POLYTESTS
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TEST REPORT

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

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

Client:

Jotul

55 Hutcherson Dr,
Gorham, USA
04038

Model Name: F 602 V2

Attention: Rafael Sanchez

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

TEST DATES: January 7th and 8th 2019
REPORT DATE: January 25th 2019
Project number: PI-20183

Tested:
Maxime Martin

written by:
Danick Power, P. Eng

Verified by third party certifier: Intertek

SUMMARY

List of appendix

APPENDIX 14: Drawing Air flow pattern

APPENDIX 15: Application for wood stove program

1 INTRODUCTION

1.1 GENERAL

Laboratory

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

Test program

- Purpose: unit qualification NSPS 2020 cord wood Test dates: January 7th and 8th 2019 Test methods used:
  - Particulate emissions: ASTM E3053-17; ASTM E2515-11 methods ALT-125 as referred into 40 CFR Part 60 Subpart AAA o
  Efficiency: CSA B415.1-10

1.2 TEST UNIT INFORMATION

General

- Manufacturer: Jotul
- Product type: wood heater,
- Combustion system: non-catalytic
- Unit tested: F 602 V2

Particularities

- The F 602 V2 is a unique model to the Jøtul wood heater product line.

In Summary:

- A small north /south loading adjustable rate free standing non-catalytic wood heater employing a stepped baffle secondary combustion technology. The unit is composed of primarily cast-iron construction.

1.3 RESULTS

Emission results obtained

- Weighted Average Emissions Rate: 2.11 g/hr
- Weighted Average Overall Efficiency: 69.8 %

Conformity: NSPS Phase 2020, cord wood test method

1.4 PRETEST INFORMATION

Unit condition: The unit was received by carrier during December 2018 in good condition. The 50hrs of aging was made by the manufacturer.

Set up

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

2 SUMMARY OF TEST RESULTS

2.1 MODEL IDENTIFICATION

Model name number	F 602 V2
Manufacturer	JOTUL
address	55 Hutcherson Dr, Gorham, USA,04038
appliance category	WOODSTOVE
Usable Firebox Volume – ft3	0,817
Catalytic/Non-Cat	Non-Cat
convection air fan (no, standard, Optional)	NO

2.2 LABORATORY INFORMATION

Testing laboratory	Polytests Services
address	695-B Gaudette, St-jean-sur-richelieu
ISO/ Accreditation info	17025
Dates tested	January 7th and 8th 2018
Test Methods / Standard	ALT-125
Dilution Tunnel Inside diameter – in	8
Filter diameter	47
Filter material	PTFE Pall

2.3 TEST CONDITION SUMMARY

Model Name(s) / number(s)	F 602 V2			
Usable firebox Volume-ft3	0,817			
Convection Air Fan (No, Standard, Optional)	NO			
Test runs #	1,1	1,2	2,1	2,2

Date tested	07-012019	07-012019	08-012019	08-012019
test run category (L,M,H)	H	L	H	M
average barometric pressure – in Hg	30,37	30,37	29,72	29,72
Max observe Ambient temp. °F	80,13	78,20	77,32	81,70
Min observe Ambient Temp °F	72,57	73,04	72,68	75,72
Max observe Filter temp °F	89,12	88,32	89,37	86,09
Run air settings				
Primary (measured up from minimum)	full open	full closed	full open	medium setting
Secondary (measured up from minimum)	fix	fix	fix	fix
Convection air setting	none	none	none	none
Test fuel load				
Cordwood fuel species	Oak	Oak	Oak	Oak
specific Gravity (from Table 1)	0,66	0,66	0,66	0,66
Higher heating value - Btu/lb (from Annex A1)	8690	8690	8690	8690
Nom. Test fuel piece length - in	14	14	14	14
Number of test fuel pieces	4	5	4	5
Test fuel Weight				
Kindling - as fired lb.	1,30	NA	1,20	NA
Kindling Wt. - as % of test fuel load	16,3%	NA	14,6%	NA
Kindling Moisture % Db	9,0	NA	9,0	NA
Kindling Kg DB	0,54	NA	0,50	NA
SU Fuel Wt- as fired lb	2,00	NA	2,00	NA
SU Fuel wt. - as % of test fuel load	25,1%	NA	24,3%	NA
SU Fuel moisture - % DB	20,0	NA	20,0	NA
SU fuel- Kg DB	0,76	NA	0,76	NA
Test Fuel Load - As Fired lb	7,98	9,50	8,22	9,76
Ave. Test Fuel Load MC % DB	21,52	20,93	21,12	21,06
Test Fuel Load - kg DB	2,98	3,56	3,08	3,66
Test fuel Loading density lb./ft3	9,98	11,88	10,27	12,20
Residual SU fuel wt. - as fired lb.	1	NA	1	NA
Residual SU fuel wt.- as % of test fuel load	12,5%	NA	12,2%	NA
Test run duration - minutes	58	192	50	159
Test run duration - h	0,97	3,20	0,83	2,65
Test fuel load wt at the end of the test - as fired lb	0,8	0	0,77	0

total fuel burned kg Db	3,46	3,56	3,53	3,66
% test fuel load wt at end of the test	10,0%	0,0%	9,4%	0,0%

2.4 TEST RUN RESULTS SUMMARY

Model name / number	F 602 V2			
Usable Firebox volume	0,817			
Convection air Fan (no, Standard, option)	NO			
Test runs nu.	1,1	1,2	2,1	2,2
Date tested	07-01-2019	07-01-2019	08-01-2019	08-01-2019
Test run category	H	L	H	M
Burn rate - Kg/hr DB	3,65	1,11	3,99	1,38
Burn rate as % of low to high Midpoint	NA	30,5%	NA	34,6%
Burn duration - h	0,97	3,20	1	3
Heat output btu/hr	46 466	15 200	52 685	18 506
Average Dilution Tunnel Flow Rate - dscfm	319,1	347,3	316,8	336,9
Average Sample Flow Rates - dscfm				
Train 1	0,1358	0,1338	0,1352	0,1332
train 2	0,1324	0,1303	0,1313	0,1295
Total PM Emissions - g				
Train 1 g	4,15	3,55	2,50	6,50
train 2 g	4,26	3,12	2,82	5,90
Average	4,21	3,33	2,66	6,20
PM emission train precision %	1,29%	6,54%	5,97%	4,78%
PM emission g/kg	1,22	0,94	0,75	1,69
PM emission rate g/h	4,35	1,04	3,19	2,34
Total Co Emission g	37,8	181,8	51,6	239,6
Co emission Rate g/h	54,0	56,8	75,4	90,4
1st hour emission rate g/h	4,2	2,6	2,6	4,6
Overall Efficiency - CSA B415,1				
% HHV Basis	67,26%	71,18%	66,80%	69,88%
% LHV Basis	72,37%	76,59%	71,88%	75,19%

2.5 WEIGHTED AVERAGE SUMMARY

Model name / number	F 602 V2
Usable Firebox volume	0,817
Convection air Fan (no, Standard, option)	NO

average for each test run category	L	M	H
burn rate kg/h DB	1,11	1,38	3,82
PM Emission rate - g/h	1,04	2,34	3,77
Co emission rate - g/h	56,82	90,40	64,73
Overall Efficiency - CSA B 415,1			
% HHV Basis	71,2%	69,9%	67,0%
% LHV Basis	76,6%	75,2%	72,1%
Heat output - Btu/hr	15200	18506	49576
Category weighting	0,4	0,4	0,2

2.6 Weighted average Final results

ASTM E 3053 Weighted averages			
PM Emission Rate - g/h	2,11		
CO Emission Rate g/h	71,8		
Overall Efficiency - CSA B415,1			
% HHV Basis	69,83%		
% LHV Basis	75,14%		
Heat output range - Btu/h	15 200	to	49576
Co Arithmetic average g/min	1,18		

2.7 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	70	75	30,39	30,36	19,9	20,6	0	0
2	74	86	29,77	29,68	17	18,2	0	0

2.8 Dilution tunnel flow rate measurements and sampling data (ASTM E2515)

Average dilution tunnel measurements				*Sample Data*			
Run Number/ test category	*Burn Rate (Min)*	*Volumetric Flow Rate (dscf/min)*	*Total Temperatures (°R)*	*Volume sampled (DSCF)*		*Particulate catch (mg)*	
				1	*2*	*1*	*2*
1.1	58	319,08	588,25	7,877	7,679	1,80	1,80
1.2	192	347,26	551,67	25,681	25,012	1,40	1,20

2.1	50	316,79	583,30	6,761	6,567	1,10	1,20
2.2	159	336,93	563,26	21,172	20,584	2,60	2,30

2.9 Dilution tunnel dual train precision

Run Number / test category	*Sample Ratio*		*Total Emission (g)*		
	Train 1	*Train 2*	*Train 1*	*Train 2*	*% Deviation*
1.1	2349,53	2409,88	4,15	4,26	1,29%
1.2	2596,20	2665,69	3,55	3,12	6,54%
2.1	2342,90	2412,10	2,50	2,82	5,97%
2.2	2530,29	2602,53	6,50	5,90	4,78%

3 Process description

3.1 Discussion

The wood heater has been received in a good shape by a carrier in December 2018. Maximum burn rate has been done on January 7th 2019 followed by a minimum burn rate. On January 8th, a second maximum burn rate as been done to average both maximum burn rate. The medium burn rate as been done following the second maximum burn rate.

3.2 Unit dimensions

Baffle

- Location: between top of combustion chamber and hearth
- Restriction: 2 ½ inches at the front of unit
- Dimensions: covers the hearth area minus the restriction at front Material: Cast iron

Firebox material

- Cast Iron lining cover all back and sides and bottom

Flue gas exhaust

- Location: Top or back
- Dimensions: 4. 5 in. diameter with an adaptor to 6 inches
- Material: Cast Iron 4.5 "flue collar. 6" Steel adaptor

Gasket

- Door: Fiberglass rope. 11/32" dia. Low density Glass: Fiberglass rope. 3/16" dia. Low density Refer to appendix 6 for all details and location

Overall unit dimension

- Firebox dimensions: 8 ½ inch wide x 16-inch-deep x 8 ½ to 10 inch high Usable volume: 0.817 cuft.
- Overall heater dimension: 13-inch-wide 20-inch-deep 25 inch high

Convection fan

- None

Catalyst

- None

3.3 AIR SUPPLY SYSTEM

Description

- Primary air: from the bottom through an air wash above the door.
- Secondary air: From the bottom of the stove through the back and sides and into three stainless tubes with holes.

Characterization

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

AIR INTRODUCTION SYSTEM		INLET (1) sq. in.			OUTLET
Identification	Type	Imin	Imax	Controlled	(sq. in.)
A *	Primary	0.898	2.339	Yes	2.257
B *	Secondary	0.810	0.810	No	0.711
C *	Pilot	NA	NA	NA	NA

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

Legend

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

3.4 OPERATION DURING TEST

Run #1.1

This run was performed on January 7th 2018. It lasted 58 minutes and a maximum burn rate was obtained at 3.65 kg/hr & emission at 4.4 gr/hr. The air inlet damper was at the maximum setting.

Run #1.2

This run was performed on January 7th 2018. It lasted 192 minutes and a minimum burn rate was obtained at 1.11 kg/hr & emission at 1.04 gr/hr. The air inlet damper was at the minimum setting.

Run #2.1

This run was performed on January 8th 2018. It lasted 50 minutes and a maximum burn rate was obtained at 3.99 kg/hr & emission at 3.2 gr/hr. The air inlet damper was at the maximum setting. During this test on 2nd sample train There's was a lot of stick filters on the gaskets, the overall catch is the weight of filters + weight of the gaskets. We notice overtime that some gaskets stick more than others with filters. The high burn was only 50 minutes moreover a small firebox tested with an 8 inches dilution tunnel, can reduce significantly the catch weight on filters. The negative filter weight of this run is explained by the above comments.

Run #2.2

This run was performed on January 8th 2018. It lasted 159 minutes and a minimum burn rate was obtained at 1.38 kg/hr & emission at 2.34 gr/hr. The air inlet damper was at the medium setting.

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

Test fuel cribs

- Type of wood: Red Oak, 18 to 25% dry basis moisture content
- Description: for each test, description of the fuel crib is found on the front page of each test run data sheet together with photograph in appendix.

3.5 START-UP OPERATION

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

3.6 SAMPLING LOCATIONS

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

3.7 DRAWINGS

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

3.8 EMISSIONS EFFICIENCY TESTING EQUIPMENT LIST

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

4 SAMPLING METHODS

4.1 PARTICULATE SAMPLING

Particulates were sampled in strict accordance with ASTM E2515. This method uses two identical sampling systems with Gelman A/E 61631 binder free (or equivalent), 47 mm diameter EMFAB TX40H 120-WW Pall filters. The dryers used in the sample systems are filled with "Drierite" before each test run.

5 QUALITY ASSURANCE

5.1 INSTRUMENT CALIBRATION

5.1.1 GAS METERS

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

5.1.2 SCALES

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

5.1.3 GAS ANALYZERS

The continuous analyzers are zeroed and spanned before each test with NBS traceable gases. A mid-scale multicomponent 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. Pretest 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:	JOT	

Description du test

Test standard	EPA	
Run #	1	
Date	07-01-2019	
Technicien	M.M	
Project #	PI 20183	

Description de l'unité

Manufacturier	JOTUL	
Modèle	F602	
Combustion system	Non-Cat	
Appliance type	WOODSTOVE	cu ft.
Firebox volume	0,817	lbs
Appliance weight empty	n.a	
Fan (no, Standard, Option)	NO	

Paramètres du test

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

Échantillonnage

Blank sampling rate	0,20	cuft/min	
Internal probe diameter	0,18	in.	
Calibration Factor (DGM #1):	1,010		Dimensionless
Equipment number (DGM #1):	EM 178		
Calibration Factor (DGM #2):	0,987		Dimensionless
Equipment number (DGM #2):	EM179		
Calibration Factor (DGM #3):	0,996		Dimensionless
Equipment number (DGM #3):	EM 070		

Tunnel

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

Project nu.	PI 20183
Date	07-01-2019
Technicien	m.m

Fuel data

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

Default Fuel Values

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

Adjunct to ASTM E XXXX Wood Heater Cordwood Test Method - May 10, 2017 Version
Cordwood Fuel Load Calculators - 10 lb/ft³ Nominal Load Density
Core 45-65% of Total Load Weight, Remainder 35-55% of Total Load Weight
Values to be input manually

For All Usable Firebox Volumes - High Fire Test Only

	Pc. #	Value			Unit	Status	
Nominal Required Load Density (wet basis)		10			lb/ft³		
Usable Firebox Volume		0,82			ft³		
Total Nom. Load Wt. Target		8,17			lb		
Total Load Wt. Allowable Range		7,80	to	8,60	lb		
Core Target Wt. Allowable Range		3,70	to	5,30	lb		
Remainder Load Wt. Allowable Range		2,90	to	4,50	lb		Mid-Point
Core Load Pc. Wt. Allowable Range		1,20	to	2,00	lb		1,60
Remainder Load Pc. Wt. Allowable Range		0,80	to	4,50	lb		2,65
Core Load Piece Wt. Actual	1	1,61			lb	In Range	
	2	1,65			lb	In Range	
	3	1,66			lb	In Range	
Core Load Total. Wt. Actual		4,92			lb	In Range	
Remainder Load Piece Wt.	1	3,06			lb	In Range	
(1 to 3 Pcs.)	2				lb	NA	
	3				lb	NA	
Remainder Load Tot. Wt. Act		3,06			lb	In Range	
Total Load Wt. Actual		7,98			lb	In Range	
Core % of Total Wt.		62%				In Range	45-65%
Remainder % of Total Wt.		38%				In Range	35-55%
Actual Load % of Nominal Target		98%				In Range	95-105%
Actual Fuel Load Density		9,8			lb/ft³		

Kindling and Start-up Fuel						
Maximim Kindling Wt. (20% of Tot. Load Wt.)			1,60	lb		
Actual Kindling Wt.			1,30	lb	In Range	16,3%
Maximum Start-up Fuel Wt. (30% of Tot. Load Wt.)			2,39	lb		
Actual Start-up Fuel Wt.			2,00	lb	In Range	25,1%
Allowable Residual Start-up Fuel Wt. Range	0,8	to	1,6	lb		Mid-Point
Actual Residual Start-up Fuel Wt.			1	lb	In Range	1,2
Total Wt. All Fuel Added (wet basis)			11,28	lb		

High Fire Test Run End Point Range	Low		High			Mid-Point
Based on Fuel Load Wt. (w/tares)	0,7	to	0,9	lb		0,8
Actual Fuel Load Ending Wt.			0,8	lb	In Range	

Load pieces Length in. 14 in.

Fuel Piece Moisture Reading (%-dry basis) 1	2	3	Ave.		Pc. Wt. Dry Basis			
19,3	23	21	21,1	In Range	1,33	lb	0,60	kg
19,6	19,4	19,6	19,5	In Range	1,38	lb	0,63	kg
22,1	23,1	22,1	22,4	In Range	1,35	lb	0,61	kg
21	22,9	23,1	22,3	In Range	2,50	lb	1,14	kg
			NA	NA	NA	lb	NA	kg
			NA	NA	NA	lb	NA	kg
Total Load Ave. MC (%-dry basis)			21,5	In Range				
Total Load Ave. MC % (wet basis)			17,7					
Total Test Load Weight (dry basis)					6,57	lb	2,98	kg
Kindling Moisture (%-dry basis)								
9	9	9	9,0	In Range	1,19	lb	0,54	kg
Start-up Fuel Moisture Readings (%-dry basis)								
20	20	20	20,0	In Range	1,67	lb	0,76	kg
Total Wt. All Fuel Added (dry basis)					9,43	lb	4,28	kg
Total Wt. All Fuel Burned (dry basis)					7,6	lb	3,5	kg

Load high fire

DATA 2019-01-07 EPA PI 20183 RUN 1 LOW

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

Cordwood Fuel Load Calculators - 12 lb/ft^3 Nominal Load Density

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

Values to be input manually

For Usable Firebox Volumes up to 3.0 ft^3 - Low and Medium Fire

Nominal Required Load Density (wet basis)	12	lb/ft^3				
Usable Firebox Volume	0,82	ft^3				
Total Nom. Load Wt. Target	9,804	lb				
Total Load Wt. Allowable Range	9,31	to	10,29	lb		
Core Target Wt. Allowable Range	4,4118	to	6,37	lb		
Remainder Load Wt. Allowable Range	3,43	to	5,39	lb		
						Mid-Point
Core Load Fuel Pc. Wt. Allowable Range	1,47	to	2,45	lb		1,96
Remainder Load Pc. Wt. Allowable Range	0,98	to	2,94	lb		1,96
	Pc. #					
Core Load Piece Wt. Actual	1	1,97	lb	In Range		
	2	1,88	lb	In Range		
	3	1,79	lb	In Range		
Core Load Total. Wt. Actual		5,64	lb	In Range		
	Pc. #					
Remainder Load Piece Wt.	1	1,32	lb	In Range		
(2 or 3 Pcs.)	2	2,54	lb	In Range		
	3		lb	NA		
Remainder Load Piece Weight Ratio - Small/Large		52%		In Range	≤ 67%	
Remainder Load Tot. Wt. Act		3,86	lb	In Range		
Total Load Wt. Actual		9,50	lb	In Range		
Core % of Total Wt.		59%		In Range	45-65%	
Remainder % of Total Wt.		41%		In Range	35-55%	
Actual Load % of Nominal Target		97%		In Range	95-105%	
Actual Fuel Load Density		11,6	lb/ft^3			
Allowable Charcoal Bed Wt. Range (lb)	1,0	to	1,9		Mid-Point	
Actual Charcoal Bed Wt.		1,1	lb	In Range	1,4	
Actual Fuel Load Ending Wt.		0,0	lb	Valid Test	≥ 90%	
Total Wt. of Fuel Burned During Test Run lb.		9,5	lb			
Load pieces Length in.		14	in.			

