. EPA-3-TP and EPA-4-TP. See Section 6.2.4 of EPA Method 28 for details of firebox volume determination.
 8. If unit is catalytically equipped, additional thermocouples must be installed upstream and downstream of catalyst. Thermocouples should also be placed in the primary and secondary combustion chambers of all units.
 9. Plug thermocouples into data acquisition system jacks making a check of locations and jack numbers for each test on data form no. EPA-5-TP.
 10. Note that inserts are tested as if they are freestanding stoves.
 11. Dilution tunnel should be cleaned prior to each certification test series and at anytime a higher burn rate follows a lower test burn rate.
- II. SAMPLING SYSTEM – SET-UP
- A. GAS ANALYSIS**
1. Instruments should be turned on and allowed to warm up for one (1) hour minimum.

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SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

2. Calibrate analyzers as follows:

NOTE : Prior to proceeding with calibration, make sure to use NIST tracable 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)
- b) Place impingers in container and connect with “U TUBES”. Grease carefully on bottom half of ball joint so that grease will not get into tubes.
- c) Connect filter to first impinger and sample line to last impinger.
- e) Leak check system as follows.

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- 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) System 1: $\frac{(DGM_3 - DGM_1)}{10} = CFM_1$

2) 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. 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 flow rate to 140 SCFM if burn rate is to be less than 3 kg/hr or to an appropriate rate from table provided in laboratory for higher burn rates. Record readings on data form no. EPA-9-TP.
2. Check draft imposed on cold stove with all inlets closed and a draft gauge in the chimney. If draft is greater than 0.005 inches water column, adjust tunnel to stack gap until draft is less than 0.005.
3. Check for ambient airflow around unit with hot wire anemometer. Must be less than 50 ft/min.
4. Check all equipment for proper operation. Analyzers should be on and in sample mode. Computer should be loaded with test program and awaiting test start command.
5. Zero scale and start fire with uncolored newspaper and kindling representing 10 % of test load with the same type of fuel.
6. Once kindling is burning well after 5 minutes, add splitted pieces having a bottom surface around 4 sq. inches and representing 25% of test load weight. Operate at high fire for 15 minutes. Then adjust settings to intended test run levels as per the manufacturer's.
7. Following addition of pretest fuel load (splitted pieces), start computer for data logging.

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8. All fuel additions, air intake settings and operational characteristics shall be noted with associated time stamp on form no. EPA-1-TP.

C. TEST RUN

1. Once the targeted test fuel bed weight is obtained, the test is to be started as follows:
 - a) Insert the sample probes into the tunnel being careful not to hit sides of tunnel with probe tip.
 - b) Check tunnel pitot tube for proper position. (Pitot should be carefully cleaned prior to each test.)
 - c) Turn on probe sample systems and stack sampler.
 - d) Open stove door, rake coals and load stove as follows: **TO BE DETERMINED**
 - e) Close door or follow manufacturer's start-up procedures. (Five (5) minutes maximum time before all doors and controls must be set to final positions for duration of test.)
 - f) An alarm will sound an audible signal at the (10) minutes intervals. This signal a reading interval. You must verify at each interval that the following readings are correctly logged by the data acquisition system and make observations of any unusual or non routine events that could occur.
 - 1) Rotometer readings.
 - 2) Tunnel pitot tube reading.
(Zero regularly between readings)
 - 3) Gas meter readings.
 - 4) Temperature readings.
 - 5) Draft reading
 - 6) Test load weight
 - 7) CO, 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

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other equipment. Be sure dryers and filters are working and monitor impinger train for proper water and ice levels etc.

- h) When the fuel charge is consumed, it will signal end of test and shut down the sampling systems. When this occurs, remove filter holder and probes from tunnel and impingers from sample line.

IV. POST TEST PROCEDURES

A. SAMPLE RECOVERY – FILTER TRAINS

1. Carefully clean outside of probes and filter housings with alcohol.
2. Disassemble filter holder and transfer filters to clean petri dish. Scrape gasket with scalpel and collect any loose material on filters.
3. Place probe and front half of first filter holders (still assembled) and filters in desiccator. Allow 24-hour desiccation before weighing.
4. Weigh probe filter holder units and filters at six (6) hour intervals until weight change between weighings is less than 0.2 mg. Record all weights taken on data form no. EPA-10-TP.

B. CALCULATION OF RESULTS

The computer program carries out all final calculations. When run, it will ask for data from forms used during the test. Enter data as called for.

GENERAL

This guide cannot cover every possible contingency, which may develop during a particular test program. Many questions, which may arise, can be answered by a complete understanding of the test standards and their intent. When in doubt on any detail, check with the laboratory manager and be sure you understand the procedures involved.

It is critical that all spaces on the data forms be properly filled in. Each test must be represented by a complete record of what was done and when.

APPENDIX 11: Sample calculations

Validation du fichier de calcul avec les équations provenant des normes:

ASTM E2515-11

ASTME2618

Dry burn rate (BR)

Equation used

B415.1, 13.4

$$BR = \left[\frac{60W_{WD}}{\theta} \right] \left[\frac{100 - \%M_W}{100} \right]$$

Nomenclature

- BR Dry wood burn rate, kg/hr (lb/hr)
- W_{WD} Total mass of wood burned (wet basis) during the test run, kg (lb)
- 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} 8,67 lbs
- θ 360 min
- $\%M_W$ 4,25 %

Calculation

- BR 0,628 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	64,67 dcf
Y	0,98843
P_{bar}	30,00 in Hg
ΔH	-1,1061 in Hg
T_m	532,7 R

Calculation

$V_{m(std)}$	61,17 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	0,006 g
F_2	0,000 g
ΔPF	0,001 g