Fuel Piece Moisture Reading (%-dry basis)					Pc. Wt. Dry Basis			
1	2	3	Ave.					
19,1	19	19	19,0	In Range	1,66	lb	0,75	kg
19,9	22,1	21,3	21,1	In Range	1,55	lb	0,70	kg
21	23	23	22,3	In Range	1,47	lb	0,67	kg
19,1	19,6	19,1	19,3	In Range	1,11	lb	0,50	kg
21	23	22,6	22,2	In Range	2,08	lb	0,94	kg
			NA	NA	NA	lb	NA	kg
Total Load Ave. MC % (dry basis)			20,9	In Range				
Total Load Ave. MC % (wet basis)			17,3					
Total Test Load Weight (dry basis)				→	7,86	lb	3,56	kg
Total Fuel Weight Burned During Test Run (dry basis)					7,9	lb	3,56	kg

	Nominal Required Load Density (wet basis)	12	lb/ft³			
	Usable Firebox Volume Total Nom. Load Wt.		ft³			
	Target					
	Total Load Wt. Allowable		0 lb			
Total					lb	
					lb	
	Core Target Wt. Allowable Range	0,00	to	0,00		
Wt. of					lb	Mid-Point
	Remainder Load Wt. Allowable Range	0,00	to	0,00		0,00
	Core Load Fuel Pc. Wt. Allowable Rangeto	0,00		0,00	lb	
	Remainder Load Pc. Wt. Allowable Rangeto	0,00		0,00	lb	
Fuel						0,00
Burned		Pc. #				
	Core Load Piece Wt. Actual	1		lb	In Range	
		2		lb	In Range	
		3		lb	In Range	
During					In Range	
	Core Load Total. Wt. Actual		0,00	lb		
		Pc. #			In Range	
Test	Remainder Load Piece Wt.	1		lb	In Range	
					In Range	
					NA	
Run					#NOMBRE!	
					In Range	
					In Range	
lb.0,0 lb					#DIV/0!	
					#DIV/0!	
					#DIV/0!	
Load	(3 or 4 Pcs)	2		lb		
min-		3		lb		
med		4		lb		
			#NOMBRE!			
			0,00	lb		
			0,00	lb		≤ 67%
	Remainder Load Piece Weight Ratio - Small/Large					
	Remainder Load Tot. Wt. Act					
	Total Load Wt. Actual					45-65%
	Core % of Total Wt. #DIV/0! Remainder % of Total Wt.	#DIV/0!				35-55%
	Actual Load % of Nominal Target #DIV/0!					95-105%
	Actual Fuel Load Density		#DIV/0!	lb/ft³		
	Allowable Charcoal Bed Wt. Range (lb)	0,1	to	-0,1		Mid-Point
	Actual Charcoal Bed Wt.			lb	Out of Range	0,0
	Actual Fuel Load Ending Wt.			lb	Valid Test	≥ 90%

Fuel Piece Moisture Reading (%-dry basis)

1	2	3	Ave.		Pc. Wt. Dry Bais			
			#DIV/0!	#DIV/0!	#DIV/0!	lb	#DIV/0!	kg
				#DIV/0!	#DIV/0!	lb	#DIV/0!	kg
				#DIV/0!	#DIV/0!	lb	#DIV/0!	kg
			#DIV/0!					
			#DIV/0!					
				#DIV/0!	#DIV/0!	lb	#DIV/0!	kg
				#DIV/0!	#DIV/0!	lb	#DIV/0!	kg
			#DIV/0!	#DIV/0!	#DIV/0!	lb	#DIV/0!	kg
				NA	NA	lb	NA	kg
				#DIV/0!				
			#DIV/0!		#DIV/0!	lb	#DIV/0!	kg
			#DIV/0!			lb		
			NA					
Total Load Ave. MC % (dry basis)			#DIV/0!					
Total Load Ave. MC % (wet basis)			#DIV/0!					

Total Test Load Weight (dry basis)
Total Fuel Weight Burned During Test Run (dry basis)

#DIV/0!		#DIV/0!	kg

	Start	End
Barometer (kPa):	102,9	102,8
Barometer (in.Hg):	30,386359	30,35682857
Dry Bulb (F):	70,34	75,31
Humidity (%):	19,9	20,6
Air velocity (ft/min)	0	0

High fire test

DGM #1	Final:	29621,802 cuft 29613,749 cuft	Final:	838796,010	Liter Liter
	Initial:	27879,043 cuft 27871,016 cuft	Initial:	838567,960	Liter Liter
DGM #2	Final:		Final:	789446,580	cuft cuft
	Initial:		Initial:	789219,260	
DGM room			Final:	208,880	
			Initial:	184,160	

min or med burnrate

DGM #1	Final:	29648,079 cuft 29621,955 cuft	Final:	839540,080	Liter Liter
	Initial:	27905,264 cuft 27879,226 cuft	Initial:	838800,350	Liter Liter
DGM #2	Final:		Final:	790189,050	cuft cuft
	Initial:		Initial:	789451,750	
DGM room			Final:	289,880	
			Initial:	208,880	

Numéro de la ligne dans "Raw data" à partir duquel les données du test commence	202
Numéro de la ligne dans "Raw data" à partir duquel les données du highfire test commence	217
Numéro de la ligne dans "Raw data" à partir duquel les données du min ou medium fire test commence	284

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

Project nu.	PI 20183
Date	07-01-2019
Technicien	M.M

Key in data

Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure:in. H20 | 0,2 | Barometer:
30,386 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= 1,002

Pour un tunnel moins de 12", prendre 4 lectures

	TUNNEL TUNNEL SQUARE VELOCITY TEMP ROOT		
	In. wc	°F	
A center	0,061	71,09	0,2470
B center	0,058	70,19	0,2408
A1	0,055	70,93	0,2345
A2	0,062	70,93	0,2490
A3	0,070	70,73	0,2646
A4	0,067	70,51	0,2588
B1	0,061	70,490	
B2	0,065	70,990	
B3	0,051	71,330	
B4	0,049	71,320	
			0,2470
			0,2550
			0,2258
			0,2214
AVERAGE	0,0599	70,8510	0,2444

Project nu. PI 20183	
Date	07-01-2019
Technicien	M.M

Filter set weight highfire

Number
Before (1)
Before (2)
Before (3)
Before (4)
Before (5)
Before (6)
After (1)
After (2)
After (3)
After (4)
After (5)
After (6)

Difference
Total

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		
12	400	401	13	36	402	403	16	42	404	405	43	406		
94,5384	0,0871	0,0869	34,8191	107,7341	0,0849	0,0867	34,7622	110,3111	0,0856	0,0862	34,3582	0,0851	2018-12-20	17:00
94,5384	0,0870	0,0868	34,8192	107,7342	0,0848	0,0866	34,7623	110,3110	0,0857	0,0862	34,3583	0,0850	2019-01-07	08:00
94,5400	0,0882	0,0871	34,8195	107,7342	0,0848	0,0866	34,7623	110,3113	0,0871	0,0865	34,3590	0,0852	2019-01-07	15:00
94,5388	0,0881	0,0869	34,8194	107,7342	0,0848	0,0866	34,7623	110,3111	0,0869	0,0863	34,3587	0,0851	2019-01-15	15:00
94,5388	0,0881	0,0869	34,8194	107,7342	0,0848	0,0866	34,7623	110,3111	0,0869	0,0863	34,3587	0,0851	2019-01-21	08:00
94,5388	0,0881	0,0869	34,8194	107,7342	0,0848	0,0866	34,7623	110,3111	0,0869	0,0863	34,3587	0,0851	2019-01-21	08:00
0,0004	0,0011	0,0001	0,0002	0,0000	0,0000	0,0000	0,0000	0,0001	0,0012	0,0001	0,0004	0,0001	(mg) 1,8	1,8
													1,8	0,1

Total ajusté (mg) **1,70** **1,70** **1,70**

Project nu.	PI 20183
Date	07-01-2019
Technicien	mm

Filter set weight Low/ medium fire

Number
Before (1)
Before (2)
Before (3)
Before (4)
Before (5)
Before (6)
After (1)
After (2)
After (3)
After (4)
After (5)
After (6)

Difference
Total

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		
17	407	408	24	19	409	410	27	34	411	412	41	413		
108,9490	0,0886	0,0841	34,4435	109,0904	0,0849	0,0865	35,1074	110,1031	0,0840	0,0851	35,0733	0,0852	2018-12-20	17:00
108,9491	0,0885	0,0840	34,4436	109,0905	0,0850	0,0864	35,1075	110,1032	0,0841	0,0852	35,0734	0,0853	2019-01-07	08:00
108,9497	0,0892	0,0841	34,4442	109,0908	0,0852	0,0864	35,1081	110,1034	0,0853	0,0849	35,0745	0,0854	2019-01-07	17:00
108,9493	0,0892	0,0840	34,4439	109,0906	0,0852	0,0863	35,1077	110,1033	0,0850	0,0849	35,0738	0,0854	2019-01-15	15:00
108,9492	0,0892	0,0840	34,4438	109,0906	0,0852	0,0863	35,1077	110,1033	0,0850	0,0850	35,0738	0,0854	2019-01-21	08:00
108,9492	0,0892	0,0840	34,4438	109,0906	0,0852	0,0863	35,1077	110,1033	0,0850	0,0850	35,0738	0,0854	2019-01-21	08:00
0,0001	0,0007	0,0000	0,0002	0,0001	0,0002	-0,0001	0,0002	0,0001	0,0009	-0,0002	0,0004	0,0001	(mg) 1	1,4
													1,2	0,1

Total ajusté (mg) **0,90** **1,30** **1,10**

Project nu.	PI 20183
Date	07-01-2019
Technicien	M.M

Filter set weight Low fire

SFBA EPA EMISSION RESULTS

RESULTS			
Average emission rate:	4,4	g/hr	
Burn Rate :	3,651	Dry kg/hr	
Test Duration:	**58**	min	

PRESSURE FACTOR:	DGM 1	0,99440	
	DGM 2	0,99523	
	DGM 3	1,01509	
TEMPERATURE FACTORS	DGM 1	0,97375	
	DGM 2	0,97357	
	DGM 3	0,98360	
VOLUMES SAMPLED	DGM 1	7,877	SCft
	DGM 2	7,679	Scft
	DGM 3	24,577	SCft
TOTAL TUNNEL VOLUME :		18511	
SAMPLE RATIOS			
	Sample Train 1:	2350,095	
	Sample Train 2:	2410,463	
Paticulate concentration			
	Sample Train 1	**0,000229**	g/dscf
	Sample Train 2	**0,000234**	g/dscf
	Room	**0,000004**	g/dscf
TOTAL EMISSIONS			
	Sample Train 1	**4,15**	g
	Sample Train 2	**4,26**	g
EMISSION RATES			
	Sample Train 1	**4,30**	g/hr
	Sample Train 2	**4,41**	g/hr
1st hour emission rate		**4,23**	g/hr

BAROMETRIC PRESSURE			
	Average:	30,37159357	in Hg
	Start:	30,38635856	in Hg
	End:	30,35682857	in Hg
DGM CONTROLLER VALUES			
DGM 1	Final:	29621,802	Cuft
	Initial:	29613,749	Cuft
DGM 2	Final:	27879,043	Cuft
	Initial:	27871,016	Cuft
DGM #3	Final:	208,880	Cuft
	Initial:	184,160	Cuft
TEMPERATURES			
	DGM 1	542,231	°R
	DGM 2	542,336	°R
CALIBRATION FACTORS			
	DGM 1	1,0101	
	DGM 2	0,9873	
	DGM #3	0,9958	
TUNNEL FLOW RATE:		319,156	Dscfm
PARTICULATE CATCH			
	Total Sample Train 1:	1,80	mg
	Total Sample Train 2:	1,80	mg
	Total Sample Train 1 1st hour:	1,80	mg
DEVIATION:		1,29%	

	Train 1	Train 2
Cs	0,0002285	0,00023439

Elapsed		Weight			Flue	Room	Tunnel	Unit	Unit	Unit	Unit	Unit	Reading	Inlet T	Outlet T	Temp	Reading	Inlet T	Outlet T	Temp
Time	Raw data row	Remaining	CO	CO_2	Gas	Temp	Dry Bulb	Top	Back	R.Side	L.Side	Bottom								
min		lbs	%	%	°F	°F	°F	°F	°F	°F	°F	°F	cuft/min	oF	oF	oF	cuft/min	oF	oF	oF
0,00	202,00	3,4	0,0	0,2	100,0	72,9	85,1	75,9	70,9	72,0	71,8	70,9	0,13	78,89	79,47	84,38	0,13	79,32	79,29	84,12
1,0	203,0	3,3	0,0	0,9	121,4	72,9	85,6	81,2	71,0	72,3	72,3	70,9	0,13	78,50	79,36	84,08	0,13	79,15	79,19	83,81
2,0	204,0	3,3	0,0	1,2	145,6	73,0	85,0	96,6	71,3	73,0	73,4	70,9	0,13	78,25	79,27	83,77	0,13	78,99	79,07	83,52
3,0	205,0	3,2	0,0	2,7	201,7	72,6	86,4	125,6	71,6	73,9	74,9	70,9	0,13	78,09	79,15	84,25	0,13	78,84	78,97	84,01
4,0	206,0	3,1	0,1	3,9	255,1	72,8	87,8	156,9	72,1	75,2	77,0	70,9	0,13	77,97	79,07	84,44	0,13	78,73	78,88	84,26
5,0	207,0	3,0	0,1	4,7	317,7	73,0	90,5	191,9	72,9	77,2	79,5	71,0	0,13	77,85	78,98	84,19	0,13	78,63	78,82	84,06
6,0	208,0	2,9	0,1	5,7	389,4	73,2	95,7	234,9	74,1	80,6	82,5	71,0	0,13	77,81	78,96	83,87	0,13	78,54	78,77	83,78
7,0	209,0	2,6	0,1	7,2	488,3	73,2	103,7	291,8	76,0	85,4	86,9	71,0	0,13	77,90	78,95	83,60	0,13	78,61	78,78	83,51
8,0	210,0	2,4	0,3	9,9	584,1	73,8	111,9	374,0	79,0	92,5	93,4	71,1	0,13	78,04	79,00	83,37	0,13	78,70	78,82	83,26
9,0	211,0	2,1	0,3	12,2	681,9	74,1	121,2	460,8	83,2	102,8	101,9	71,2	0,13	78,20	79,04	83,19	0,13	78,82	78,87	83,06
10,0	212,0	1,9	0,3	13,9	730,5	74,6	127,1	539,6	88,5	116,3	112,3	71,4	0,13	78,47	79,15	83,05	0,13	79,02	78,95	82,93
11,0	213,0	1,6	0,4	14,6	736,7	74,5	128,3	609,5	94,7	132,6	124,6	71,8	0,13	78,82	79,31	82,97	0,13	79,30	79,10	82,81
12,0	214,0	1,4	0,4	14,6	689,1	75,2	127,1	659,8	101,8	152,3	138,8	72,4	0,13	79,18	79,44	82,88	0,13	79,57	79,24	82,72
13,0	215,0	1,2	0,5	12,5	668,5	75,5	126,4	695,3	109,6	174,8	155,0	73,4	0,13	79,54	79,58	82,81	0,13	79,84	79,38	82,63
14,0	216,0	1,0	0,6	12,0	648,7	75,9	125,4	722,9	118,0	198,9	173,0	74,9	0,13	79,85	79,73	82,72	0,13	80,08	79,53	82,58
15,0	217,0	8,6	0,6	2,3	473,2	75,5	141,9	711,6	128,2	223,9	192,7	77,0	0,13	80,18	79,88	82,75	0,13	80,35	79,70	82,58
16,0	218,0	8,8	0,2	3,4	510,7	75,7	121,4	691,5	136,6	245,8	211,7	79,3	0,13	80,49	80,02	82,75	0,13	80,57	79,85	82,56
17,0	219,0	8,7	0,2	5,8	512,7	75,7	119,1	682,9	143,0	263,5	228,3	81,9	0,13	80,79	80,15	82,73	0,13	80,83	79,99	82,55
18,0	220,0	8,6	0,3	5,6	509,0	75,5	118,4	677,3	148,4	277,5	241,8	84,6	0,13	81,02	80,26	82,75	0,13	81,04	80,12	82,53
19,0	221,0	8,5	0,3	5,5	538,3	75,8	120,0	680,4	152,9	288,5	252,3	87,4	0,13	81,24	80,40	82,78	0,13	81,23	80,25	82,56
20,0	222,0	8,3	0,2	6,9	571,6	76,0	122,3	694,8	157,0	297,4	260,6	90,4	0,13	81,43	80,51	82,83	0,13	81,44	80,37	82,61
21,0	223,0	8,2	0,2	8,0	603,8	75,9	124,7	716,3	160,9	305,1	267,6	93,7	0,13	81,62	80,62	82,87	0,13	81,63	80,50	82,63
22,0	224,0	8,0	0,2	8,6	633,9	76,3	127,5	741,0	165,1	312,4	273,8	97,2	0,13	81,79	80,78	82,95	0,13	81,85	80,66	82,70
23,0	225,0	7,8	0,1	9,4	668,2	76,0	130,7	773,2	169,4	319,3	279,6	100,9	0,13	82,02	80,94	83,04	0,13	82,07	80,78	82,77
24,0	226,0	7,6	0,1	10,6	705,7	76,3	134,2	809,6	173,8	326,3	285,2	104,6	0,13	82,24	81,07	83,14	0,13	82,31	80,94	82,88
25,0	227,0	7,3	0,1	11,7	736,8	76,7	137,7	845,2	178,6	333,5	290,9	108,6	0,13	82,50	81,25	83,30	0,13	82,55	81,10	82,99
26,0	228,0	7,1	0,1	12,6	750,1	76,9	140,0	874,5	184,0	341,3	296,7	112,9	0,13	82,77	81,43	83,45	0,13	82,83	81,28	83,16
27,0	229,0	6,9	0,1	12,7	752,3	76,9	141,0	894,1	190,1	349,6	302,9	117,3	0,13	83,08	81,60	83,63	0,13	83,11	81,47	83,32
28,0	230,0	6,7	0,1	12,7	759,1	77,1	141,4	910,7	196,8	358,9	309,3	121,9	0,13	83,34	81,78	83,82	0,13	83,38	81,65	83,52
29,0	231,0	6,5	0,1	13,0	762,2	77,7	140,2	926,3	204,3	369,1	316,4	126,8	0,13	83,49	81,89	84,03	0,13	83,54	81,79	83,71
30,0	232,0	6,2	0,1	13,4	786,1	77,8	141,3	940,2	212,3	380,2	324,3	131,7	0,13	83,53	81,97	84,26	0,13	83,63	81,90	83,88
31,0	233,0	5,9	0,2	14,0	810,5	77,9	143,1	956,8	219,9	392,3	333,1	136,8	0,13	83,57	82,02	84,45	0,13	83,71	82,00	84,05
32,0	234,0	5,6	0,3	14,9	819,7	78,1	143,5	971,0	227,8	404,9	342,7	142,0	0,13	83,63	82,10	84,67	0,13	83,81	82,13	84,27
33,0	235,0	5,4	0,3	15,0	815,8	78,4	143,5	984,0	236,5	418,1	353,2	147,4	0,13	83,71	82,16	84,91	0,13	83,88	82,22	84,48
34,0	236,0	5,2	0,2	15,0	806,3	77,8	143,8	992,1	245,8	431,1	364,0	153,0	0,13	83,77	82,22	85,12	0,13	84,00	82,30	84,70
35,0	237,0	4,9	0,2	14,7	794,3	78,0	145,7	996,0	255,7	443,5	376,0	158,4	0,13	84,02	82,32	85,34	0,13	84,18	82,42	84,94
36,0	238,0	4,7	0,2	14,3	781,4	78,0	145,8	1000,3	266,2	456,6	388,0	164,7	0,13	84,34	82,43	85,57	0,13	84,39	82,54	85,14
37,0	239,0	4,5	0,2	13,9	771,4	77,8	145,9	1001,8	276,8	469,0	401,1	170,5	0,13	84,64	82,53	85,80	0,13	84,62	82,66	85,36
38,0	240,0	4,3	0,1	13,6	765,7	77,7	145,8	1001,2	287,9	480,6	414,0	176,7	0,13	84,97	82,66	86,02	0,13	84,85	82,82	85,56
39,0	241,0	4,1	0,1	13,4	760,2	78,1	146,2	1002,4	299,0	491,8	426,7	183,1	0,13	85,28	82,80	86,27	0,13	85,07	82,97	85,77
40,0	242,0	3,9	0,1	13,2	754,6	78,5	146,0	1001,4	309,9	502,0	439,3	189,4	0,13	85,55	82,94	86,52	0,13	85,31	83,12	86,00
41,0	243,0	3,7	0,1	13,0	745,3	78,4	145,4	999,5	321,1	511,2	451,6	196,1	0,13	85,81	83,05	86,73	0,13	85,53	83,26	86,20
42,0	244,0	3,5	0,1	12,5	734,4	78,9	144,4	994,4	332,1	520,1	463,3	203,4	0,13	86,04	83,20	86,96	0,13	85,74	83,41	86,42
43,0	245,0	3,4	0,1	12,1	726,9	78,8	144,2	985,2	343,4	527,9	474,0	210,4	0,13	86,23	83,33	87,21	0,13	85,96	83,57	86,60
44,0	246,0	3,2	0,1	12,1	720,6	79,1	143,8	975,4	355,0	536,0	484,5	218,3	0,13	86,41	83,47	87,44	0,13	86,13	83,72	86,81
45,0	247,0	3,1	0,1	11,9	715,6	78,7	143,7	966,8	366,6	543,1	494,8	225,5	0,13	86,58	83,60	87,66	0,13	86,33	83,88	86,99
46,0	248,0	2,9	0,1	11,7	710,4	78,9	142,4	959,7	379,1	548,8	503,2	232,7	0,13	86,75	83,73	87,86	0,13	86,53	84,02	87,20
47,0	249,0	2,8	0,1	11,4	701,9	78,8	141,7	951,1	390,8	554,7	511,8	240,4	0,13	86,92	83,84	88,00	0,13	86,68	84,13	87,38
48,0	250,0	2,6	0,1	11,2	691,4	79,1	139,7	943,4	403,0	560,3	519,1	248,3	0,13	87,07	83,99	88,21	0,13	86,82	84,28	87,55
49,0	251,0	2,5	0,1	10,6	672,7	79,0	137,0	928,3	415,1	565,7	526,1	256,6	0,13	87,09	84,08	88,40	0,13	86,90	84,37	87,71
50,0	252,0	2,4	0,1	9,6	655,5	79,4	134,2	908,8	426,3	570,3	532,8	264,8	0,13	86,97	84,15	88,57	0,13	86,90	84,47	87,85
51,0	253,0	2,3	0,1	8,6	641,3	80,1	131,1	888,2	437,4	574,0	538,5	273,0	0,13	86,83	84,19	88,69	0,13	86,83	84,50	87,99
52,0	254,0	2,3	0,2	8,2	627,9	79,2	129,9	867,5	447,9	576,9	543,4	281,4	0,13	86,57	84,18	88,82	0,13	86,73	84,51	88,08
53,0	255,0	2,2	0,2	7,8	619,2	78,7	128,1	848,2	457,7	579,7	548,6	290,0	0,13	86,30	84,17	88,89	0,13	86,64	84,52	88,18
54,0	256,0	2,1	0,2	7,6	610,4	79,2	126,2	832,6	466,9	580,5	551,8	297,9	0,13	86,09	84,16	88,94	0,13	86,54	84,50	88,23
55,0	257,0	2,0	0,3	7,4	606,5	79,4	125,0	816,5	474,3	580,7	555,1	305,6	0,13	85,92	84,14	89,03	0,13	86,42	84,50	88,28
56,0	258,0	1,9	0,3	7,3	601,6	79,0	124,7	802,8	480,4	580,6	557,2	313,7	0,13	85,70	84,09	89,07	0,13	86,28	84,47	88,32
57,0	259,0	1,9	0,4	7,1	596,2	78,8	124,1	789,3	486,2	580,0	558,9	321,9	0,13	85,56	84,08	89,11	0,13	86,15	84,44	88,31
58,0	260,0	1,8	0,4	7,0	587,7	78,4	122,8	776,5	490,9	579,0	559,2	329,4	0,13	85,40	84,05	89,12	0,13	86,03	84,41	88,30

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 1,04 g/hr

Burn Rate : 1,114 Dry kg/hr

Test Duration: **192** min

PRESSURE FACTOR:	DGM 1	0,99440	
	DGM 2	0,99523	
	DGM 3	1,01509	
TEMPERATURE FACTORS	DGM 1	0,97875	
	DGM 2	0,97762	
	DGM 3	0,98615	
VOLUMES SAMPLED	DGM 1	25,681	SCft
	DGM 2	25,012	Scft
	DGM 3	80,740	SCft
TOTAL TUNNEL VOLUME :		66689	

SAMPLE RATIOS

Sample Train 1:	2596,827	
Sample Train 2:	2666,336	

Paticulate concentration

Sample Train 1	**0,000055**	g/dscf
Sample Train 2	**0,000048**	g/dscf
Room	**0,000001**	g/dscf

TOTAL EMISSIONS

Sample Train 1	**3,55**	g
Sample Train 2	**3,12**	g

EMISSION RATES

Sample Train 1	**1,11**	g/hr
Sample Train 2	**0,97**	g/hr
1st hour emission rate	**2,60**	g/hr

	Train 1	Train 2
Cs	5,452E-05	4,7978E-05

BAROMETRIC PRESSURE

Average:	30,37159357	in Hg
Start:	30,38635856	in Hg
End:	30,35682857	in Hg

DGM CONTROLLER VALUES

DGM 1	Final:	29648,079	Cuft
	Initial:	29621,955	Cuft
DGM 2	Final:	27905,264	Cuft
	Initial:	27879,226	Cuft
DGM #3	Final:	289,880	Cuft
	Initial:	208,880	Cuft

TEMPERATURES

DGM 1	539,463	°R
DGM 2	540,089	°R

CALIBRATION FACTORS

DGM 1	1,0101
DGM 2	0,9873
DGM #3	0,9958

TUNNEL FLOW RATE: 347,339 Dscfm

PARTICULATE CATCH

Total Sample Train 1:	1,40 mg
Total Sample Train 2:	1,20 mg
Total Sample Train 1 1st hour:	1,00 mg

DEVIATION: 6,54%

*		*	*	*	*1	*2	*3	*4	*5	*6	*7	*8	Mass flow 1	DGM 1	DGM 1	Filter 1	Mass flow 2	DGM 2	DGM 2	Filter 2
Elapsed		Weight			Flue	Room	Tunnel	Unit	Unit	Unit	Unit	Unit	Reading	Inlet T	Outlet T	Temp	Reading	Inlet T	Outlet T	Temp
Time	Raw data row	Remaining	CO	CO_2	Gas	Temp	Dry Bulb	Top	Back	R.Side	L.Side	Bottom								
min		lbs	%	%	°F	°F	°F	°F	°F	°F	°F	°F	cuft/min	oF	oF	oF	cuft/min	oF	oF	oF
0,00	284,00	9,5	0,4	3,3	297,3	76,1	113,0	489,1	435,1	472,8	481,7	391,5	0,13	82,08	82,47	82,08	0,13	82,98	83,05	82,90
1,0	285,0	9,4	0,2	5,3	328,3	76,3	102,8	465,8	432,0	467,2	476,4	389,4	0,13	81,98	82,42	82,08	0,13	82,86	82,96	82,82
2,0	286,0	9,3	0,5	2,8	360,6	76,3	100,8	462,5	423,3	461,6	470,6	386,0	0,13	81,86	82,38	82,05	0,13	82,74	82,90	82,76
3,0	287,0	9,2	0,5	6,7	414,8	76,2	99,5	495,4	410,2	454,7	465,7	383,2	0,13	81,85	82,33	81,99	0,13	82,67	82,85	82,68
4,0	288,0	8,9	0,4	10,2	486,5	76,1	102,2	547,3	399,1	449,1	460,9	381,5	0,13	81,82	82,29	81,95	0,13	82,55	82,77	82,61
5,0	289,0	8,8	0,3	12,6	515,6	77,0	103,2	597,1	388,4	443,7	457,0	379,3	0,13	81,81	82,27	81,93	0,13	82,48	82,71	82,54
6,0	290,0	8,6	0,3	12,8	531,7	76,8	105,2	642,1	379,0	438,8	453,6	376,3	0,13	81,76	82,24	81,97	0,13	82,45	82,68	82,53
7,0	291,0	8,4	0,3	13,0	544,2	76,2	105,6	681,9	371,0	435,5	451,3	373,8	0,13	81,68	82,20	82,00	0,13	82,40	82,66	82,50
8,0	292,0	8,2	0,3	13,2	552,2	76,7	106,6	716,5	364,3	434,3	449,8	371,7	0,13	81,67	82,19	82,03	0,13	82,38	82,64	82,54
9,0	293,0	8,0	0,3	13,3	557,2	77,0	106,5	747,8	358,0	433,6	449,0	369,2	0,13	81,71	82,17	82,03	0,13	82,38	82,66	82,54
10,0	294,0	7,9	0,3	13,4	559,8	77,0	106,5	776,3	352,2	433,6	449,5	365,2	0,13	81,79	82,15	82,05	0,13	82,34	82,63	82,51
11,0	295,0	7,7	0,5	13,5	560,4	77,2	106,3	799,7	347,3	434,7	451,4	361,7	0,13	81,89	82,13	82,08	0,13	82,33	82,62	82,53
12,0	296,0	7,5	0,5	13,5	560,2	77,4	106,3	820,9	342,8	436,5	453,1	358,5	0,13	81,98	82,13	82,12	0,13	82,36	82,60	82,55
13,0	297,0	7,3	0,5	13,3	556,8	77,5	105,9	836,1	338,7	439,1	455,6	355,2	0,13	82,09	82,13	82,17	0,13	82,41	82,61	82,58
14,0	298,0	7,2	0,5	13,1	551,9	77,7	105,9	846,9	335,1	442,1	458,8	351,5	0,13	82,16	82,11	82,23	0,13	82,43	82,62	82,61
15,0	299,0	7,0	0,4	12,9	551,7	77,9	105,7	856,1	331,8	445,6	462,1	348,9	0,13	82,27	82,12	82,27	0,13	82,48	82,63	82,66
16,0	300,0	6,9	0,4	12,8	547,5	77,2	106,1	862,1	328,9	449,0	465,7	346,5	0,13	82,32	82,10	82,34	0,13	82,53	82,63	82,74
17,0	301,0	6,7	0,4	12,6	545,1	76,7	107,1	865,7	326,5	452,4	469,8	344,2	0,13	82,43	82,13	82,40	0,13	82,58	82,61	82,75
18,0	302,0	6,5	0,3	12,5	541,8	77,0	106,7	871,0	324,0	455,6	473,9	341,5	0,13	82,45	82,13	82,45	0,13	82,58	82,62	82,81
19,0	303,0	6,3	0,3	12,4	540,3	77,2	106,7	874,4	322,0	458,8	477,7	339,4	0,13	82,44	82,10	82,52	0,13	82,56	82,61	82,86
20,0	304,0	6,2	0,3	12,3	534,9	77,2	105,9	873,9	320,1	461,6	481,4	336,5	0,13	82,44	82,09	82,58	0,13	82,57	82,63	82,92
21,0	305,0	6,0	0,3	12,1	531,4	77,7	105,4	873,7	318,3	464,5	485,0	333,7	0,13	82,39	82,05	82,60	0,13	82,55	82,62	82,96
22,0	306,0	5,9	0,3	11,9	528,5	78,2	104,6	872,5	316,5	466,8	489,3	331,4	0,13	82,40	82,03	82,65	0,13	82,56	82,59	83,01
23,0	307,0	5,8	0,2	11,7	527,3	77,5	104,4	870,8	315,7	469,0	492,7	329,8	0,13	82,49	82,04	82,71	0,13	82,58	82,59	83,07
24,0	308,0	5,6	0,2	11,7	525,9	77,0	106,1	870,3	314,5	471,4	496,7	328,8	0,13	82,53	82,03	82,73	0,13	82,61	82,57	83,09
25,0	309,0	5,5	0,2	11,7	521,8	77,2	104,8	869,9	313,6	473,4	499,2	327,7	0,13	82,54	82,00	82,78	0,13	82,61	82,57	83,12
26,0	310,0	5,4	0,2	11,6	520,0	77,5	105,2	868,0	312,8	475,2	502,4	326,0	0,13	82,60	81,99	82,83	0,13	82,62	82,57	83,15
27,0	311,0	5,3	0,2	11,4	516,5	77,3	104,1	867,7	312,3	476,9	505,4	324,5	0,13	82,64	82,01	82,85	0,13	82,65	82,56	83,19
28,0	312,0	5,2	0,2	11,2	515,2	77,9	103,9	866,4	312,0	478,8	508,1	323,2	0,13	82,64	81,97	82,88	0,13	82,65	82,55	83,22
29,0	313,0	5,0	0,2	11,1	512,3	77,5	104,6	864,1	311,8	480,0	510,6	322,4	0,13	82,59	81,95	82,93	0,13	82,64	82,55	83,28
30,0	314,0	4,9	0,2	11,0	508,9	77,5	103,9	862,4	311,8	481,4	513,1	321,3	0,13	82,58	81,93	82,95	0,13	82,63	82,55	83,30
31,0	315,0	4,8	0,2	10,8	505,5	77,7	102,9	858,4	311,8	482,4	516,0	320,2	0,13	82,50	81,92	82,97	0,13	82,58	82,54	83,30
32,0	316,0	4,6	0,1	10,7	502,5	77,4	103,4	855,0	312,2	483,1	518,4	318,2	0,13	82,43	81,88	83,00	0,13	82,54	82,50	83,36
33,0	317,0	4,6	0,1	10,7	501,2	77,8	103,2	854,5	312,6	484,5	520,4	317,9	0,13	82,31	81,81	83,02	0,13	82,46	82,47	83,37
34,0	318,0	4,5	0,1	10,7	499,6	78,2	102,9	853,5	313,0	485,3	522,2	317,4	0,13	82,19	81,77	83,04	0,13	82,39	82,45	83,38
35,0	319,0	4,4	0,1	10,6	496,7	78,1	102,1	853,0	313,5	486,1	523,6	317,2	0,13	82,14	81,72	83,04	0,13	82,37	82,43	83,38
36,0	320,0	4,2	0,1	10,6	495,9	77,9	102,0	852,9	314,3	487,0	525,3	317,0	0,13	82,16	81,69	83,07	0,13	82,35	82,43	83,38
37,0	321,0	4,1	0,1	10,6	495,5	77,8	102,0	853,2	315,4	487,8	527,4	316,9	0,13	82,15	81,67	83,08	0,13	82,36	82,43	83,41
38,0	322,0	4,0	0,1	10,6	491,8	77,5	101,5	852,3	316,5	488,4	529,2	317,0	0,13	82,15	81,63	83,07	0,13	82,36	82,44	83,40
39,0	323,0	3,9	0,1	10,5	487,3	77,2	101,7	850,5	317,9	489,1	529,7	316,7	0,13	82,16	81,60	83,08	0,13	82,37	82,45	83,41
40,0	324,0	3,8	0,1	10,2	484,3	76,8	101,1	846,2	319,2	489,8	531,5	316,3	0,13	82,09	81,55	83,05	0,13	82,35	82,42	83,39
41,0	325,0	3,8	0,1	9,9	477,2	77,6	101,6	839,6	320,7	490,2	532,8	316,3	0,13	82,01	81,52	83,04	0,13	82,30	82,38	83,36
42,0	326,0	3,7	0,1	9,5	470,9	76,8	101,6	831,6	322,0	491,3	533,4	317,2	0,13	82,07	81,52	83,03	0,13	82,31	82,39	83,33
43,0	327,0	3,6	0,1	8,9	465,1	77,0	100,6	822,1	323,3	491,5	534,0	317,1	0,13	82,04	81,47	82,99	0,13	82,30	82,37	83,32
44,0	328,0	3,5	0,1	8,6	459,0	77,4	99,6	814,1	324,3	491,8	533,0	316,8	0,13	81,99	81,48	82,98	0,13	82,27	82,38	83,29
45,0	329,0	3,4	0,1	8,5	453,8	77,3	99,7	804,6	325,2	492,7	533,3	317,8	0,13	81,99	81,46	82,91	0,13	82,25	82,34	83,27
46,0	330,0	3,3	0,1	8,5	453,8	77,2	99,1	796,0	325,7	492,1	533,4	318,2	0,13	81,94	81,43	82,88	0,13	82,22	82,32	83,26
47,0	331,0	3,3	0,1	8,6	455,0	77,1	98,8	790,6	326,6	491,6	533,6	318,4	0,13	81,93	81,43	82,87	0,13	82,17	82,26	83,22
48,0	332,0	3,2	0,1	8,8	457,8	77,3	99,1	789,5	327,4	491,0	533,9	317,6	0,13	81,85	81,39	82,81	0,13	82,12	82,20	83,18
49,0	333,0	3,1	0,1	9,1	459,4	77,8	98,9	788,9	328,8	490,5	534,4	317,6	0,13	81,84	81,38	82,78	0,13	82,10	82,18	83,13
50,0	334,0	3,0	0,2	9,4	462,9	77,3	98,7	791,3	330,8	490,0	535,2	318,2	0,13	81,83	81,40	82,75	0,13	82,10	82,15	83,11
51,0	335,0	2,9	0,2	9,7	465,8	76,8	98,8	791,5	332,8	488,9	535,8	317,1	0,13	81,72	81,38	82,69	0,13	82,05	82,14	83,07
52,0	336,0	2,8	0,1	9,6	465,9	76,8	99,9	793,9	335,5	489,2	536,1	317,5	0,13	81,41	81,31	82,66	0,13	81,86	82,07	83,04
53,0	337,0	2,8	0,1	9,6	465,6	76,8	99,3	794,6	338,0	489,6	537,8	318,4	0,13	81,29	81,25	82,62	0,13	81,76	82,04	83,00
54,0	338,0	2,7	0,1	9,5	462,1	76,5	98,8	796,7	340,5	489,6	538,0	319,2	0,13	81,28	81,22	82,58	0,13	81,74	82,01	82,92
55,0	339,0	2,6	0,1	9,4	458,6	77,0	98,4	794,9	342,4	489,9	538,6	318,3	0,13	81,26	81,19	82,56	0,13	81,69	81,98	82,91
56,0	340,0	2,5	0,1	9,0	451,4	76,5	98,2	787,2	344,5	490,1	539,6	318,5	0,13	81,29	81,18	82,53	0,13	81,64	81,94	82,88
57,0	341,0	2,5	0,1	8,4	447,0	76,6	97,7	779,0	346,8	490,2	539,7	319,2	0,13	81,07	81,13	82,50	0,13	81,53	81,89	82,84
58,0	342,0	2,4	0,1	8,1	445,3	76,0	97,6	774,3	348,7	490,8	540,4	319,5	0,13	81,06	81,09	82,45	0,13	81,50	81,85	82,80
59,0	343,0	2,4	0,1	8,4	446,9	76,6	97,8	772,0	351,1	491,4	540,8	319,9	0,13	81,17	81,11	82,20	0,13	81,50	81,82	82,76
60,0	344,0	2,3	0,1	8,7	444,7	76,4	97,0	770,6	352,9	491,3	540,5	320,6	0,13	81,17	81,07	80,79	0,13	81,50	81,80	82,70
61,0	345,0	2,2	0,1	8,4	440,5	76,3	97,8	765,7	355,3	491,3	541,1	321,1	0,13	81,02	81,00	81,62	0,13	81,38	81,74	82,64
62,0	346,0	2,2	0,1	8,1	437,6	76,0	97,4	759,4	357,9	491,5	541,6	321,6	0,13	81,02	80,97	83,34	0,13	81,38	81,73	82,55
63,0	347,0	2,1	0,1	7,9	435,8	76,7	97,0	755,1	360,3	491,6	541,8	322,0	0,13	80,91	80,94	83,25	0,13	81,30	81,70	82,50
64,0	348,0	2,1	0,1	7,8	431,5	76,8	96,3	751,1	362,5	491,3	541,8	321,4	0,13	80,83	80,88	83,12	0,13	81,20	81,68	82,46
65,0	349,0	2,0	0,2	7,7	428,3	76,8	95,8	744,1	364,9	490,9	542,4	321,6	0,13	80,83	80,84	82,96	0,13	81,20	81,65	82,42
66,0	350,0	2,0	0,2	7,6	423,7	76,1	96,1	734,3	367,0	490,7	543,3	322,7	0,13	80,76	80,77	82,76	0,13	81,12	81,60	82,36
67,0	351,0	1,9	0,2	7,3	416,2	76,1	95,7	725,3	369,1	490,2	542,6	323,4	0,13	80,78	80,75	82,62	0,13	81,12	81,61	82,31
68,0	352,0	1,8	0,3	6,7	407,5	76,0	95,5	711,3	370,9	489,3	541,9	324,1	0,13	80,78	80,71	82,50	0,13	81,13	81,59	82,31
69,0	353,0	1,8	0,4	6,1	400,5	76,3	94,9	698,4	372,6	488,4	540,4	324,2	0,13	80,77	80,68	82,36	0,13	81,10	81,56	82,27
70,0	354,0	1,8	0,4	5,9	394,4	76,4	94,3	684,9	373,7	487,4	539,6	324,5	0,13	80,63	80,64	82,21	0,13	81,00	81,55	82,23
71,0	355,0	1,8	0,4	5,9	390,4	76,3	94,0	674,6	374,8	485,7	537,8	325,1	0,13	80,57	80,58	82,08	0,13	80,96	81,54	82,17
72,0	356,0	1,7	0,4	5,9	387,6	75,9	93,4	664,2	375,3	483,8	536,2	325,5	0,13	80,46	80,54	81,96	0,13	80,89	81,53	82,13