Calculation

m_n	7,300 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	7,300 mg
$V_{m(\text{std})}$	61,17 dscf

Calculation

C_s	0,000119 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
$V_{mr(std)}$	29,70 dscf

Calculation

C_r	0,000003 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}	0,215186227
V_{scent}	0,224719297

Calculation

F_P	0,957578
-------	----------

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	0,958
$(\sqrt{\Delta P})_{avg}$	0,2257 in H ₂ O ^{1/2}
P_{bar}	30,00 in Hg
P_g	0,23 in H ₂ O
P_S	30,02 in Hg
M_S	28,78 lb/lb-mol
t_S	93,17 F
T_S	553,17 R

Calculation

V_s 14,6374 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 ($^{\circ}\text{K}$), 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	14,637
A	0,196 ft^2
T_{std}	528 R
T_S	553,17 R
P_S	30,019 in Hg
P_{std}	29,92 in Hg

Calculation

Q_{std}	161,84 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	0,000119 g/dscf
C_r	0,000003 g/dscf
Q_{std}	161,84 dscf/min

Calculation

E	0,02 g/min
E	1,13 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	0,000119 g/dscf
C_r	0,000003 g/dscf
Q_{std}	161,84 dscf/min
θ	360 min

Calculation

E 6,76 g
 Calculation based on train 2 data.

Average gas velocity in dilution tunnel during each min interval, i, of the test run

Equation used

ASTM 2515, equation 10

$$v_{si} = F_p K_p C_p \sqrt{\Delta p_i} \sqrt{\frac{T_{si}}{P_s M_s}}$$

Nomenclature

	Average gas velocity in dilution tunnel during each min interval, i of the test run
v_{si}	m/sec (ft/sec)
F_p	Pitot tube correction factor
K_p	Pitot tube constant
	For the metric units: $34.97 \text{ m/sec} \left[\frac{(\frac{g}{\text{mole}})(\text{mm Hg})}{(^{\circ}\text{K})(\text{mm H}_2\text{O})} \right]^{1/2}$
	For English units: $85.49 \text{ ft/sec} \left[\frac{(\frac{\text{lb}}{\text{mole}})(\text{in Hg})}{(^{\circ}\text{R})(\text{in H}_2\text{O})} \right]^{1/2}$
C_p	Pitot tube coefficient (use 0.99 for standard pitot tube, 0.84 may be used for S-type tubes constructed according to Method 2 specifications)
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	0,958	F_p	0,958
K_p	85,49	K_p	85,49
C_p	0,99	C_p	0,99
Δp_i	0,051 in H ₂ O	Δp_i	0,051 in H ₂ O
T_{si}	572,5 R	T_{si}	573,0 R
P_s	30,02 in Hg	P_s	30,02 in Hg
M_s	28,78 lb/lb-mol	M_s	28,78 lb/lb-mol

Calculation

i=1		i=2	
v_{si}	14,92 ft/sec	v_{si}	14,90 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	360	min	θ	360	min
θ_i	1	min	θ_i	1	min
V_m	60,14	dcf	V_m	61,19	dcf
$V_{mi(std)}$	0,171	cuft	$V_{mi(std)}$	0,1682	cuft
V_S	14,64	ft/sec	V_S	14,64	ft/sec
V_{Si}	14,932	ft/sec	V_{Si}	14,932	ft/sec
T_m	532,4	R	T_m	532,7	R
T_{mi}	531,73	R	T_{mi}	531,88	R
T_S	553,17	R	T_S	553,17	R
T_{Si}	572,5	R	T_{Si}	572,5	R

Calculation

train=1		train=2	
PR	104,1 %	PR	100,6 %

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}	0,167 dcf
F_A	0,0116 ft ²

Calculation

FV_{max}	14,37 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	7,17 g
Train 2	6,76 g

Calculation

Dual train precision	2,96 %
----------------------	--------

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 %
-------	--------

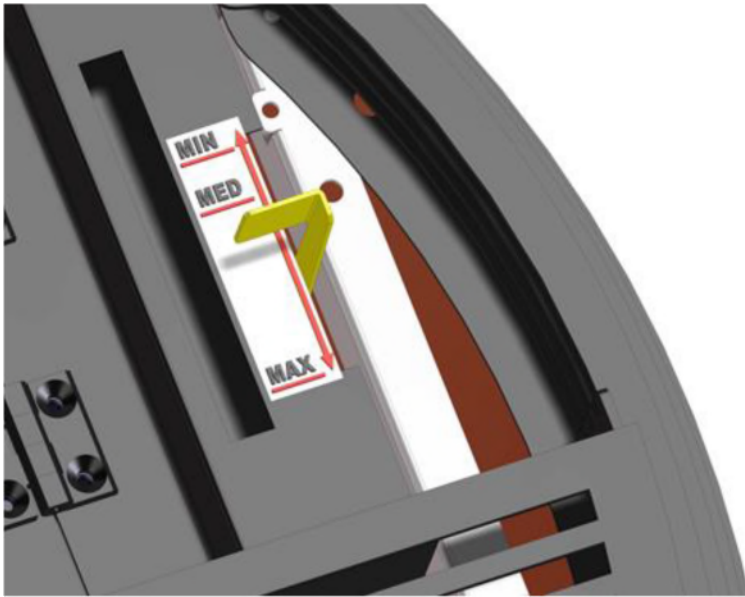
Calculated with CO concentration values.