73,0	357,0	1,7	0,3	5,9	386,5	75,9	94,1	654,6	375,2	482,5	534,8	326,1	0,13	80,37	80,48	81,87	0,13	80,83	81,51	82,09
74,0	358,0	1,7	0,3	5,9	384,5	76,0	93,6	647,7	375,3	481,5	532,7	326,0	0,13	80,30	80,47	81,76	0,13	80,77	81,48	82,06
75,0	359,0	1,6	0,3	5,9	383,5	76,1	93,7	642,4	375,0	480,8	530,0	327,2	0,13	80,26	80,39	81,61	0,13	80,74	81,46	82,02
76,0	360,0	1,6	0,3	6,0	384,0	75,9	93,1	638,3	374,6	479,7	528,0	327,2	0,13	80,18	80,34	81,48	0,13	80,68	81,43	81,93
77,0	361,0	1,5	0,3	6,1	385,5	76,0	92,9	636,1	373,9	478,7	525,6	327,4	0,13	80,19	80,33	81,37	0,13	80,66	81,38	81,91
78,0	362,0	1,5	0,3	6,2	386,9	75,9	93,2	637,5	373,0	477,8	523,6	326,9	0,13	80,06	80,28	81,31	0,13	80,59	81,35	81,85
79,0	363,0	1,5	0,2	6,1	382,7	75,8	93,0	632,8	372,1	476,6	522,3	326,9	0,13	79,98	80,21	81,23	0,13	80,51	81,31	81,78
80,0	364,0	1,4	0,3	5,6	374,0	75,3	92,3	625,2	371,3	475,2	520,5	327,5	0,13	79,92	80,18	81,14	0,13	80,43	81,27	81,75
81,0	365,0	1,4	0,4	4,9	361,9	75,6	92,2	615,3	370,5	473,6	518,2	328,1	0,13	79,93	80,15	81,04	0,13	80,42	81,23	81,67

82,0	366,0	1,4	0,6	4,3	352,7	75,1	91,9	600,7	369,2	471,4	515,3	327,7	0,13	79,89	80,15	80,98	0,13	80,41	81,18	81,61
83,0	367,0	1,4	0,7	4,1	345,0	75,1	91,5	587,8	367,6	469,2	511,8	327,5	0,13	79,83	80,14	80,89	0,13	80,39	81,15	81,56
84,0	368,0	1,4	0,7	3,9	339,7	75,7	91,1	573,7	366,6	466,9	509,7	328,0	0,13	79,78	80,12	80,77	0,13	80,37	81,13	81,49
85,0	369,0	1,4	0,7	3,9	334,0	76,0	90,5	563,7	365,0	464,8	506,0	328,8	0,13	79,64	80,05	80,66	0,13	80,27	81,09	81,41
86,0	370,0	1,3	0,7	3,8	330,3	75,7	89,7	552,3	363,2	461,4	503,0	328,0	0,13	79,59	80,04	80,60	0,13	80,22	81,07	81,37
87,0	371,0	1,3	0,7	3,9	326,9	75,5	89,6	542,6	361,8	458,1	500,6	328,2	0,13	79,44	79,98	80,54	0,13	80,10	81,00	81,28
88,0	372,0	1,3	0,7	3,9	323,3	75,7	89,3	534,7	360,3	454,8	497,7	328,3	0,13	79,38	79,92	80,46	0,13	80,00	80,95	81,23
89,0	373,0	1,2	0,7	3,9	319,6	75,6	89,1	526,2	359,0	451,3	495,3	328,5	0,13	79,35	79,89	80,38	0,13	79,95	80,89	81,16
90,0	374,0	1,2	0,7	3,9	317,2	75,6	88,8	518,7	357,7	447,4	492,2	328,6	0,13	79,26	79,84	80,31	0,13	79,88	80,88	81,10
91,0	375,0	1,2	0,7	3,9	313,7	75,4	88,3	512,6	355,9	443,4	489,4	327,3	0,13	79,18	79,78	80,20	0,13	79,81	80,83	81,03
92,0	376,0	1,2	0,7	3,8	311,7	75,2	88,2	506,4	354,9	439,8	486,7	327,5	0,13	79,09	79,77	80,15	0,13	79,77	80,78	80,97
93,0	377,0	1,2	0,6	3,8	308,6	75,2	88,2	499,7	353,3	436,5	483,9	327,9	0,13	78,94	79,72	80,07	0,13	79,68	80,73	80,89
94,0	378,0	1,2	0,7	3,8	306,4	75,2	88,4	494,4	352,4	433,4	481,3	327,7	0,13	78,80	79,69	80,99	0,13	79,58	80,70	80,82
95,0	379,0	1,1	0,7	3,8	304,0	74,7	87,7	489,4	351,2	430,0	478,1	327,7	0,13	78,63	79,62	80,88	0,13	79,45	80,64	80,75
96,0	380,0	1,1	0,7	3,7	301,5	74,7	88,1	483,6	349,9	427,1	475,3	327,9	0,13	78,52	79,55	80,78	0,13	79,36	80,57	80,67
97,0	381,0	1,1	0,7	3,7	299,4	75,0	87,7	478,2	348,7	424,3	472,5	327,1	0,13	78,39	79,50	80,69	0,13	79,26	80,51	80,58
98,0	382,0	1,1	0,6	3,7	297,1	75,0	87,2	473,2	347,3	421,6	469,6	326,7	0,13	78,28	79,43	80,56	0,13	79,14	80,45	80,49
99,0	383,0	1,1	0,6	3,6	294,8	74,7	87,0	468,6	345,7	419,0	467,4	326,1	0,13	78,18	79,38	80,49	0,13	79,04	80,39	80,41
100,0	384,0	1,1	0,6	3,6	293,1	74,7	87,2	464,0	344,5	416,2	464,7	325,4	0,13	78,18	79,34	80,42	0,13	78,98	80,34	80,32
101,0	385,0	1,1	0,6	3,6	291,3	74,7	87,0	459,5	343,4	414,1	461,7	325,3	0,13	78,28	79,31	80,33	0,13	78,99	80,28	80,24
102,0	386,0	1,0	0,6	3,6	291,0	74,8	86,8	455,8	341,8	412,1	459,0	325,0	0,13	78,29	79,29	80,26	0,13	78,96	80,23	80,16
103,0	387,0	1,0	0,7	3,6	290,0	74,8	86,4	451,8	340,9	409,5	456,5	323,8	0,13	78,23	79,25	80,21	0,13	78,93	80,20	80,11
104,0	388,0	1,0	0,7	3,5	288,1	74,7	86,2	448,4	339,9	406,9	453,6	322,5	0,13	78,18	79,21	80,15	0,13	78,93	80,18	80,05
105,0	389,0	1,0	0,7	3,5	286,4	74,4	86,4	445,2	338,8	405,2	451,3	321,9	0,13	78,08	79,19	80,04	0,13	78,87	80,16	80,95
106,0	390,0	1,0	0,7	3,4	284,7	74,5	86,8	441,4	338,2	403,5	447,9	321,3	0,13	78,02	79,15	80,97	0,13	78,84	80,13	80,92
107,0	391,0	1,0	0,6	3,4	282,6	74,6	86,3	438,9	337,3	402,0	444,7	321,2	0,13	78,01	79,12	80,87	0,13	78,78	80,07	80,83
108,0	392,0	1,0	0,6	3,4	281,9	74,6	85,5	435,9	336,2	400,1	441,9	320,5	0,13	77,92	79,05	80,78	0,13	78,69	80,02	80,75
109,0	393,0	0,9	0,6	3,4	280,8	74,1	86,2	431,7	335,2	398,7	440,1	320,2	0,13	77,78	79,00	80,70	0,13	78,58	79,97	80,66
110,0	394,0	0,9	0,6	3,4	279,8	74,4	85,9	428,9	334,2	396,6	437,4	319,2	0,13	77,69	78,96	80,99	0,13	78,52	79,93	82,24
111,0	395,0	0,9	0,6	3,4	278,8	74,6	85,3	425,7	333,1	394,4	433,5	318,2	0,13	77,67	78,93	83,03	0,13	78,47	79,89	86,50
112,0	396,0	0,9	0,6	3,3	276,8	74,5	85,4	422,8	331,9	393,1	430,6	317,1	0,13	77,60	78,88	83,89	0,13	78,37	79,84	87,41
113,0	397,0	0,9	0,6	3,3	274,8	74,4	85,4	419,5	330,8	391,8	428,7	316,0	0,13	77,54	78,83	83,67	0,13	78,30	79,78	87,27
114,0	398,0	0,9	0,6	3,3	273,7	74,2	85,3	416,7	329,7	390,3	427,1	315,0	0,13	77,46	78,80	83,36	0,13	78,25	79,73	86,85
115,0	399,0	0,9	0,6	3,3	273,0	73,8	85,6	414,1	328,4	388,1	424,3	313,5	0,13	77,46	78,75	83,11	0,13	78,21	79,69	86,40
116,0	400,0	0,8	0,6	3,3	272,0	74,0	84,8	411,1	327,7	386,6	422,0	312,7	0,13	77,40	78,69	82,83	0,13	78,16	79,64	85,93
117,0	401,0	0,9	0,6	3,3	270,4	74,0	85,2	409,3	326,6	385,8	419,8	312,2	0,13	77,34	78,66	82,57	0,13	78,11	79,58	85,49
118,0	402,0	0,8	0,6	3,2	268,8	74,2	85,1	407,1	325,5	384,9	417,6	311,7	0,13	77,35	78,62	82,30	0,13	78,08	79,54	85,10
119,0	403,0	0,8	0,6	3,3	267,2	74,2	84,4	404,9	324,2	383,6	414,8	310,4	0,13	77,35	78,59	82,07	0,13	78,04	79,48	84,74
120,0	404,0	0,8	0,6	3,2	266,0	74,1	84,5	402,4	322,9	383,0	413,1	309,8	0,13	77,25	78,56	81,86	0,13	77,98	79,45	84,40
121,0	405,0	0,8	0,6	3,3	264,4	74,2	84,5	400,1	321,7	381,5	411,0	308,4	0,13	77,22	78,52	81,66	0,13	77,95	79,40	84,06
122,0	406,0	0,8	0,6	3,2	263,6	73,9	84,3	398,1	320,4	380,6	409,2	307,5	0,13	77,15	78,49	81,46	0,13	77,89	79,36	83,77
123,0	407,0	0,7	0,6	3,2	262,8	74,0	84,3	396,2	319,0	379,6	407,1	306,4	0,13	77,07	78,42	81,26	0,13	77,83	79,30	83,46
124,0	408,0	0,7	0,6	3,2	262,2	74,1	84,0	394,6	317,8	379,0	405,4	305,4	0,13	77,03	78,39	81,03	0,13	77,78	79,29	83,15
125,0	409,0	0,7	0,6	3,3	261,3	74,1	84,2	392,7	316,7	378,2	402,6	304,5	0,13	76,96	78,33	80,85	0,13	77,73	79,22	82,88
126,0	410,0	0,7	0,7	3,2	260,3	73,9	84,1	390,3	315,1	377,3	400,8	303,5	0,13	76,92	78,31	80,69	0,13	77,68	79,19	82,64
127,0	411,0	0,7	0,7	3,2	259,1	74,0	84,0	388,7	313,7	376,7	399,3	302,2	0,13	76,91	78,27	80,54	0,13	77,64	79,16	82,37
128,0	412,0	0,7	0,7	3,2	258,1	74,0	84,3	386,2	312,5	376,1	397,7	301,2	0,13	76,82	78,23	80,37	0,13	77,57	79,09	82,73
129,0	413,0	0,6	0,7	3,2	257,8	74,0	83,5	384,9	311,2	375,2	394,9	300,1	0,13	76,71	78,19	84,71	0,13	77,50	79,04	86,35
130,0	414,0	0,6	0,7	3,2	257,4	74,1	83,2	383,6	310,3	374,6	393,1	299,3	0,13	76,60	78,15	86,40	0,13	77,39	78,96	88,13
131,0	415,0	0,6	0,7	3,3	256,3	73,9	83,7	381,6	309,4	374,2	391,3	297,8	0,13	76,60	78,09	85,98	0,13	77,34	78,94	88,07
132,0	416,0	0,6	0,7	3,3	255,6	74,0	83,7	380,2	308,5	373,8	390,2	295,5	0,13	76,61	78,07	85,58	0,13	77,33	78,88	87,62
133,0	417,0	0,6	0,7	3,3	255,0	73,9	83,7	378,6	307,4	373,5	389,5	293,1	0,13	76,66	78,04	85,18	0,13	77,34	78,85	87,07
134,0	418,0	0,5	0,6	3,3	254,4	74,0	83,3	377,6	306,9	373,2	387,4	292,6	0,13	76,64	78,01	84,83	0,13	77,28	78,82	86,56
135,0	419,0	0,6	0,6	3,3	254,2	74,0	83,9	376,4	306,1	372,3	386,8	292,6	0,13	76,61	77,97	84,46	0,13	77,26	78,79	86,05
136,0	420,0	0,5	0,6	3,4	254,3	73,7	85,1	375,5	305,9	371,6	385,4	291,3	0,13	76,77	78,01	84,06	0,13	77,37	78,80	85,57
137,0	421,0	0,5	0,6	3,4	253,3	74,1	86,4	374,4	305,6	371,4	384,4	290,2	0,13	76,91	78,01	83,73	0,13	77,43	78,79	85,17
138,0	422,0	0,5	0,6	3,4	252,5	74,4	87,4	373,7	304,9	371,7	383,2	290,5	0,13	77,08	78,05	83,49	0,13	77,54	78,79	84,82
139,0	423,0	0,5	0,6	3,4	251,9	74,5	88,6	373,2	305,0	372,4	382,0	289,3	0,13	77,23	78,09	83,22	0,13	77,66	78,85	84,44
140,0	424,0	0,5	0,6	3,4	251,4	74,2	88,2	372,3	304,4	371,9	380,9	289,3	0,13	77,41	78,15	82,97	0,13	77,79	78,91	84,12
141,0	425,0	0,4	0,6	3,4	251,4	74,6	87,7	371,1	304,3	371,7	379,8	288,2	0,13	77,60	78,20	82,72	0,13	77,88	78,94	83,77
142,0	426,0	0,5	0,6	3,4	250,9	74,7	86,7	370,3	304,0	371,7	378,5	287,1	0,13	77,66	78,22	82,47	0,13	77,94	78,96	83,46
143,0	427,0	0,4	0,6	3,4	250,4	74,9	85,9	369,3	303,7	371,2	377,3	286,0	0,13	77,62	78,21	82,22	0,13	77,95	78,94	83,14
144,0	428,0	0,4	0,6	3,3	250,4	74,9	85,6	368,9	303,6	371,7	376,0	285,3	0,13	77,62	78,22	81,99	0,13	77,97	78,94	82,91
145,0	429,0	0,4	0,6	3,4	250,1	74,8	85,2	368,3	303,4	371,3	375,0	284,8	0,13	77,60	78,22	81,78	0,13	77,95	78,92	82,67
146,0	430,0	0,4	0,6	3,3	250,0	74,3	84,9	368,0	303,5	370,9	373,8	285,1	0,13	77,58	78,21	81,60	0,13	77,96	78,92	82,44
147,0	431,0	0,4	0,6	3,3	249,6	74,6	84,8	367,0	303,1	370,7	372,4	283,5	0,13	77,58	78,21	81,38	0,13	77,97	78,91	82,19
148,0	432,0	0,3	0,6	3,3	247,4	74,6	84,2	365,4	303,2	370,8	371,5	281,2	0,13	77,56	78,20	81,21	0,13	77,95	78,88	81,97
149,0	433,0	0,4	0,6	2,8	245,9	74,7	84,2	363,6	303,2	369,9	370,6	279,6	0,13	77,54	78,22	81,04	0,13	77,97	78,90	81,76
150,0	434,0	0,3	0,5	2,8	244,4	74,5	84,1	361,7	303,0	370,0	369,2	278,8	0,13	77,47	78,18	80,87	0,13	77,92	78,87	81,54
151,0	435,0	0,3	0,5	2,8	243,0	74,6	84,1	360,1	302,5	369,5	367,7	278,9	0,13	77,36	78,13	80,66	0,13	77,85	78,85	81,32
152,0	436,0	0,3	0,5	2,7	242,1	74,5	83,9	358,0	301,9	369,2	366,1	278,5	0,13	77,27	78,10	80,55	0,13	77,82	78,82	81,15
153,0	437,0	0,3	0,5	2,7	241,9	74,6	84,0	356,5	301,1	368,5	364,2	278,5	0,13	77,16	78,05	80,36	0,13	77,75	78,80	80,97
154,0	438,0	0,3	0,5	2,7	241,2	74,6	83,3	354,5	300,5	367,7	362,0	277,5	0,13	77,12	78,04	80,22	0,13	77,71	78,77	80,78
155,0	439,0	0,3	0,5	2,7	239,7	74,5	83,3	352,7	300,2	366,9	360,7	276,9	0,13	77,13	78,01	81,17	0,13	77,68	78,72	81,60
156,0	440,0	0,3	0,5	2,7	239,0	74,3	82,8	351,1	299,1	366,0	358,3	276,1	0,13	77,07	78,00	83,98	0,13	77,66	78,70	86,59