APPENDIX 12: Volume calculations

APPENDIX 13: Operating instruction

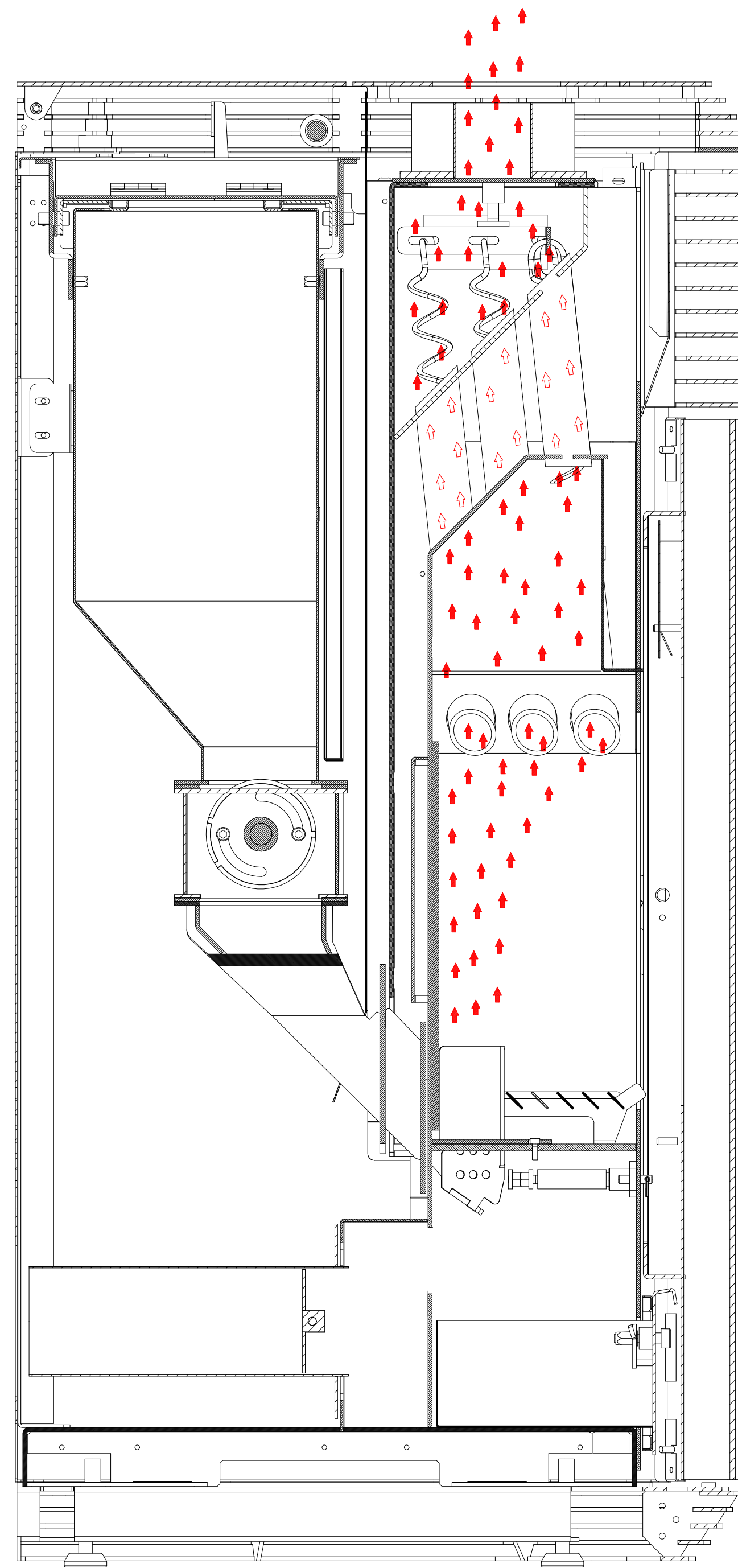
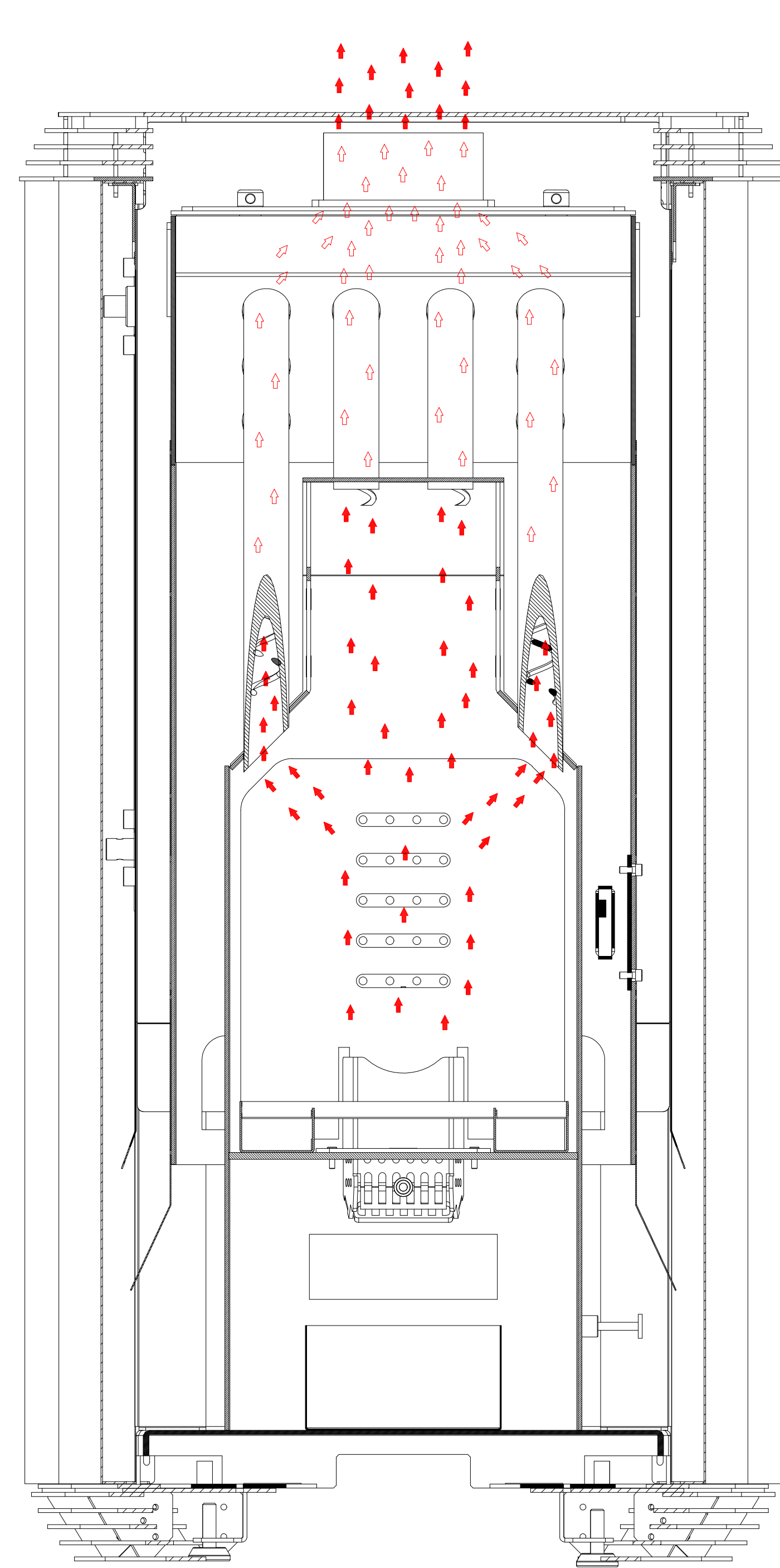
Operating instruction for Jessica Natural