157,0	441,0	0,3	0,5	2,7	238,3	74,2	83,0	349,1	298,5	365,4	356,3	275,9	0,13	77,02	77,99	84,18	0,13	77,64	78,68	88,32
158,0	442,0	0,2	0,5	2,7	236,7	74,2	83,4	347,2	297,8	364,6	354,7	274,2	0,13	76,97	77,94	83,91	0,13	77,60	78,64	88,24
159,0	443,0	0,2	0,5	2,7	236,3	74,3	83,2	345,8	297,1	364,1	352,9	274,0	0,13	76,98	77,94	83,65	0,13	77,59	78,61	87,75
160,0	444,0	0,2	0,5	2,7	235,9	74,2	83,2	344,1	296,2	363,0	351,4	273,6	0,13	77,02	77,93	83,36	0,13	77,56	78,57	87,17
161,0	445,0	0,2	0,5	2,7	234,6	74,1	83,0	342,7	295,5	361,9	349,6	272,2	0,13	76,96	77,89	83,11	0,13	77,49	78,52	86,62
162,0	446,0	0,2	0,5	2,6	233,8	74,1	82,7	341,2	294,7	360,7	348,0	271,2	0,13	76,90	77,88	82,85	0,13	77,44	78,50	86,12
163,0	447,0	0,2	0,5	2,5	233,0	74,2	82,7	340,1	293,7	360,0	346,1	271,1	0,13	76,88	77,85	82,57	0,13	77,41	78,45	85,61
164,0	448,0	0,2	0,5	2,4	232,6	74,0	82,7	338,2	292,9	358,8	344,3	270,6	0,13	76,80	77,80	82,30	0,13	77,35	78,39	85,13
165,0	449,0	0,2	0,5	2,4	231,4	74,1	82,6	337,1	292,0	357,1	342,7	268,4	0,13	76,81	77,78	82,08	0,13	77,34	78,35	84,69
166,0	450,0	0,2	0,5	2,4	230,8	74,0	82,4	335,8	291,1	355,7	341,1	268,1	0,13	76,84	77,77	81,82	0,13	77,32	78,33	84,27
167,0	451,0	0,2	0,4	2,4	229,2	73,8	82,1	334,2	290,1	354,0	339,4	268,3	0,13	76,87	77,75	81,57	0,13	77,30	78,29	83,88
168,0	452,0	0,1	0,4	2,4	228,2	73,6	82,1	332,8	289,1	352,9	337,8	268,7	0,13	76,80	77,74	81,37	0,13	77,28	78,26	83,51
169,0	453,0	0,1	0,4	2,4	227,1	73,8	82,0	331,1	288,1	351,0	336,2	267,8	0,13	76,71	77,70	81,16	0,13	77,23	78,23	83,18
170,0	454,0	0,1	0,4	2,3	226,4	73,7	81,8	329,7	287,0	349,4	334,3	267,8	0,13	76,65	77,67	80,96	0,13	77,21	78,21	82,87
171,0	455,0	0,1	0,4	2,4	225,9	73,7	81,7	328,1	286,0	347,8	332,7	267,6	0,13	76,58	77,64	80,76	0,13	77,18	78,18	82,53
172,0	456,0	0,1	0,4	2,4	225,2	73,7	81,7	326,4	285,1	345,7	331,7	265,8	0,13	76,56	77,61	80,56	0,13	77,17	78,17	82,26
173,0	457,0	0,1	0,4	2,4	224,8	73,0	81,7	324,6	283,7	343,3	330,5	264,4	0,13	76,52	77,60	80,37	0,13	77,13	78,12	81,96
174,0	458,0	0,1	0,4	2,4	223,5	73,4	81,4	323,7	283,2	341,5	328,8	263,8	0,13	76,48	77,55	80,17	0,13	77,08	78,09	81,70
175,0	459,0	0,1	0,4	2,2	222,8	73,6	81,1	322,0	281,6	339,2	326,9	263,0	0,13	76,42	77,51	83,31	0,13	77,03	78,06	83,78
176,0	460,0	0,1	0,4	2,2	221,8	73,7	81,6	320,7	280,9	337,6	325,4	262,5	0,13	76,36	77,48	85,54	0,13	76,97	78,03	84,64
177,0	461,0	0,1	0,4	2,2	220,6	73,6	81,3	319,2	280,2	336,1	323,8	261,9	0,13	76,40	77,45	85,23	0,13	76,95	77,99	84,51
178,0	462,0	0,1	0,4	2,2	219,8	73,5	81,5	317,3	279,2	334,2	322,1	260,9	0,13	76,40	77,43	84,83	0,13	76,91	77,94	84,16
179,0	463,0	0,1	0,4	2,2	218,7	73,5	81,2	315,9	278,6	332,9	320,6	260,7	0,13	76,37	77,41	84,42	0,13	76,86	77,91	83,76
180,0	464,0	0,1	0,4	2,2	217,2	73,4	81,2	314,2	277,6	330,7	318,8	259,7	0,13	76,31	77,39	84,04	0,13	76,83	77,87	83,31
181,0	465,0	0,1	0,4	2,1	217,1	73,1	81,8	312,3	276,8	328,5	317,9	257,9	0,13	76,21	77,35	83,61	0,13	76,77	77,86	82,92
182,0	466,0	0,1	0,4	2,1	215,7	73,3	83,5	310,8	276,0	326,5	316,0	256,7	0,13	76,22	77,33	83,24	0,13	76,78	77,84	82,57
183,0	467,0	0,1	0,4	2,1	214,3	73,5	84,7	309,0	275,3	325,1	314,8	255,9	0,13	76,29	77,33	82,96	0,13	76,83	77,86	82,26
184,0	468,0	0,1	0,4	2,1	213,7	73,8	86,0	307,3	274,7	323,6	313,7	254,8	0,13	76,43	77,35	82,68	0,13	76,90	77,88	81,99
185,0	469,0	0,1	0,4	2,1	213,1	74,0	87,1	306,1	273,8	322,5	312,5	254,3	0,13	76,56	77,37	82,42	0,13	76,98	77,92	81,72
186,0	470,0	0,1	0,4	2,1	212,3	74,3	87,0	304,9	272,9	320,9	310,8	253,8	0,13	76,75	77,42	82,17	0,13	77,11	77,98	81,50
187,0	471,0	0,1	0,4	2,1	211,9	74,2	86,1	303,7	271,8	319,3	309,9	253,1	0,13	76,84	77,46	83,54	0,13	77,20	78,01	83,96
188,0	472,0	0,1	0,4	2,1	211,6	74,4	85,4	302,0	270,9	317,7	308,2	252,0	0,13	76,96	77,49	86,55	0,13	77,27	78,05	86,59
189,0	473,0	0,1	0,4	2,2	211,3	74,4	84,4	300,7	270,2	316,1	306,9	251,3	0,13	77,00	77,51	86,28	0,13	77,31	78,07	86,91
190,0	474,0	0,1	0,4	2,2	210,5	74,3	83,5	300,2	269,3	314,8	305,1	250,6	0,13	76,99	77,51	85,83	0,13	77,32	78,08	86,59
191,0	475,0	0,1	0,4	2,2	209,4	74,3	83,1	298,5	268,3	313,2	304,3	249,3	0,13	76,96	77,50	85,37	0,13	77,32	78,07	86,07
192,0	476,0	0,0	0,4	2,2	209,1	74,3	82,8	297,3	267,5	312,0	303,1	248,5	0,13	76,94	77,51	84,96	0,13	77,31	78,06	85,62

Manufacturer: JOTUL
Model: F602

Combustion Efficiency: 99,14%

Heat Output:	46 466 Btu/h	48 984 kJ/h
Heat Input:	69 083 Btu/h	72 825 kJ/h
Burn Duration:	0,70 h	
Burn Rate:	7,94 lb/h	3,604 kg/h
Stack Temp:	691,9 Deg. F	366,6 Deg. C

Note: In the "Input data", "Calc. % O_2", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a]. [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3

PI 20183 Heat Transfer Efficiency: 67,84%
Test Duration: 192 min

Ultimate CO_2
$CO_{2\text{-ult}}$ 19,86

F_o
1,050

	HHV	LHV
Eff	67,26%	72,37%
Comb Eff	99,14%	99,14%
HT Eff	67,84%	73,00%
Output	48 984	kJ/h
Burn Rate	3,60	kg/h
Grams CO	38	g
Input	72 825	kJ/h
MC wet	17,71	

Overall Heating Efficiency: 67,26%
Run: 1
Project #:

Air Fuel Ratio (A/F)	
Dry Molecular Weight (M_d)	30,08
Dry Moles Exhaust Gas (N_t):	352,78
Air Fuel Ratio (A/F)	10,10

Manufacturer: JOTUL
Model: F602

Combustion Efficiency: 96,75%

Heat Output:	15 200 Btu/h	16 024 kJ/h
Heat Input:	21 356 Btu/h	22 513 kJ/h
Burn Duration:	3,20 h	
Burn Rate:	2,46 lb/h	1,114 kg/h
Stack Temp:	347,9 Deg. F	175,5 Deg. C

Note: In the "Input data", "Calc. % O_2", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a]. [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3

PI 20183 Heat Transfer Efficiency: 73,57%
Test Duration: 192 min

Ultimate CO_2
$CO_{2\text{-ult}}$ 19,86

F_0
1,048

	HHV	LHV
Eff	71,18%	76,59%
Comb Eff	96,75%	96,75%
HT Eff	73,57%	79,16%
Output	16 024	kJ/h
Burn Rate	1,11	kg/h
Grams CO	182	g
Input	22 513	kJ/h
MC wet	17,31	

Overall Heating Efficiency: 71,18%
Run: 1
Project #:

Air Fuel Ratio (A/F)	
Dry Molecular Weight (M_d)	29,51
Dry Moles Exhaust Gas (N_T):	565,33
Air Fuel Ratio (A/F)	16,17

POLYTESTS
TESTING THROUGH YOUR REALITY

Date: 2019-01-07 Manufacturer: Jotul Model: F602
Project # PI 20183 Run: 1 Tech: M M Reviewer: DP

- kindling 3.3 LBS Start fire
- No paper 1 min torche
- At 2 min close Door
- At 1.00 LBS insert load (High)
- At 1.8 LBS stop pompe
- At 1.00 LBS insert load
- close Door immediatly
After 2 min close air ncl (tol 0.040 in)

TEST LOAD CONFIGURATION

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE / POST CHECKS

Date: 2019 01 07 Manufacturer: Jotul Model: F 602
Project #: PI 20183 Run: 1 Tech: M M Reviewer: SD

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

Moisture Meter Calibration Check:

	Pre-Test	Post-Test
Facility Conditions:		
Air Velocity from less than 2 feet	0 (max50 Fpm)	0 (max50 Fpm)
Smoke Capture Check	ok	ok
Picture	4 sides ok	ok

Wood Heater Conditions:

Date Wood Heater Stack Cleaned	2019-01-07
Date Dilution Tunnel Cleaned	2019-01-07
Induced Draft Check (max 0.005 H2O)	ok
Traverse before ignition	ok

Temperature System:

Ambient (65°-90°F)	ok °F

Proportional Checks:

Thermocouple check	ok
Pitot Clean	ok
Pitot verification	ok

Sampling Train ID Numbers:

	High fire test			Medium low fire test		
	1st hour	Train 1	Train 2	1st hour	Train 1	Train 2
Probe	12	36	42	17	19	34
Filter Front	400	402	404	408	409	411
Filter Back	401	403	405	409	410	412
Filter Thermocouple	11	11	12	11	11	12
Filter (80°F ≥ <90°F)	ok	ok	ok	ok	ok	ok

POLYTESTS
TESTING THROUGH YOUR REALITY

SAMPLING EQUIPMENT CHECK OUT

Date: 2019-01-07 Manufacturer: Jotul Model: F602
Project #: PJ 20183 Run: 1 Tech: MM Reviewer: NP

Leakage Checks Tunnel Samplers

High fire test	System 1st hour		System 1		System 2	
Unplugged Flow Rate = .25cfm	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)	83856660	83879661	83856668	83879671	78921702	78944703
Initial 1minute DGM (Liter)	83856658	83879660 ~~83886884~~	83856668	83879670	78921702	78944698 ~~798~~ MM
Change © (Liter)	002	001	Ø	Ø	Ø	005
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Low medium fire test	System 1st hour		System 1		System 2	
Unplugged Flow Rate = .25cfm	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)	83879969	83954099	83879980	83954108	78945058	79018958
Initial 1minute DGM (Liter)	83879960	83954098	83879978	83954106	78945056	79018956
Change © (Liter)	009	001	002	002	002	002
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

POLYTESTS
TESTING THROUGH YOUR REALITY

SAMPLING EQUIPMENT CHECK OUT

Date: 2019-01-07 Manufacturer: Jc-fvl Model: F602

Project #: PI 20183 Run: 1 Tech: M M Reviewer: RP

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre-Test	Post Test
Vacuum (inches Hg.)	-5	-5
Rotameter Reading (mml/min.)	6	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	ok	ok

Leakage Checks Pitot

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

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 06/01-07 Manufacturer: JØTUL Model: F 602

Project #: PT 20183 Run: 1 Tech: MM Reviewer: BP

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	4.4 lbs, Class F	4.4 lbs
Wood	EM-090	44 lbs, Class F	44 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

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

Date: 2019-01-07 Manufacturer: Jotul Model: F602

Project #: PI 20183 Run: 1 Tech: M M Reviewer: DP

FOR TUNNELS < 12 in

Barometric pressure (P_{bar}) 102.9 (KPa.) Static pressure (P_q) 0.18 (inches w.c.)

Inside diameter: Port A _______ Port B _____

Tunnel cross sectional area: .1963Ft^2

Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H_2O)	Tunnel Temperature (°F)
	6 po	7 po	8 po	0.061	
A- Centroid	3.00	3.50	4	~~0.0[illegible]~~ MM	71.09
B - Centroid	3.00	3.50	4	0.058	70.19
A-1	0.40	0.50	0.50	0.055	70.93
A-2	1.50	1.75	2	0.062	70.93
A-3	4.50	5.25	6	0.070	70.73
A-4	5.60	6.5	7.5	0.067	70.51
B-1	0.40	0.50	0.50	0.061	70.49
B-2	1.50	1.75	2	0.065	70.99
B-3	4.50	5.25	6	0.051	71.33
B-4	5.60	6.5	7.5	0.049	71.32
				AVERAGE	

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

Where,

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

Δ_p = manometer reading (inches H_2O)

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

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

P_q = static pressure $\frac{\text{in. } H_2O}{\{\ 13.6\ \}}$

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

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

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

POLYTESTS
TESTING THROUGH YOUR REALITY

CONTINUOUS ANALYZERS

Date: 2019-01-07 Manufacturer: Jotul Model: F602

Project #: PJ 20183 Run: 1 Tech: MM Reviewer: NP

Pre-Test (Adjust and Record)

	ZERO		MM SPAN		CAL. (Record Only)	
CO	0	0	~~1,005~~ 3,995	~~1000~~ MM 3,000	1005	1000
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO_2	0	0	~~9,71~~ 18,01 MM	~~10,00~~ MM 18,00	9,71	10,00
Tolerance CO2		+/- 0.02		+/- 0.5		+/- 0.5
O_2 informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0	2,990	0,996	0	0.02	0,005	0.15	0,009	0.05	✓	
CO_2	0	17,90	9,74	0	0.02	0,11	0.5	0,03	0.5	✓	

POLYTESTS
TESTING THROUGH YOUR REALITY

TEST DATA LOG

Date: ~~2018~~ 2019-01-07 Manufacturer: Jotul Model: F602

Project #: PI 20183 Run: 1 Tech: M M Reviewer: DP

RAW DRY GAS METER READINGS

		System 1	System 2	Blank
High fire test	Final (Liter)	838796,01	789446,58	208,88
	Initial (Liter)	838567,96	789219,26	184,16
Low medium fire test	Final (Liter)	839540,08	790189,05	289,31
	Initial (Liter)	838800,35	789451,75	208,88

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	102.9	102.8
Dry Bulb (F):	70,34	75,31
Humidity (%):	19.9	20.6

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2019-01-07 Manufacturer: Jotul Model: F602
Project #: PT 20183 Run: 1 Tech: MM Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

KINDLING AND START-UP LOAD

Piece Size	Weight	Meter Moisture Content (% dry)				
x x 14 in.	lbs.					
x x 14 in.	lbs.					
x x 14 in.	lbs.					
x x 10 in.	lbs.					
x x 6 in.	MM ~~160~~ 130 lbs.	9		9		9
x x in.	lbs.					
x x 10 in.	lbs.					
x x 6 in.	200 lbs.	20		20		20
x x in.	lbs.					

HIGHFIRE TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)				
200 x 200 x 14 in.	1610 lbs.	193		230		21
200 x 225 x 14 in.	1652 lbs.	196		194		196
250 x 225 x 14 in.	1656 lbs.	221		231		221
x x in.	lbs.					~~231~~ MM
325 x 300 x 14 in.	3064 lbs.	21		229		231
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2019-01-07 Manufacturer: Jotul Model: F 602

Project #: PI 60182 Run: 1 Tech: MM Reviewer: AP

FUEL DESCRIPTION:

Type of wood:

LOW OR MEDIUM TEST LOAD

Piece Size				Weight		Meter Moisture Content (% dry)				
2.25	x 1.75	x 14	in.	1.974	lbs.	19.1		19.0		19.0
2.00	x 2.00	x 14	in.	1.876	lbs.	19.9		22.1		21.3
2.00	x 2.25	x 14	in.	1.794	lbs.	21.0		23.0		23
	x	x	in.		lbs.					
2.00	x 1.75	x 14	in.	1.32	lbs.	19.1		19.6		19.1
3.00	x 2.25	x 14	in.	2.538	lbs.	~~2~~ 21.0		23.0		22.6
	x	x	in.		lbs.					
	x	x	in.		lbs.					
	x	x	in.		lbs.					
	x	x	in.		lbs.					
	x	x	in.		lbs.					
	x	x	in.		lbs.					
	x	x	in.		lbs.					
	x	x	in.		lbs.					