- For maximum output set the lever to max
- For medium output, set the lever to med
- For minimum output set the lever to min



APPENDIX 14: Drawing Air flow pattern

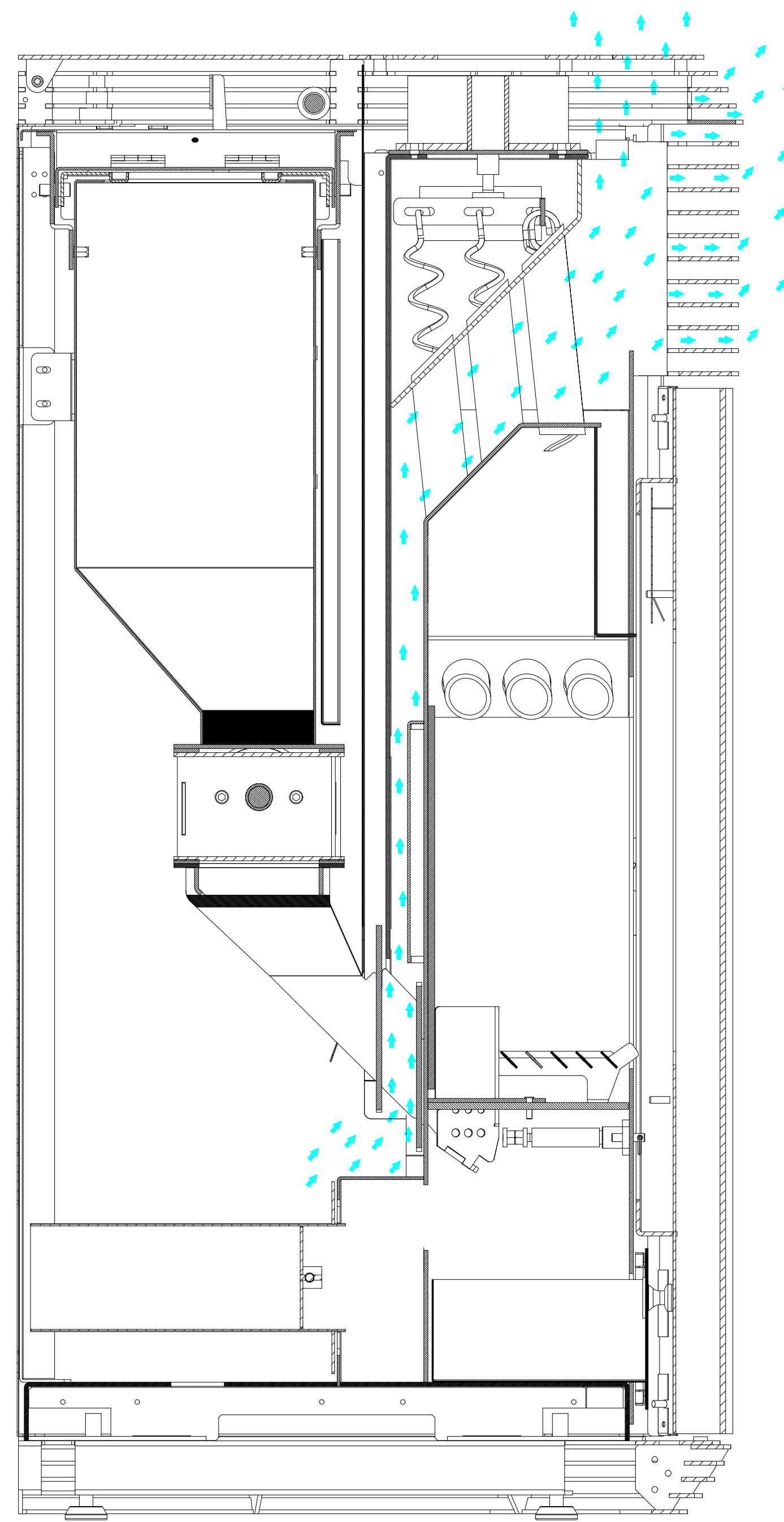
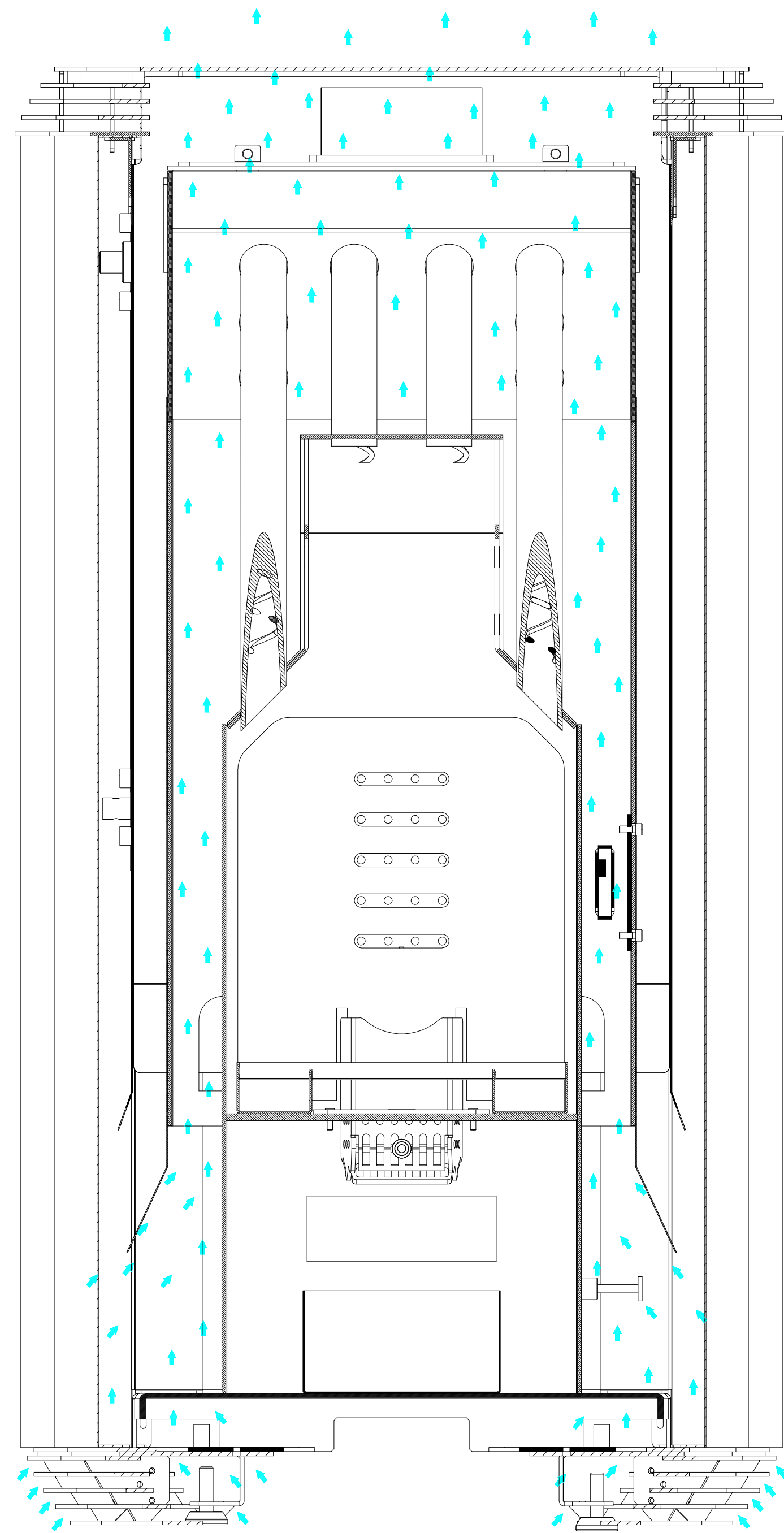
PASSAGGIO FUMI



Articolo	<i>JESSICA NATURAL</i>		N° progetto :	
Gruppo		Quantità	Scala  1:4	Sezione Dis.
Particolare	<i>PARRAGGIO FUMI</i>			A4
		Dis.	Data	Approvato
		Codice :		
		Disegno N° : 026		