DILUTION TUNNEL PARTICULATE SAMPLER DATA

POLYTESTS — TESTING THROUGH YOUR REALITY

Date: 2018-~~22~~ 12-20 mm Manufacturer: Jotul Model: F602

Project #: PT 20/83 Run: 1 Tech: MM Reviewer: NP

Pre-test Weight Record		HIGHFIRE TEST FILTERS								
		SYSTEM 1 – 1st hour				SYSTEM 1				
		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	12	400	401	13	36	402	403	16	406
2018-12-20	17:30	94 5384	00871	00869	34 8191	107 7341	00849	00867	34 7622	00851
2019-01-07	8:30	94 5384	00870	00868	34 8192	107 7342	00848	00866	34 7623	00850

Post-test Weight Record		SYSTEM 1 – 1st hour				SYSTEM 1				
		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	12	400	401	13	36	402	403	16	406
2019-01-07	15:30	94 5400	00882	00871	34 8195	107 7342	00848	00866	34 7623	00852
2019-01-15	15:30	94 5388	00881	00869	34 8194	107 7342	00848	00866	34 7623	00851
2019-01-21	8:30	94 5388	00881	00869	34 8194	107 7342	00848	00866	34 7623	00851

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: ~~2018~~ 2018-12-20 Manufacturer: Jotul Model: F 602

Project #: PT 6183 Run: 1 Tech: MR Reviewer: DP

Pre-test Weight Record		HIGH FIRE TEST FILTERS — SYSTEM 2: Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	42	404	405	43
2018-12-20	17:00	110.3110	00856	00862	34.3582
2019-01-07	8:00	110.3110	00857	00862	34.3583

Post-test Weight Record		SYSTEM 2: Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	42	404	405	43
2019-01-07	15:00	110.3113	00871	00865	34.3590
2019-01-15	15:00	110.3111	00869	00863	34.3587
2019-01-21	8:00	110.3111	00869	00863	34.3587

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2018-12-20
Project #: pt 20183 Run: 1
Manufacturer: Jotul
Tech: MM
Reviewer: DP
Model: F602

		LOW OR MEDIUM TEST FILTERS								
		SYSTEM 1 – 1st hour				SYSTEM 1				
Pre-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	17	407	408	24	19	409	410	27	413
2018-12-20	17:00	108 9490	00886	00841	34 4435	109 0904	00849	00865	35 1074	00852
2019.01.07	8:00	108 9491	00885	00840	34 4436	109 0905	00850	00864	35 1075	00853

		SYSTEM 1 – 1st hour				SYSTEM 1				
Post-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	17	407	408	24	19	409	410	27	413
2019.01.07	17:00	108 9497	00892	00841	34 4442	109 0908	00852	00864	35 1081	00854
2019.01.15	~~8:00~~ 15:20 MM	108 9493	00892	00840	34 4439	109 0906	00852	00863	35 1077	00854
2019.01.21	8:30	108 9492	00892	00840	34 4438	109 0906	00852	00863	35 1077	00854

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2018-12-20 Manufacturer: Jotul Model: F602
Project #: PT 20/83 Run: 1 Tech: MM Reviewer: DO

		LOW OR MEDIUM FIRE TEST FILTERS			
		SYSTEM 2			
Pre-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	34	411	412	41
2018-12-20	17:00	110 1031	00840	00851	350733
2019-01-07	8:00	110 1032	00841	00852	35 0734

		SYSTEM 2			
Post-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	34	411	412	41
2019-01-07	17:00	110 1034	00853	00849	35 0745
2019-01-15	15:00	110 1033	00850	00849	35 0738
2019-01-21	8:00	110 1033	00850	00850	35 0738

Paramètres

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

Code verrouillage:	JOT	

Description du test

Test standard	EPA	
Run #	2	
Date	08-01-2019	
Technicien	M.M	
Project #	PI 20183	

Description de l'unité

Manufacturier	JOTUL	
Modèle	F602	
Combustion system	Non-Cat	
Appliance type	WOODSTOVE	cu ft.
Firebox volume	0,8	lbs
Appliance weight empty	n.a	
Fan (no, Standard, Option)	NO	

Paramètres du test

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

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	1,010	Dimensionless
Equipment number (DGM #1):	EM 178	
Calibration Factor (DGM #2):	0,987	Dimensionless
Equipment number (DGM #2):	EM179	
Calibration Factor (DGM #3):	0,996	Dimensionless
Equipment number (DGM #3):	EM 070	

Tunnel

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

Project nu.	PI 20183
Date	08-01-2019
Technicien	m.m

Fuel data

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

Default Fuel Values

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

DATA 2019-01-08 EPA PI 20183 RUN 2 MEDIUM

Adjunct to ASTM E XXXX Wood Heater Cordwood Test Method - May 10, 2017 Version
Cordwood Fuel Load Calculators - 10 lb/ft³ Nominal Load Density
Core 45-65% of Total Load Weight, Remainder 35-55% of Total Load Weight
Values to be input manually

For All Usable Firebox Volumes - High Fire Test Only

Nominal Required Load Density (wet basis)		10	lb/ft³				
Usable Firebox Volume		0,80	ft³				
Total Nom. Load Wt. Target		8,00	lb				
Total Load Wt. Allowable Range		7,60	to	8,40	lb		
Core Target Wt. Allowable Range		3,60	to	5,20	lb		
Remainder Load Wt. Allowable Range		2,80	to	4,40	lb		
							Mid-Point
Core Load Pc. Wt. Allowable Range		1,20	to	2,00	lb		1,60
Remainder Load Pc. Wt. Allowable Range		0,80	to	4,40	lb		2,60
	Pc. #						
Core Load Piece Wt. Actual	1	1,80	lb		In Range		
	2	1,57	lb		In Range		
	3	1,61	lb		In Range		
Core Load Total. Wt. Actual		4,98	lb		In Range		
	Pc. #						
Remainder Load Piece Wt.	1	3,24	lb		In Range		
(1 to 3 Pcs.)	2		lb		NA		
	3		lb		NA		
Remainder Load Tot. Wt. Act		3,24	lb		In Range		
Total Load Wt. Actual		8,22	lb		In Range		
Core % of Total Wt.		61%			In Range		45-65%
Remainder % of Total Wt.		39%			In Range		35-55%
Actual Load % of Nominal Target		103%			In Range		95-105%
Actual Fuel Load Density		10,3	lb/ft³				
Kindling and Start-up Fuel							
Maximim Kindling Wt. (20% of Tot. Load Wt.)		1,64	lb				
Actual Kindling Wt.		1,20	lb		In Range		14,6%
Maximum Start-up Fuel Wt. (30% of Tot. Load Wt.)		2,46	lb				
Actual Start-up Fuel Wt.		2,00	lb		In Range		24,3%
Allowable Residual Start-up Fuel Wt. Range	0,8		to	1,6	lb		Mid-Point
Actual Residual Start-up Fuel Wt.		1	lb		In Range		1,2
Total Wt. All Fuel Added (wet basis)		11,42	lb				
High Fire Test Run End Point Range	Low			High			Mid-Point
Based on Fuel Load Wt. (w/tares)	0,7		to	0,9	lb		0,8
Actual Fuel Load Ending Wt.		0,8	lb		In Range		

Load pieces Length in. 14 in.

Fuel Piece Moisture Reading (%-dry basis) 1	2	3	Ave.		Pc. Wt. Dry Basis			
19,4	20	22,1	20,5	In Range	1,49	lb	0,68	kg
19	19,4	19,2	19,2	In Range	1,31	lb	0,60	kg
22,1	23	23	22,7	In Range	1,32	lb	0,60	kg
19	23,1	22,8	21,6	In Range	2,66	lb	1,21	kg
			NA	NA	NA	lb	NA	kg
			NA	NA	NA	lb	NA	kg
Total Load Ave. MC (%-dry basis)			21,1	In Range				
Total Load Ave. MC % (wet basis)			17,4					
Total Test Load Weight (dry basis)					6,78	lb	3,08	kg
Kindling Moisture (%-dry basis)								
9	9	9	9,0	In Range	1,10	lb	0,50	kg
Start-up Fuel Moisture Readings (%-dry basis)								
20	20	20	20,0	In Range	1,67	lb	0,76	kg
Total Wt. All Fuel Added (dry basis)					9,55	lb	4,33	kg
Total Wt. All Fuel Burned (dry basis)					7,8	lb	3,5	kg

Load high fire

DATA 2019-01-08 EPA PI 20183 RUN 2 MEDIUM

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

Cordwood Fuel Load Calculators - 12 lb/ft^3 Nominal Load Density

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

Values to be input manually

For Usable Firebox Volumes up to 3.0 ft^3 - Low and Medium Fire

Nominal Required Load Density (wet basis)		12	lb/ft^3				
Usable Firebox Volume		0,80	ft^3				
Total Nom. Load Wt. Target		9,6	lb				
Total Load Wt. Allowable Range	9,12	to	10,08	lb			
Core Target Wt. Allowable Range	4,32	to	6,24	lb			
Remainder Load Wt. Allowable Range	3,36	to	5,28	lb			
							Mid-Point
Core Load Fuel Pc. Wt. Allowable Range	1,44	to	2,40	lb			1,92
Remainder Load Pc. Wt. Allowable Range	0,96	to	2,88	lb			1,92
	Pc. #						
Core Load Piece Wt. Actual	1	1,96	lb		In Range		
	2	1,96	lb		In Range		
	3	1,97	lb		In Range		
Core Load Total. Wt. Actual		5,90	lb		In Range		
	Pc. #						
Remainder Load Piece Wt.	1	1,35	lb		In Range		
(2 or 3 Pcs.)	2	2,51	lb		In Range		
	3		lb		NA		
Remainder Load Piece Weight Ratio - Small/Large		54%			In Range	≤ 67%	
Remainder Load Tot. Wt. Act		3,86	lb		In Range		
Total Load Wt. Actual		9,76	lb		In Range		
Core % of Total Wt.		60%			In Range	45-65%	
Remainder % of Total Wt.		40%			In Range	35-55%	
Actual Load % of Nominal Target		102%			In Range	95-105%	
Actual Fuel Load Density		12,2	lb/ft^3				
Allowable Charcoal Bed Wt. Range (lb)	1,0	to	1,9				Mid-Point
Actual Charcoal Bed Wt.		1,1	lb		In Range		1,5
Actual Fuel Load Ending Wt.		0,0	lb		Valid Test		≥ 90%
Total Wt. of Fuel Burned During Test Run lb.		9,8	lb				
Load pieces Length in.		14	in.				

Fuel Piece Moisture Reading (%-dry basis)					Pc. Wt. Dry Basis			
1	2	3	Ave.					
23,1	22	22,5	22,5	In Range	1,60	lb	0,73	kg
20	21,1	21	20,7	In Range	1,62	lb	0,74	kg
19	19,2	19,2	19,1	In Range	1,66	lb	0,75	kg
19	19,2	19,6	19,3	In Range	1,14	lb	0,51	kg
22	23,8	22,5	22,8	In Range	2,04	lb	0,93	kg
			NA	NA	NA	lb	NA	kg
Total Load Ave. MC % (dry basis)			21,1	In Range				
Total Load Ave. MC % (wet basis)			17,4					
Total Test Load Weight (dry basis)				→	8,06	lb	3,66	kg
Total Fuel Weight Burned During Test Run (dry basis)					8,1	lb	3,66	kg

	Nominal Required Load Density (wet basis)	12	lb/ft³		
	Usable Firebox Volume Total Nom. Load Wt.		ft³		
	Target				
	Total Load Wt. Allowable		0 lb		
Total				lb	
				lb	
	Core Target Wt. Allowable Range	0,00	to	0,00	
Wt. of				lb	
	Remainder Load Wt. Allowable Range	0,00	to	0,00	Mid-Point
	Core Load Fuel Pc. Wt. Allowable Rangeto	0,00		0,00 lb	0,00
	Remainder Load Pc. Wt. Allowable Rangeto	0,00		0,00 lb	
Fuel					
					0,00
Burned		Pc. #		In Range	
	Core Load Piece Wt. Actual	1	lb	In Range	
During		2	lb	In Range	
		3	lb	In Range	
	Core Load Total. Wt. Actual		0,00 lb		
		Pc. #		In Range	
Test	Remainder Load Piece Wt.	1	lb	In Range	
				In Range	
				NA	
Run				#NOMBRE!	
				In Range	
				In Range	
lb.0,0 lb				#DIV/0!	
				#DIV/0!	
				#DIV/0!	
Load	(3 or 4 Pcs)	2	lb		
min-		3	lb		
med		4	lb		
		#NOMBRE!			
		0,00	lb		
		0,00	lb		≤ 67%
	Remainder Load Piece Weight Ratio - Small/Large				
	Remainder Load Tot. Wt. Act				
	Total Load Wt. Actual				45-65%
	Core % of Total Wt. #DIV/0! Remainder % of Total Wt.	#DIV/0!			35-55%
	Actual Load % of Nominal Target #DIV/0!				95-105%
	Actual Fuel Load Density	#DIV/0!	lb/ft³		
	Allowable Charcoal Bed Wt. Range (lb)	0,1 to	-0,1		Mid-Point
	Actual Charcoal Bed Wt.		lb	Out of Range	0,0
	Actual Fuel Load Ending Wt.		lb	Valid Test	≥ 90%

Fuel Piece Moisture Reading (%-dry basis)

1	2	3	Ave.		Pc. Wt. Dry Ba:is			
			#DIV/0!	#DIV/0!	#DIV/0!	lb	#DIV/0!	kg
				#DIV/0!	#DIV/0!	lb	#DIV/0!	kg
				#DIV/0!	#DIV/0!	lb	#DIV/0!	kg
			#DIV/0!					
			#DIV/0!					
				#DIV/0!	#DIV/0!	lb	#DIV/0!	kg
				#DIV/0!	#DIV/0!	lb	#DIV/0!	kg
			#DIV/0!	#DIV/0!	#DIV/0!	lb	#DIV/0!	kg
				NA	NA	lb	NA	kg
				#DIV/0!				
			#DIV/0!		#DIV/0!	lb	#DIV/0!	kg
			#DIV/0!			lb		
			NA					
Total Load Ave. MC % (dry basis)			#DIV/0!					
Total Load Ave. MC % (wet basis)			#DIV/0!					
Total Test Load Weight (dry basis)								
Total Fuel Weight Burned During Test Run (dry basis)					#DIV/0!		#DIV/0!	kg

DATA 2019-01-08 EPA PI 20183 RUN 2 MEDIUM

	Start	End
Barometer (kPa):	100,8	100,5
Barometer (in.Hg):	29,766229	29,67763883
Dry Bulb (F):	73,88	85,82
Humidity (%):	17	18,2
Air velocity (ft/min)	0	0

High fire test

DGM #1	Final:	29655,160 29648,142	cuft Final:	839740,600	Liter Liter
	Initial:	27912,340 27905,333	cuft Initial:	839541,860	Liter Liter
DGM #2	Final:		cuft Final:	790389,440	cuft cuft
	Initial:		cuft Initial:	790191,020	
DGM room			Final:	310,640	
			Initial:	289,340	

min or med burnrate

DGM #1	Final:	29677,401 cuft	Final:	840370,400	Liter Liter Liter Liter
	Initial:	29655,279 cuft	Initial:	839743,980	cuft cuft
DGM #2	Final:	27934,597 cuft	Final:	791019,680	
	Initial:	27912,479 cuft	Initial:	790393,360	
DGM room			Final:	377,320	
			Initial:	310,640	

Numéro de la ligne dans "Raw data" à partir duquel les données du test commence	120
Numéro de la ligne dans "Raw data" à partir duquel les données du highfire test commence	129
Numéro de la ligne dans "Raw data" à partir duquel les données du min ou medium fire test commence	197

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

Project nu.	PI 20183
Date	08-01-2019
Technicien	M.M

Key in data

DATA 2019-01-08 EPA PI 20183 RUN 2 MEDIUM

Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure:in. H20 0,19 Barometer: 29,766 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= 0,997

Pour un tunnel moins de 12", prendre 4 lectures

	TUNNEL TUNNEL SQUARE VELOCITY TEMP ROOT		
	In. wc	°F	
A center	0,062	76,14	0,2490
B center	0,061	76,81	0,2470
A1	0,059	75,58	0,2429
A2	0,063	75,77	0,2510
A3	0,070	75,6	0,2646
	0,067	75,4	

A4			0,2588
	0,062	77,910	
B1	0,066	78,990	
B2	0,053	80,010	
B3	0,050	80,530	
B4			
			0,2490
			0,2569
			0,2302
			0,2236
AVERAGE	0,0613	77,2740	0,2473

Project nu. PI 20183
Date 08-01-2019
Technicien M.M

Traverse

Filter set weight highfire

Number
Before (1)
Before (2)
Before (3)
Before (4)
Before (5)
Before (6)
After (1)
After (2)
After (3)
After (4)
After (5)
After (6)

Difference
Total

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		
3	414	415	15	5	416	417	19	13	418	419	20	420		
61,4560	0,0860	0,0855	35,4337	61,5045	0,0866	0,0853	34,9957	95,1491	0,0857	0,0857	35,4333	0,0858	2019-01-07	17:00
61,4559	0,0859	0,0855	35,4336	61,5044	0,0867	0,0853	34,9956	95,1492	0,0858	0,0856	35,4334	0,0858	2019-01-08	08:00
61,4561	0,0868	0,0857	35,4338	61,5044	0,0867	0,0853	34,9956	95,1505	0,0847	0,0848	35,4366	0,0860	2019-01-08	11:30
61,4560	0,0866	0,0856	35,4338	61,5044	0,0867	0,0853	34,9956	95,1496	0,0846	0,0848	35,4362	0,0859	2019-01-15	15:00
61,4560	0,0866	0,0856	35,4338	61,5044	0,0867	0,0853	34,9956	95,1496	0,0846	0,0848	35,4362	0,0859	2019-01-21	08:00
61,4560	0,0866	0,0856	35,4338	61,5044	0,0867	0,0853	34,9956	95,1496	0,0846	0,0848	35,4362	0,0859	2019-01-21	08:00
0,0001	0,0007	0,0001	0,0002	0,0000	0,0000	0,0000	0,0000	0,0004	-0,0012	-0,0008	0,0028	0,0001	(mg) 1,1 1,2	1,1 0,1

Total ajusté (mg)	1,00	1,00	1,10

Project nu.	PI 20183
Date	08-01-2019
Technicien	M.M

Filter set weight Low/ medium fire

Number
Before (1)
Before (2)
Before (3)
Before (4)
Before (5)
Before (6)
After (1)
After (2)
After (3)
After (4)
After (5)
After (6)

Difference
Total

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		
10	421	422	14	11	423	424	23	20	425	426	34	427		
94,6401	0,0850	0,0852	33,4618	93,7242	0,0868	0,0853	34,3049	108,8431	0,0860	0,0860	34,2435	0,0876	2019-01-07	17:00
94,6402	0,0851	0,0852	33,4619	93,7243	0,0868	0,0853	34,3050	108,8432	0,0859	0,0860	34,2436	0,0876	2019-01-08	08:00
94,6408	0,0866	0,0856	33,4629	93,7243	0,0874	0,0856	34,3057	108,8435	0,0877	0,0865	34,2444	0,0880	2019-01-08	14:00
94,6405	0,0866	0,0853	33,4620	93,7243	0,0874	0,0855	34,3051	108,8432	0,0877	0,0863	34,2436	0,0877	2019-01-15	15:00
94,6404	0,0865	0,0853	33,4620	93,7243	0,0874	0,0854	34,3051	108,8432	0,0878	0,0863	34,2437	0,0877	2019-01-21	08:00
94,6404	0,0865	0,0853	33,4620	93,7243	0,0874	0,0854	34,3051	108,8432	0,0878	0,0863	34,2437	0,0877	2019-01-21	08:00
0,0002	0,0014	0,0001	0,0001	0,0000	0,0006	0,0001	0,0001	0,0000	0,0019	0,0003	0,0001	0,0001	(mg) 1,8	2,6
													2,3	0,1

Total ajusté (mg) **1,70** **2,50** **2,20**

Project nu.	PI 20183
Date	08-01-2019
Technicien	M.M

Filter set weight Low fire

SFBA EPA EMISSION RESULTS

RESULTS			
Average emission rate:	3,2	g/hr	
Burn Rate :	3,992	Dry kg/hr	

Test Duration: **50** min

PRESSURE FACTOR:	DGM 1	0,97257	
	DGM 2	0,96824	
	DGM 3	0,99338	
TEMPERATURE FACTORS	DGM 1	0,98057	
	DGM 2	0,98034	
	DGM 3	0,98529	
VOLUMES SAMPLED	DGM 1	6,761	SCft
	DGM 2	6,567	Scft
	DGM 3	20,759	SCft