Tel-0733-657622
Zona industriale
62028 SARNANO (MC) ITALY

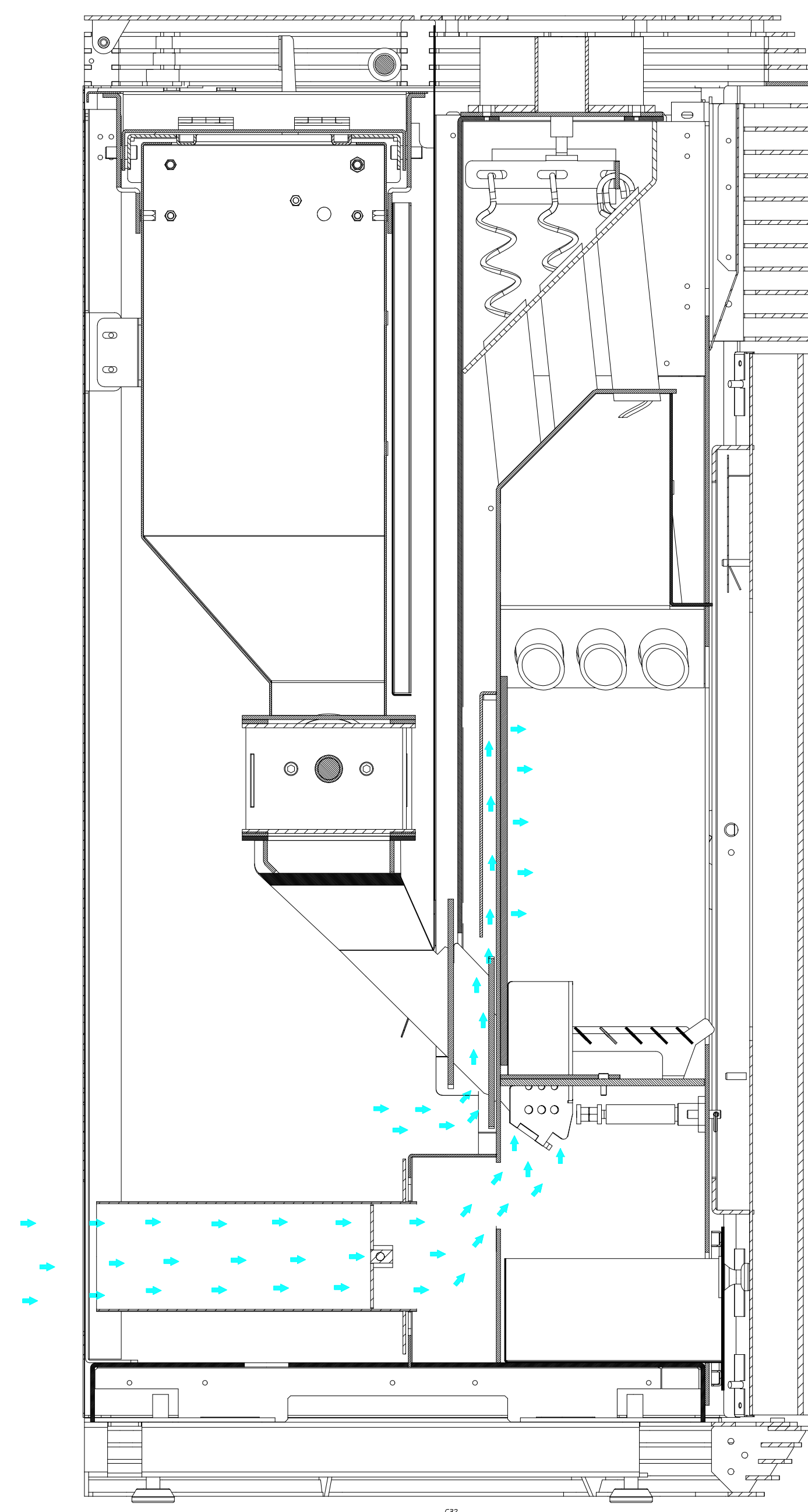
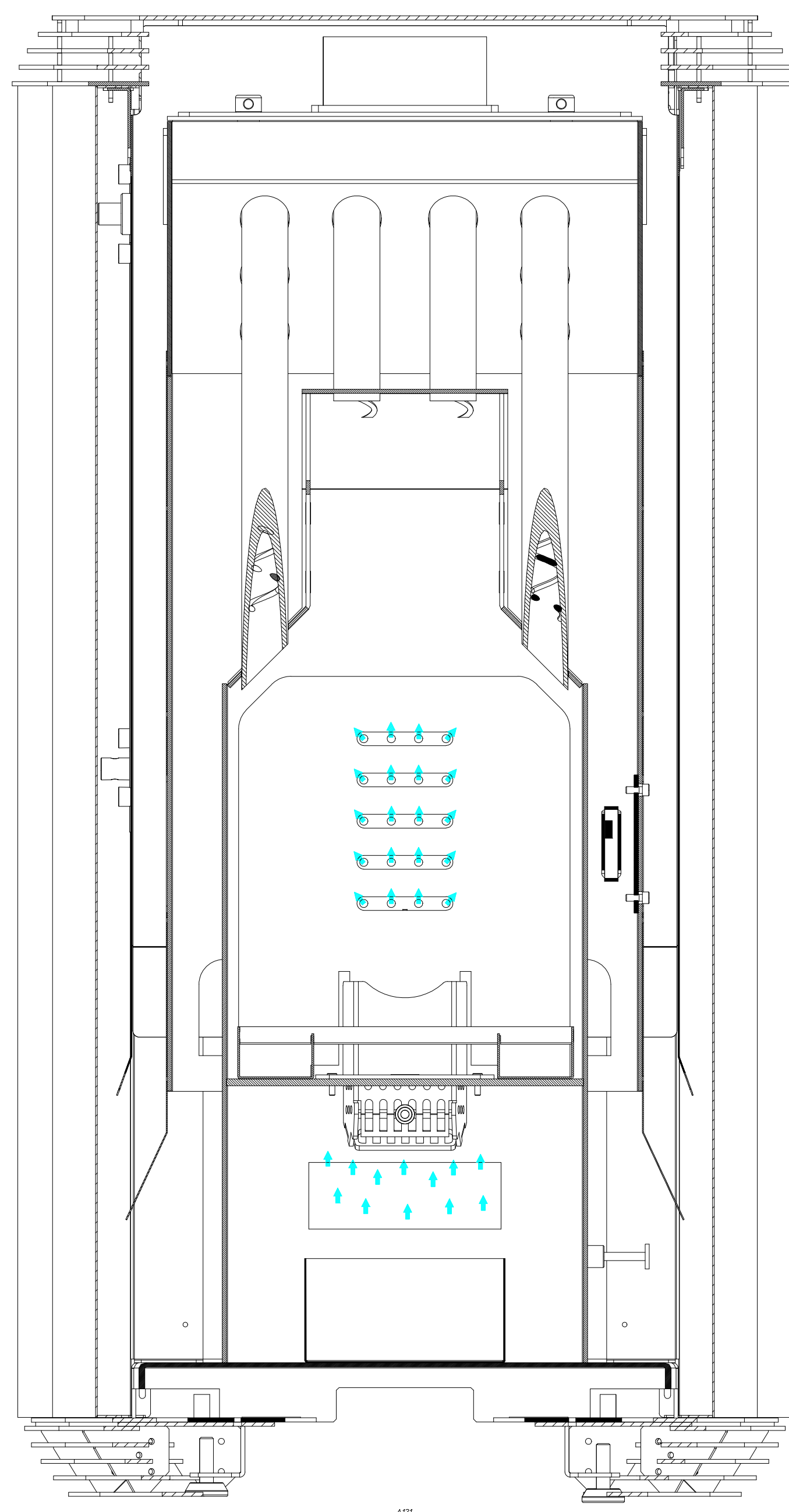
PASSAGGIO ARIA CONVETTIVA



Articolo	<i>JESSICA NATURAL</i>		N° progetto :	
Gruppo		Quantità	Scala  1:4	Sezione Dis.
Particolare	<i>PARRAGGIO ARIA CONVETTIVA</i>			A4
		Dis.	Data	Approvato
		Codice :		
		Disegno N° : 027		

Tel-0733-657622
Zona industriale
62028 SARNANO (MC) ITALY

ARIA COMBUERANTE



Articolo	<i>JESSICA NATURAL</i>		N° progetto :	
Gruppo		Quantità	Scala  1:4	Sezione Dis.
Particolare	<i>PARRAGGIO ARIA COMBURENTE</i>			A4
 Tel-0733-657622 Zona industriale 62028 SARNANO (MC) ITALY		Dis.	Data	Approvato
		Codice :		
		Disegno N° : 028		

APPENDIX 15: WHA, CoC, 30 days notices, others

**U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
 CERTIFICATION OF CONFORMITY
 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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GENERAL INFORMATION

Manufacturer's Name:

Laminox S.r.l.

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 ALL that apply):	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:	

Model Name(s) (as it appears on test report):

Jessica Natural

Model Number(s) (as it appears on test report):

Jessica Natural

Catalyst: Yes _____ No X _____

Mailing Address:

Zona Industriale Callarella 261/263

Street Address:

Zona Industriale Callarella 261/263

City: Samano	State: Italy	ZIP Code: 62028
Phone: +39 0733657622	E-Mail: idro@laminnox.com	Web Site: www.laminnoxidro.com

Address of Manufacturer:

Zona Industriale Callarella 261/263

City: Samano	State: Italy	ZIP Code: 62028
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EPA APPROVED THIRD PARTY CERTIFIER

Authorized Representative(s):

Robert J. Zimmerman Jr.

Company:

UL LLC

Phone: 847-664-3129	E-mail: Robert.J.Zimmermanjr@ul.com	Fax: 847-272-8129
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**U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
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City: Northbrook	State: Illinois	ZIP Code: 60062
Position: Senior Staff Engineering Associate		
Report Number: PI-20163	Date(s) of Tests: 2018-04-11	Date of Report: 2018-04-20
Quality Assurance Plan included?: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wood Heater/Hydronic Heater/Forced-Air Furnace Application Included: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Remarks:
Affected Source Data Summary		
This affected source has been tested to (select one): <input type="checkbox"/> 2015 NSPS particulate matter emissions limit of 4.5 g/hr <input checked="" type="checkbox"/> 2020 NSPS particulate matter emissions limit of 2.0 g/hr (2.5 g/hr if cordwood)		
Wood Burning Heater	Hydronic Heater	Forced-Air Furnace
Weighted particulate emission average of <u>1</u> test runs: <u>1.2</u> grams per hour	Maximum Output Rating: _____ Weighted particulate emission average: _____ Lbs/MMbtu output	Particulate emission average: _____ Lbs/MMbtu output
Weighted average HHV efficiency of <u>1</u> test runs: <u>60.82</u> %	Annual Efficiency Rating: _____	Overall thermal efficiency (HHV): _____ %
	Particulate Emissions: _____	Overall Delivered Heat Efficiency: _____ %
AFFIRMATIONS		

**U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
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- **The above-named affected source has been tested by a laboratory qualified to test and report on the emissions of this type of product under 40 CFR Part 60, Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces (2015 Standards).**
- **The Test Report No. PI-20163, prepared by Danick Power and dated 2018-04-20, has been reviewed by Robert J. Zimmerman Jr. and was found to be complete and to have used the correct procedures in accordance to the 2015 Standards.**
- **The emissions levels listed in the test report and listed above comply with the relevant particulate matter limits established by the 2015 Standards.**
- **The model listed above was tested using the following Test method(s): Method 28R, ASTM 2779, ASTM 2515.**
- **The permanent label and owner's manual meet the requirements of 40 CFR § 60.536 and/or § 60.5478.**
- **The above-named manufacturer, on the effective date of this certificate, was operating under a quality assurance plan, per 40 CFR § 60.533(m) and/or § 60.5475(m), that has been reviewed and approved by Robert J. Zimmerman Jr.**
- **The above-named manufacturer has contracted UL LLC to conduct regular (at least annual) unannounced audits of the manufacturing facility, affected source, and quality assurance plan pursuant to 40 CFR § 60.533(m) and/or § 60.5475(m).**

Robert J. Zimmerman Jr. /Senior Staff Engineering Associate
 Print Name and Title

Robert J. Zimmerman, Jr.
 Signature of Authorized Third-Party Representative

 Date

This is a certification of conformity to certify that the bearer has successfully completed the requirements pursuant to the 2015 Standards.