TOTAL TUNNEL VOLUME : 15840

SAMPLE RATIOS

Sample Train 1:	2342,902
Sample Train 2:	2412,103

Paticulate concentration

Sample Train 1	**0,000163**	g/dscf
Sample Train 2	**0,000183**	g/dscf
Room	**0,000005**	g/dscf

TOTAL EMISSIONS

Sample Train 1	**2,50**	g
Sample Train 2	**2,82**	g

EMISSION RATES

Sample Train 1	**3,00**	g/hr
Sample Train 2	**3,38**	g/hr
1st hour emission rate	**2,58**	g/hr

	Train 1	Train 2
Cs	0,0001627	0,00018274

BAROMETRIC PRESSURE

Average:	29,72193381 in Hg
Start:	29,7662288 in Hg
End:	29,67763883 in Hg

DGM CONTROLLER VALUES

DGM 1	Final:	29655,160	Cuft
	Initial:	29648,142	Cuft
DGM 2	Final:	27912,340	Cuft
	Initial:	27905,333	Cuft
DGM #3	Final:	310,640	Cuft
	Initial:	289,340	Cuft

TEMPERATURES

DGM 1	538,461	°R
DGM 2	538,591	°R

CALIBRATION FACTORS

DGM 1	1,0101
DGM 2	0,9873
DGM #3	0,9958

TUNNEL FLOW RATE: 316,793 Dscfm

PARTICULATE CATCH

Total Sample Train 1:	1,10 mg
Total Sample Train 2:	1,20 mg
Total Sample Train 1 1st hour:	1,10 mg

DEVIATION: 5,97%

DATA 2019-01-08 EPA PI 20183 RUN 2 MEDIUM

*		*	*	*	*1	*2	*3	*4	*5	*6	*7	*8	Mass flow 1	DGM 1	DGM 1	Filter 1	Mass flow 2	DGM 2	DGM 2	Filter 2
Elapsed		Weight			Flue	Room	Tunnel	Unit	Unit	Unit	Unit	Unit	Reading	Inlet T	Outlet T	Temp	Reading	Inlet T	Outlet T	Temp
Time	Raw data row	Remaining	CO	CO_2	Gas	Temp	Dry Bulb	Top	Back	R.Side	L.Side	Bottom								
min		lbs	%	%	°F	°F	°F	°F	°F	°F	°F	°F	cuft/min	oF	oF	oF	cuft/min	oF	oF	oF
0,00	120,00	3,2	0,0	0,0	113,8	72,9	78,5	75,9	72,5	72,7	73,2	72,3	0,13	76,05	76,23	83,21	0,13	76,33	76,35	81,07
1,0	121,0	3,0	0,0	1,2	223,6	72,7	85,3	89,3	72,6	73,1	73,7	72,3	0,13	75,98	76,20	82,86	0,13	76,29	76,33	81,78
2,0	122,0	2,8	0,1	2,8	426,4	73,0	90,3	151,5	73,2	74,4	75,5	72,4	0,13	75,96	76,21	83,70	0,13	76,31	76,34	85,24
3,0	123,0	2,6	0,2	1,8	585,7	73,5	100,1	264,9	74,7	77,0	78,1	72,4	0,13	75,95	76,21	84,33	0,13	76,33	76,36	87,63
4,0	124,0	2,3	0,2	2,4	682,1	73,6	109,8	383,5	77,5	82,1	81,7	72,4	0,13	75,98	76,23	84,38	0,13	76,36	76,39	87,97
5,0	125,0	2,0	0,1	2,8	775,1	73,8	119,0	495,3	82,0	89,9	86,8	72,4	0,13	76,07	76,28	84,07	0,13	76,45	76,42	88,04
6,0	126,0	1,7	1,0	3,3	813,9	74,3	125,7	593,6	88,0	101,7	93,4	72,5	0,13	76,20	76,34	83,68	0,13	76,57	76,52	88,09
7,0	127,0	1,4	1,2	3,4	793,2	74,4	128,0	671,3	94,9	118,6	102,0	72,6	0,13	76,40	76,44	83,34	0,13	76,75	76,61	87,61
8,0	128,0	1,1	1,3	3,2	742,6	74,9	125,6	724,2	102,5	140,4	113,5	72,9	0,13	76,67	76,55	82,98	0,13	76,92	76,71	87,48
9,0	129,0	9,3	0,7	2,7	626,7	74,8	138,7	738,3	110,8	165,7	127,5	73,5	0,13	76,91	76,61	82,69	0,13	77,06	76,81	87,47
10,0	130,0	9,1	0,3	6,2	560,4	74,7	119,2	713,0	119,8	191,6	143,6	74,3	0,13	77,09	76,66	82,43	0,13	77,17	76,89	87,49
11,0	131,0	8,9	0,2	7,0	576,9	74,6	114,5	708,9	126,7	215,0	159,2	75,4	0,13	77,23	76,71	82,15	0,13	77,28	76,97	86,99
12,0	132,0	8,7	0,2	7,9	636,6	74,4	116,7	724,2	133,0	236,0	173,4	76,6	0,13	77,36	76,75	81,93	0,13	77,38	77,02	86,75
13,0	133,0	8,5	0,2	11,2	684,3	74,8	119,7	758,4	138,9	254,1	186,3	78,2	0,13	77,45	76,81	81,73	0,13	77,46	77,08	86,72
14,0	134,0	8,3	0,2	12,5	722,0	74,9	122,5	792,5	145,1	270,7	198,4	79,9	0,13	77,55	76,86	81,58	0,13	77,58	77,15	86,83
15,0	135,0	8,0	0,2	13,3	764,3	75,2	126,3	826,6	151,5	286,5	209,8	81,9	0,13	77,70	76,94	81,43	0,13	77,70	77,24	86,99
16,0	136,0	7,8	0,2	14,4	786,2	75,3	130,0	855,7	158,4	301,5	220,6	84,3	0,13	77,81	76,99	81,38	0,13	77,81	77,32	87,30
17,0	137,0	7,5	0,3	14,8	798,0	75,2	131,7	882,2	165,6	316,3	231,6	87,1	0,13	77,94	77,09	83,54	0,13	77,96	77,42	87,59
18,0	138,0	7,2	0,2	14,7	801,5	75,5	131,3	899,2	173,4	330,9	242,4	90,2	0,13	78,12	77,13	84,56	0,13	78,07	77,49	87,78
19,0	139,0	7,0	0,2	14,6	789,8	75,9	131,1	917,8	181,9	345,9	254,0	93,6	0,13	78,41	77,26	84,57	0,13	78,27	77,61	87,91
20,0	140,0	6,8	0,1	14,2	776,9	76,1	130,4	931,5	191,2	360,9	265,4	97,5	0,13	78,69	77,33	84,39	0,13	78,46	77,71	88,10
21,0	141,0	6,5	0,1	13,6	771,4	76,0	129,7	937,5	200,9	374,5	276,7	101,5	0,13	78,93	77,42	84,17	0,13	78,66	77,84	88,25
22,0	142,0	6,3	0,1	13,5	769,8	76,0	130,6	944,1	211,2	388,4	287,8	105,8	0,13	79,10	77,52	83,87	0,13	78,85	77,93	88,36
23,0	143,0	6,1	0,1	13,6	773,2	76,5	129,9	951,4	221,7	401,5	298,8	110,3	0,13	79,20	77,56	83,67	0,13	78,93	78,01	88,49
24,0	144,0	5,8	0,1	13,7	803,5	76,7	132,5	962,5	233,5	414,9	309,5	115,3	0,13	79,30	77,62	83,51	0,13	79,04	78,10	88,67
25,0	145,0	5,6	0,1	15,0	818,9	76,8	134,0	976,6	246,0	427,5	320,5	120,4	0,13	79,54	77,70	83,41	0,13	79,22	78,18	88,89
26,0	146,0	5,3	0,2	15,2	815,9	77,2	135,0	987,6	258,1	439,1	330,2	125,5	0,13	79,75	77,78	83,28	0,13	79,37	78,27	89,13
27,0	147,0	5,1	0,1	14,6	817,0	76,6	135,9	997,0	268,3	451,1	340,6	130,9	0,13	79,94	77,89	83,18	0,13	79,56	78,38	89,37
28,0	148,0	4,9	0,5	13,5	788,3	76,9	134,6	1001,9	275,6	463,0	350,3	136,4	0,13	80,16	77,98	83,19	0,13	79,72	78,48	89,11
29,0	149,0	4,7	0,4	12,8	778,5	77,3	133,6	1000,9	281,4	475,1	360,0	142,0	0,13	80,31	78,04	83,21	0,13	79,83	78,57	87,23
30,0	150,0	4,5	0,2	12,6	772,3	76,8	131,5	994,8	286,7	487,5	368,6	147,5	0,13	80,57	78,16	83,18	0,13	80,01	78,68	86,02
31,0	151,0	4,3	0,1	12,8	764,1	77,1	131,2	988,2	292,3	500,2	377,8	153,0	0,13	80,81	78,24	83,14	0,13	80,21	78,77	85,30
32,0	152,0	4,1	0,1	12,7	744,0	77,2	130,2	975,6	298,3	512,4	387,1	159,6	0,13	81,01	78,33	83,08	0,13	80,39	78,86	84,79
33,0	153,0	4,0	0,3	11,9	729,8	77,2	129,0	967,4	305,3	524,2	396,6	165,7	0,13	81,09	78,39	83,02	0,13	80,50	78,95	84,41
34,0	154,0	3,8	0,3	11,7	719,9	77,2	128,0	957,0	312,3	534,8	405,7	172,1	0,13	81,16	78,42	83,02	0,13	80,59	79,01	84,68
35,0	155,0	3,6	0,2	11,4	712,8	76,6	127,0	953,1	319,9	544,5	414,9	178,7	0,13	81,16	78,47	82,95	0,13	80,63	79,07	85,23
36,0	156,0	3,5	0,2	11,2	709,4	77,0	126,6	947,9	328,1	553,4	423,3	185,8	0,13	81,19	78,51	82,88	0,13	80,71	79,12	85,71
37,0	157,0	3,3	0,2	11,2	712,2	76,9	126,8	943,1	337,0	561,4	431,4	192,8	0,13	81,26	78,55	82,86	0,13	80,75	79,15	86,18
38,0	158,0	3,2	0,2	11,2	714,6	76,7	125,6	946,4	345,4	568,2	439,6	199,7	0,13	81,27	78,60	82,90	0,13	80,84	79,24	86,58
39,0	159,0	3,0	0,1	11,1	709,4	77,0	125,5	945,5	353,3	574,2	447,3	206,9	0,13	81,32	78,64	82,96	0,13	80,91	79,30	86,92
40,0	160,0	2,9	0,1	10,8	706,7	76,5	124,4	941,3	361,2	579,5	453,6	214,1	0,13	81,38	78,69	82,98	0,13	80,96	79,34	87,20
41,0	161,0	2,7	0,1	10,8	704,3	76,7	124,7	938,4	369,2	584,0	459,6	221,7	0,13	81,39	78,73	82,99	0,13	80,98	79,38	87,46
42,0	162,0	2,6	0,1	10,7	694,8	77,0	123,3	931,4	378,0	588,1	465,2	228,5	0,13	81,48	78,77	83,03	0,13	81,05	79,44	87,70
43,0	163,0	2,5	0,1	10,3	681,7	77,1	122,8	916,6	386,3	590,6	471,1	235,1	0,13	81,52	78,82	83,08	0,13	81,11	79,48	87,88
44,0	164,0	2,4	0,1	9,9	674,9	76,9	122,7	902,2	395,4	593,8	476,6	243,0	0,13	81,61	78,85	83,14	0,13	81,20	79,54	88,01
45,0	165,0	2,3	0,2	9,7	667,3	77,0	120,9	888,3	404,6	596,3	481,4	250,9	0,13	81,58	78,90	83,13	0,13	81,22	79,58	88,13
46,0	166,0	2,2	0,2	9,5	660,2	77,3	121,2	878,6	414,0	598,4	488,4	258,5	0,13	81,61	78,94	83,17	0,13	81,26	79,63	88,24
47,0	167,0	2,1	0,2	9,3	650,1	76,7	119,9	868,5	423,4	600,1	494,6	266,9	0,13	81,73	79,00	83,22	0,13	81,33	79,68	88,29
48,0	168,0	2,0	0,2	9,0	643,4	77,1	118,8	856,4	432,5	600,7	501,1	274,9	0,13	81,62	79,00	83,25	0,13	81,31	79,74	88,33
49,0	169,0	1,9	0,3	8,8	636,3	76,5	119,5	845,2	441,4	601,9	506,2	284,2	0,13	81,54	79,02	83,23	0,13	81,30	79,74	88,34
50,0	170,0	1,8	0,3	8,6	632,0	77,0	118,5	833,2	449,7	601,9	512,2	292,5	0,13	81,56	79,04	83,23	0,13	81,32	79,78	88,43

DATA 2019-01-08 EPA PI 20183 RUN 2 MEDIUM

SFBA EPA EMISSION RESULTS

Test Duration:	**159**	min

PRESSURE FACTOR:

DGM 1	0,97257
DGM 2	0,96824
DGM 3	0,99338

TEMPERATURE FACTORS

DGM 1	0,97425
DGM 2	0,97353
DGM 3	0,98037

VOLUMES SAMPLED

DGM 1	21,172	SCft
DGM 2	20,584	Scft
DGM 3	64,663	SCft

TOTAL TUNNEL VOLUME : 53571

SAMPLE RATIOS

Sample Train 1:	2530,286
Sample Train 2:	2602,527

Paticulate concentration

Sample Train 1	**0,000123**	g/dscf
Sample Train 2	**0,000112**	g/dscf
Room	**0,000002**	g/dscf

TOTAL EMISSIONS

Sample Train 1	**6,50**	g
Sample Train 2	**5,90**	g

EMISSION RATES

Sample Train 1	**2,45**	g/hr
Sample Train 2	**2,23**	g/hr
1st hour emission rate	**4,55**	g/hr

	Train 1	Train 2
Cs	0,0001228	0,00011174

RESULTS

Average emission rate:	2,34	g/hr
Burn Rate :	1,380	Dry kg/hr

BAROMETRIC PRESSURE

Average:	29,72193381 in Hg
Start:	29,7662288 in Hg
End:	29,67763883 in Hg

DGM CONTROLLER VALUES

DGM 1	Final:	29677,401	Cuft
	Initial:	29655,279	Cuft
DGM 2	Final:	27934,597	Cuft
	Initial:	27912,479	Cuft
DGM #3	Final:	377,320	Cuft
	Initial:	310,640	Cuft

TEMPERATURES

DGM 1	541,957	°R
DGM 2	542,355	°R

CALIBRATION FACTORS

DGM 1	1,0101
DGM 2	0,9873
DGM #3	0,9958

TUNNEL FLOW RATE: 336,925 Dscfm

PARTICULATE CATCH

Total Sample Train 1:	2,60 mg
Total Sample Train 2:	2,30 mg
Total Sample Train 1 1st hour:	1,80 mg