Third-party EPA approval expiration date: 2020-11-12

V1 5.19.16

Remarks:

**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.

GENERAL INFORMATION

Manufacturer's Name:

Laminox

Appliance Type (Circle One):	Adjustable Burn Rate Wood Heater	<input checked="" type="radio"/> Pellet Stove	Single Burn Rate Heater	Hydronic Heater	Forced Air Furnace	Other:
Hydronic Heater Type (Circle One):	Traditional	Full Storage	Partial Storage	Indoor/Outdoor	Other:	
Forced-Air Furnace Type (Circle One):	Small (less than 65,000 BTU/hr heat output)		Large (greater than 65,000 BTU/hr heat output)		Other:	
Fuel Type:	Crib	<input checked="" type="radio"/> Pellet	Cordwood	Other:		

Model Name and Number:

JESSICA NATURAL AIR – JN9A

TBD

Catalyst: No_X_

Mailing Address:

Zona Industriale Callarella, 261/263 62028 SARNANO (Macerata) Italy
Cod. Fiscale, Partita I.V.A. e Reg. Imp. N. IT 00113180434

Street Address:

Zona Industriale Callarella, 261/263 62028 SARNANO (Macerata) Italy
Cod. Fiscale, Partita I.V.A. e Reg. Imp. N. IT 00113180434

City: Macerata	State: Italy	ZIP Code: IT 00113180434
Phone: 0733.657622	Fax: 0733.657494	Web Site: http://www.laminnox.com

Address of Manufacturing Facility:

Zona Industriale Callarella, 261/263 62028 SARNANO (Macerata) Italy
Cod. Fiscale, Partita I.V.A. e Reg. Imp. N. IT 00113180434

City: Macerata	State: Italy	ZIP Code: IT 00113180434
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EPA APPROVED TEST LABORATORY

**U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
30-DAY NOTIFICATION FORM
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- ▶ This notice must be received by the EPA at least 30 days before the start of testing.

Name and Title of Authorized Representative: Danick Power

Company: Services Polytests inc.

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:
Robert J. Zimmerman Jr

Company:
UL LLC

Phone: 847-664-3129

E-mail:
Robert.j.zimmerman@ul.com

Fax: 847-272-8129

City: Northbrook

State: IL

ZIP Code: 60062

COMPLIANCE TEST INFORMATION

Test Method(s):
Method 28; ASTM E2779

Date(s) of Proposed Test:

February 22nd 2018 and after

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.

RAFAELI LUYER - PRESIDENT

Print Name and Title of Authorized Official

Signature

Date

Remarks:

v1

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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**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: Laminox

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, AMST2779, ASMT 2515

Catalyst: No

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):

Jessica Natural, Veronica Natural

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

Zona Industriale Callarella 261/263

Mailing Address:

Zona Industriale Callarella 261/263

City: SARNANO

State: ITALY

ZIP Code: 62028

Phone: +39 0734657622

Email: idro@laminox.com

Website: www.laminoxidro.com

EPA Submission Date of 30 day Notice: January 12th 2018

MANUFACTURER'S AUTHORIZED REPRESENTATIVE INFORMATION

Name: Ing. Luigi Rafaiani

Position/Title: President

Address: Zona Industriale Callarella

City: Sarnano

State: Italy

ZIP Code: 62028

Phone: +39 0734657622

E-mail: l.rafaiani@laminox.com

Website: www.laminoxidro.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: UL LLC

Name of Person Authorized or Responsible for Reviewing Test Report and/or Issuing Certification of Conformity:
Robert J. Zimmerman Jr.

Position/Title:
Staff Engineering Associate

Address:

City:

State:

ZIP Code: 60062

Phone: 847-664-3129

Email:
Robert.J.Zimmermanjr@ul.com

Website: www.UL.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

All drawings are provided into the CBI report.

2. Firebox Statement Requirement

Firebox dimensions, materials and specifications are provided in the CBI report.

3. CBI

All data are provided into CBI and not CBI report.

4. Valid Certification Statement

All documentation about the valid certification test, including the summary table with data test, are provided into CBI and not CBI report submitted by Polytests Services Inc.

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 will be provided with each unit.

6. Q/A Statement

The manufacturer (Laminox) will conduct a quality assurance program for the model line that satisfies the requirements of paragraph (m) of this section.

7. Laboratory Sealing of Unit

Such unit will be stored by the manufacturer (Laminox) in the sealed state until 5 years after the certification test.

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 submittend 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 (Laminox) web site.

9. Third Party Certification Statement

The manufacturer (Laminox) has entered into contracts with Polytests Services Inc. and UL LLC approved laboratory and approved third party certifier that satisfy the requirements of paragraph (f) of this section.

10. Approved laboratory/third party Statement

The approved laboratory and approved third party certifier are allowed to submit information on behalf of the manufacturer (Laminox) including any claimed to be CBI.

11. Manufacturer's Website Certification Test Reports Availability Statement

The manufacturer (Laminox) 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.

12. Transferability Acknowledgement Statement

Laminox 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

Laminox acknowledges that is unlawful to sell, distribute or offer to sell or distribute an affected heater without a valid certificate of compliance.

Print Name and Title: Ing. Luigi Rafaiani - President

Date: 07/05/2018

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

A. SUMMARY RESULTS – PELLET HEATERS

Run Number	Date			Run Time (Min.)	Heat Output (Btu/hr)	1st Hour Emissions (g/hr)	Integrated Total (g/hr)	CO Emissions (g/min)	Overall CO Emissions (g/min)	Heating Efficiency (% HHV)	Overall Heating Efficiency (% HHV)
		Setting	BR								
1	April 11 th 2018	H	1.34	60	17 096	1.36	1.2	0.1	0.17	68.23	60.8
		M	0.4	120	4 736			.14		61.6	
		L	0.53	180	5 350			0.2		53.6	
		OA	0.62	360	11 689			0.17		60.8	