DEVIATION: 4,78%

Particulate calculation low

DATA 2019-01-08 EPA PI 20183 RUN 2 MEDIUM

*		*	*	*	*1	*2	*3	*4	*5	*6	*7	*8	Mass flow 1	DGM 1	DGM 1	Filter 1	Mass flow 2	DGM 2	DGM 2	Filter 2
Elapsed		Weight			Flue	Room	Tunnel	Unit	Unit	Unit	Unit	Unit	Reading	Inlet T	Outlet T	Temp	Reading	Inlet T	Outlet T	Temp
Time	Raw data row	Remaining	CO	CO_2	Gas	Temp	Dry Bulb	Top	Back	R.Side	L.Side	Bottom								
min		lbs	%	%	°F	°F	°F	°F	°F	°F	°F	°F	cuft/min	oF	oF	oF	cuft/min	oF	oF	oF
0,00	197,00	9,8	0,5	2,8	305,8	76,1	108,9	476,9	404,5	488,4	463,2	384,8	0,13	79,39	79,16	81,07	0,13	79,98	79,78	80,85
1,0	198,0	9,6	0,2	4,6	425,2	76,3	102,2	472,0	398,3	483,1	458,1	383,5	0,13	79,48	79,13	80,99	0,13	79,95	79,76	80,80
2,0	199,0	9,5	0,4	6,3	457,7	76,4	99,7	505,8	388,4	478,5	453,0	382,0	0,13	79,50	79,11	80,89	0,13	79,97	79,75	80,73
3,0	200,0	9,3	0,2	10,0	492,5	76,1	100,3	556,1	378,7	474,3	447,2	381,5	0,13	79,58	79,09	80,84	0,13	79,97	79,73	80,69
4,0	201,0	9,1	0,1	11,4	521,8	75,7	101,5	608,8	369,7	469,1	441,9	379,4	0,13	79,60	79,09	80,82	0,13	79,99	79,75	80,67
5,0	202,0	9,0	0,2	12,1	538,2	76,4	102,2	656,3	361,6	463,0	436,7	374,9	0,13	79,62	79,10	80,76	0,13	79,98	79,76	80,68
6,0	203,0	8,8	0,2	12,3	548,2	76,6	102,5	696,0	354,5	458,7	433,4	371,8	0,13	79,57	79,05	80,76	0,13	79,93	79,77	80,68
7,0	204,0	8,6	0,3	12,3	557,4	76,8	104,5	728,9	348,7	455,6	431,3	369,7	0,13	79,69	79,06	80,79	0,13	79,97	79,78	80,71
8,0	205,0	8,5	0,4	12,6	571,4	76,7	105,4	758,6	343,7	452,1	430,6	367,0	0,13	79,84	79,10	80,80	0,13	80,05	79,81	80,76
9,0	206,0	8,3	0,4	13,1	587,7	76,7	105,7	785,0	339,5	449,9	431,3	365,6	0,13	79,83	79,10	80,87	0,13	80,06	79,82	80,80
10,0	207,0	8,1	0,4	13,5	600,4	76,7	106,8	809,4	335,9	448,7	432,4	362,3	0,13	79,82	79,10	80,91	0,13	80,09	79,82	80,84
11,0	208,0	7,9	0,5	13,7	613,5	77,1	107,7	830,3	332,8	447,5	433,1	359,3	0,13	79,90	79,12	80,91	0,13	80,10	79,88	80,89
12,0	209,0	7,7	0,6	14,1	629,9	76,7	109,8	850,4	330,4	447,5	435,9	357,2	0,13	80,12	79,18	80,98	0,13	80,23	79,91	80,96
13,0	210,0	7,5	0,6	14,7	645,3	76,7	111,3	868,9	328,9	447,8	438,7	356,0	0,13	80,19	79,19	81,06	0,13	80,28	79,95	81,04
14,0	211,0	7,3	0,6	15,1	641,7	77,4	111,3	884,6	327,5	447,6	441,9	353,3	0,13	80,28	79,22	81,18	0,13	80,34	79,99	81,17
15,0	212,0	7,1	0,8	14,9	629,1	77,5	111,3	896,5	326,6	449,4	446,4	352,2	0,13	80,53	79,25	81,24	0,13	80,46	80,01	81,26
16,0	213,0	7,0	0,7	14,5	626,9	77,3	111,0	905,0	326,1	451,3	450,8	349,8	0,13	80,70	79,31	81,29	0,13	80,55	80,04	81,36
17,0	214,0	6,8	0,6	14,4	625,8	77,2	111,8	909,8	325,9	453,7	455,4	348,8	0,13	80,80	79,34	81,39	0,13	80,62	80,09	81,47
18,0	215,0	6,6	0,7	14,4	622,9	77,3	111,3	913,2	326,0	456,3	460,1	347,0	0,13	80,85	79,36	81,51	0,13	80,69	80,11	81,57
19,0	216,0	6,4	0,7	14,3	622,2	77,4	111,6	917,0	326,2	459,4	464,9	345,9	0,13	80,96	79,38	81,58	0,13	80,76	80,15	81,67
20,0	217,0	6,2	0,7	14,3	623,4	77,8	111,1	919,6	326,4	462,3	469,4	343,3	0,13	81,18	79,46	81,69	0,13	80,86	80,20	81,80
21,0	218,0	6,0	0,8	14,4	624,4	77,1	111,4	923,8	327,3	465,9	474,8	342,5	0,13	81,30	79,49	81,75	0,13	80,94	80,23	81,88
22,0	219,0	5,9	0,9	14,5	625,9	77,2	110,5	927,1	328,4	468,9	479,7	342,0	0,13	81,44	79,50	81,83	0,13	81,06	80,27	81,99
23,0	220,0	5,7	0,8	14,7	633,2	77,1	111,4	931,6	329,3	472,3	484,6	340,6	0,13	81,56	79,54	81,92	0,13	81,15	80,33	82,10
24,0	221,0	5,5	0,9	15,0	636,9	77,3	112,0	935,3	330,6	475,7	489,3	339,7	0,13	81,50	79,56	82,00	0,13	81,18	80,37	82,17
25,0	222,0	5,3	1,0	15,1	639,7	76,8	112,6	940,9	332,3	480,1	494,8	339,0	0,13	81,49	79,59	82,13	0,13	81,21	80,37	82,27
26,0	223,0	5,1	1,0	15,2	635,0	77,6	113,3	943,3	333,8	484,0	499,8	339,1	0,13	81,46	79,56	82,18	0,13	81,19	80,41	82,36
27,0	224,0	4,9	1,0	15,0	632,9	77,5	112,6	945,7	335,9	487,9	504,9	339,4	0,13	81,61	79,62	82,26	0,13	81,28	80,43	82,48
28,0	225,0	4,7	1,0	15,0	631,7	77,2	112,6	948,0	338,1	491,1	509,7	338,1	0,13	81,77	79,67	82,32	0,13	81,38	80,49	82,57
29,0	226,0	4,6	1,0	15,0	630,7	77,6	111,7	950,5	340,5	494,8	514,1	336,5	0,13	81,94	79,73	82,41	0,13	81,49	80,53	82,66
30,0	227,0	4,4	0,9	15,0	624,8	78,3	111,9	953,0	343,0	498,1	518,0	335,8	0,13	82,02	79,78	82,51	0,13	81,58	80,60	82,76
31,0	228,0	4,2	0,8	14,8	624,4	78,4	111,3	954,5	345,4	501,5	522,8	335,1	0,13	82,09	79,81	82,57	0,13	81,66	80,64	82,84
32,0	229,0	4,0	0,8	14,8	615,0	78,3	111,1	955,0	348,0	504,9	527,9	334,8	0,13	82,23	79,89	82,61	0,13	81,74	80,70	82,91
33,0	230,0	3,9	0,6	14,5	616,0	78,2	111,4	955,1	350,8	507,9	532,5	334,6	0,13	82,25	79,93	82,71	0,13	81,82	80,75	83,00
34,0	231,0	3,7	0,7	14,5	612,3	77,9	110,7	958,2	353,7	511,0	536,7	335,0	0,13	82,21	79,93	82,78	0,13	81,81	80,77	83,08
35,0	232,0	3,6	0,8	14,4	610,2	77,9	110,6	960,6	357,0	513,7	541,2	335,6	0,13	82,21	79,96	82,85	0,13	81,88	80,80	83,19
36,0	233,0	3,4	0,8	14,4	609,1	78,0	111,8	961,5	359,9	516,5	545,1	335,5	0,13	82,14	79,95	82,92	0,13	81,84	80,84	83,28
37,0	234,0	3,3	0,8	14,3	606,0	78,2	111,2	962,7	363,3	519,2	548,6	335,3	0,13	82,14	79,95	82,99	0,13	81,86	80,84	83,34
38,0	235,0	3,1	0,8	14,2	602,1	78,2	109,7	962,3	366,7	521,0	551,7	334,8	0,13	82,20	79,99	83,06	0,13	81,89	80,89	83,40
39,0	236,0	3,0	0,8	14,0	602,2	77,9	110,9	964,3	370,5	523,8	555,8	335,9	0,13	82,17	79,99	83,09	0,13	81,90	80,92	83,48
40,0	237,0	2,8	0,9	13,9	602,8	77,5	109,9	967,1	374,9	526,0	559,3	337,0	0,13	82,17	79,99	83,15	0,13	81,91	80,94	83,57
41,0	238,0	2,7	0,9	13,8	600,1	77,7	109,6	969,0	379,6	527,9	563,3	337,8	0,13	82,21	80,00	83,15	0,13	81,95	80,97	83,61
42,0	239,0	2,6	0,8	13,9	595,4	77,8	108,2	969,8	384,1	529,3	566,1	338,3	0,13	82,30	80,01	83,24	0,13	82,01	80,97	83,67
43,0	240,0	2,5	0,7	13,7	588,5	78,6	108,1	969,4	388,6	530,7	569,1	338,6	0,13	82,35	80,05	83,30	0,13	82,02	81,02	83,73
44,0	241,0	2,4	0,6	13,3	574,5	77,8	108,2	964,6	392,9	532,8	573,0	339,7	0,13	82,33	80,03	83,30	0,13	82,00	81,03	83,77
45,0	242,0	2,2	0,4	12,6	558,8	77,6	107,8	954,5	397,1	534,8	576,0	340,9	0,13	82,32	80,05	83,32	0,13	82,03	81,06	83,83
46,0	243,0	2,2	0,3	11,7	543,9	77,6	105,7	938,9	401,3	536,3	578,5	340,3	0,13	82,22	80,03	83,35	0,13	81,99	81,07	83,88
47,0	244,0	2,1	0,2	10,8	531,7	77,6	105,0	923,7	404,5	538,1	580,4	341,2	0,13	82,16	80,03	83,36	0,13	81,96	81,07	83,89
48,0	245,0	2,0	0,2	10,2	520,7	77,2	103,9	908,8	407,5	540,2	582,4	343,2	0,13	82,16	80,01	83,35	0,13	81,94	81,06	83,90
49,0	246,0	1,9	0,2	9,9	513,6	77,8	103,2	894,0	410,1	541,8	583,5	343,6	0,13	82,09	80,00	83,34	0,13	81,89	81,04	83,90
50,0	247,0	1,9	0,1	9,6	504,8	77,7	102,9	880,4	412,5	543,5	584,3	344,5	0,13	82,07	80,02	83,29	0,13	81,89	81,06	83,91
51,0	248,0	1,8	0,1	9,5	499,2	77,0	101,5	867,8	414,5	543,8	584,2	343,6	0,13	81,92	79,98	83,30	0,13	81,80	81,04	83,92
52,0	249,0	1,8	0,1	9,3	492,4	77,9	102,5	853,9	416,2	545,1	584,6	345,2	0,13	81,84	79,94	83,27	0,13	81,76	81,02	83,89
53,0	250,0	1,7	0,2	9,1	487,0	77,7	101,8	839,8	418,1	545,9	582,9	346,2	0,13	81,78	79,93	83,27	0,13	81,71	81,01	83,89
54,0	251,0	1,6	0,2	8,9	479,9	78,0	100,1	826,0	419,2	545,8	582,0	346,2	0,13	81,69	79,95	83,31	0,13	81,68	81,00	83,88
55,0	252,0	1,6	0,2	8,5	473,0	78,0	100,0	811,2	419,4	546,3	582,0	347,7	0,13	81,68	79,97	83,27	0,13	81,68	81,02	83,84
56,0	253,0	1,6	0,2	8,0	462,9	77,5	99,7	797,4	419,7	546,3	581,4	348,6	0,13	81,50	79,92	83,18	0,13	81,57	80,99	83,80
57,0	254,0	1,5	0,3	7,4	455,2	77,4	98,8	782,1	419,7	545,7	580,1	349,3	0,13	81,36	79,89	83,16	0,13	81,50	80,98	83,73
58,0	255,0	1,4	0,4	7,0	447,9	76,9	98,5	765,7	419,4	544,6	579,5	349,9	0,13	81,28	79,85	83,07	0,13	81,42	80,96	83,72
59,0	256,0	1,4	0,5	6,8	441,8	77,6	97,8	751,1	418,6	543,4	576,8	349,8	0,13	81,21	79,86	82,97	0,13	81,34	80,95	83,68
60,0	257,0	1,4	0,5	6,6	435,1	77,1	97,2	736,5	417,7	541,5	576,3	350,4	0,13	81,08	79,82	82,74	0,13	81,24	80,92	83,60
61,0	258,0	1,4	0,5	6,4	428,9	77,2	96,7	723,4	417,2	540,6	575,4	351,1	0,13	80,93	79,78	85,10	0,13	81,12	80,88	83,54
62,0	259,0	1,3	0,5	6,3	422,0	77,2	96,2	710,1	416,5	538,9	573,8	351,0	0,13	80,89	79,76	84,95	0,13	81,08	80,87	83,48
63,0	260,0	1,3	0,5	5,9	413,4	77,3	95,5	695,2	415,1	537,1	571,1	351,5	0,13	80,93	79,76	84,73	0,13	81,08	80,86	83,43
64,0	261,0	1,3	0,7	5,5	405,3	77,2	95,6	680,7	413,8	534,5	567,6	352,8	0,13	80,80	79,75	84,49	0,13	80,99	80,85	83,40
65,0	262,0	1,3	0,8	5,0	399,7	77,1	95,0	666,0	412,4	531,5	564,8	352,4	0,13	80,70	79,70	84,25	0,13	80,93	80,79	83,33
66,0	263,0	1,2	0,9	4,9	392,3	77,0	94,2	652,6	411,3	528,4	561,8	353,3	0,13	80,63	79,70	84,03	0,13	80,90	80,80	83,25
67,0	264,0	1,2	0,9	4,7	385,0	76,8	94,3	640,1	410,2	525,1	558,3	354,5	0,13	80,58	79,67	83,83	0,13	80,88	80,77	83,18
68,0	265,0	1,2	0,9	4,5	379,5	76,8	93,5	627,3	408,7	521,6	554,5	355,7	0,13	80,51	79,67	83,62	0,13	80,83	80,77	83,09
69,0	266,0	1,2	0,9	4,5	373,9	76,8	91,8	614,9	406,1	516,4	548,4	354,9	0,13	80,45	79,66	83,44	0,13	80,80	80,73	82,99

70,0	267,0	1,2	0,9	4,5	369,4	76,5	92,6	603,9	404,4	512,8	543,4	355,8	0,13	80,32	79,63	83,25	0,13	80,70	80,71	82,93
71,0	268,0	1,1	0,9	4,5	365,1	76,6	92,6	593,7	402,3	508,6	538,5	356,8	0,13	80,28	79,63	83,13	0,13	80,65	80,67	82,86
72,0	269,0	1,1	0,8	4,5	361,4	76,6	92,1	584,2	400,2	504,4	534,2	357,6	0,13	80,19	79,58	83,02	0,13	80,57	80,66	82,79
73,0	270,0	1,1	0,8	4,5	358,7	76,4	91,6	574,9	397,9	499,9	529,1	357,8	0,13	80,00	79,54	82,86	0,13	80,44	80,61	82,71
74,0	271,0	1,1	0,8	4,5	354,8	76,7	91,4	567,2	395,9	495,6	524,2	357,6	0,13	79,85	79,50	82,74	0,13	80,33	80,58	82,64
75,0	272,0	1,1	0,8	4,5	350,6	76,4	90,8	559,1	393,0	491,1	520,3	356,4	0,13	79,86	79,49	82,60	0,13	80,28	80,55	82,56
76,0	273,0	1,1	0,8	4,4	347,5	76,5	90,7	551,5	391,0	487,1	517,3	356,8	0,13	79,79	79,43	82,47	0,13	80,22	80,52	82,49
77,0	274,0	1,0	0,8	4,2	344,9	76,7	90,4	544,8	389,2	483,2	513,2	356,0	0,13	79,72	79,44	82,35	0,13	80,16	80,49	82,39
78,0	275,0	1,0	0,8	4,2	341,4	77,2	91,5	537,9	386,5	478,4	506,9	353,4	0,13	79,63	79,42	82,24	0,13	80,09	80,44	82,29
79,0	276,0	1,0	0,7	4,2	338,4	77,4	92,4	530,1	383,5	474,5	504,3	351,2	0,13	79,76	79,44	82,12	0,13	80,14	80,44	82,25
80,0	277,0	1,0	0,7	4,1	335,8	77,1	93,7	524,0	381,0	472,2	501,2	352,8	0,13	80,06	79,50	82,04	0,13	80,25	80,47	82,20
81,0	278,0	1,0	0,7	4,2	333,1	77,0	94,4	519,6	378,4	468,9	497,5	352,9	0,13	80,23	79,58	81,99	0,13	80,38	80,51	82,18

82,0	279,0	0,9	0,7	4,1	330,7	77,1	95,1	514,6	375,9	466,2	494,9	354,2	0,13	80,38	79,65	81,97	0,13	80,49	80,56	82,17
83,0	280,0	0,9	0,7	4,1	327,9	77,1	96,0	509,0	373,6	463,2	491,2	354,2	0,13	80,53	79,71	81,92	0,13	80,62	80,63	82,17
84,0	281,0	0,9	0,7	4,1	325,7	77,1	96,0	503,7	371,3	460,7	486,4	353,1	0,13	80,75	79,80	81,88	0,13	80,77	80,71	82,14
85,0	282,0	0,9	0,7	4,0	323,0	77,3	96,5	498,5	368,7	457,9	483,7	352,3	0,13	80,96	79,89	81,82	0,13	80,89	80,79	82,12
86,0	283,0	0,9	0,7	4,0	321,7	77,2	97,2	493,4	366,1	455,5	481,5	352,1	0,13	81,13	79,99	81,82	0,13	81,04	80,88	82,15
87,0	284,0	0,8	0,7	4,0	319,0	77,8	97,5	488,2	363,5	452,9	477,8	351,5	0,13	81,33	80,07	81,80	0,13	81,20	80,96	82,14
88,0	285,0	0,9	0,7	3,9	316,8	77,8	97,7	484,4	361,4	450,6	475,1	351,1	0,13	81,48	80,17	81,83	0,13	81,34	81,04	82,16
89,0	286,0	0,8	0,6	3,9	314,4	78,0	97,7	480,6	358,8	448,3	472,2	351,4	0,13	81,62	80,26	81,81	0,13	81,46	81,12	82,16
90,0	287,0	0,8	0,6	3,8	312,1	78,1	98,1	476,0	356,5	445,9	469,3	349,5	0,13	81,77	80,35	81,84	0,13	81,62	81,21	82,17
91,0	288,0	0,8	0,6	3,6	310,1	78,1	98,0	472,2	354,1	443,7	466,0	349,0	0,13	81,89	80,44	81,86	0,13	81,73	81,29	82,21
92,0	289,0	0,8	0,6	3,6	307,6	78,2	98,5	468,3	351,9	441,8	462,9	348,8	0,13	82,04	80,55	81,87	0,13	81,86	81,38	82,24
93,0	290,0	0,8	0,6	3,6	305,2	78,3	98,5	463,4	349,9	439,8	459,9	348,4	0,13	82,14	80,63	81,90	0,13	81,96	81,47	82,27
94,0	291,0	0,7	0,6	3,5	302,9	78,4	98,9	459,2	347,8	437,1	455,6	347,2	0,13	82,27	80,73	81,94	0,13	82,12	81,52	82,30
95,0	292,0	0,7	0,6	3,5	300,6	78,6	98,9	454,7	345,6	435,2	452,7	345,6	0,13	82,39	80,83	81,97	0,13	82,23	81,63	82,34
96,0	293,0	0,7	0,6	3,4	297,4	78,6	99,0	450,5	343,6	433,3	448,8	344,4	0,13	82,50	80,91	82,01	0,13	82,35	81,71	82,38
97,0	294,0	0,7	0,5	3,3	295,0	79,0	99,0	447,1	341,7	431,5	445,5	343,1	0,13	82,62	81,02	82,07	0,13	82,47	81,80	82,42
98,0	295,0	0,7	0,5	3,3	292,8	79,1	99,3	443,0	339,9	429,2	442,0	341,7	0,13	82,72	81,10	82,12	0,13	82,58	81,87	82,47
99,0	296,0	0,7	0,5	3,3	290,7	79,2	99,7	438,9	337,8	427,6	438,6	340,1	0,13	82,84	81,20	82,17	0,13	82,70	81,94	82,49
100,0	297,0	0,7	0,5	3,2	289,3	79,1	99,7	435,5	335,8	424,8	435,0	338,6	0,13	82,94	81,28	82,21	0,13	82,80	82,01	82,55
101,0	298,0	0,7	0,5	3,2	286,8	79,0	99,9	431,8	333,8	423,1	431,6	337,3	0,13	83,03	81,38	82,27	0,13	82,92	82,11	82,59
102,0	299,0	0,7	0,5	3,1	285,3	79,1	99,8	427,4	332,0	420,7	427,9	334,8	0,13	83,12	81,47	82,34	0,13	83,01	82,18	82,67
103,0	300,0	0,6	0,5	3,1	282,6	79,3	100,2	424,4	329,8	418,2	425,4	333,4	0,13	83,21	81,56	82,39	0,13	83,12	82,28	82,72
104,0	301,0	0,6	0,5	3,1	280,1	79,4	100,3	421,0	328,1	416,0	422,1	333,0	0,13	83,32	81,65	82,45	0,13	83,22	82,34	82,76
105,0	302,0	0,6	0,5	3,0	278,3	79,6	100,4	417,1	326,8	413,6	418,8	332,4	0,13	83,39	81,74	82,52	0,13	83,33	82,41	82,81
106,0	303,0	0,6	0,5	3,0	276,5	79,8	100,8	414,0	325,2	411,2	416,3	331,0	0,13	83,48	81,83	82,58	0,13	83,43	82,51	82,89
107,0	304,0	0,6	0,5	3,0	274,8	80,0	100,9	410,4	324,2	409,0	413,4	329,9	0,13	83,56	81,92	82,68	0,13	83,53	82,59	82,94
108,0	305,0	0,6	0,5	3,0	273,0	79,8	101,1	407,9	322,8	406,6	410,4	328,5	0,13	83,65	82,01	82,74	0,13	83,63	82,67	83,00
109,0	306,0	0,5	0,5	3,0	271,3	79,7	101,0	404,8	321,6	404,1	406,3	325,6	0,13	83,75	82,10	82,80	0,13	83,73	82,73	83,05
110,0	307,0	0,6	0,5	3,0	269,8	79,6	101,3	401,1	320,4	401,6	403,9	323,3	0,13	83,82	82,16	82,87	0,13	83,81	82,81	83,13
111,0	308,0	0,5	0,5	3,0	267,7	79,2	101,4	398,7	318,8	399,2	401,2	321,8	0,13	83,87	82,25	82,93	0,13	83,89	82,88	83,18
112,0	309,0	0,5	0,5	3,0	266,4	79,8	101,6	395,3	317,8	396,6	398,3	319,8	0,13	83,97	82,32	83,00	0,13	83,98	82,96	83,24
113,0	310,0	0,5	0,5	3,0	265,2	79,9	101,7	392,4	316,3	393,6	396,0	317,6	0,13	84,04	82,42	83,07	0,13	84,08	83,04	83,31
114,0	311,0	0,5	0,5	2,9	264,3	80,0	102,0	389,4	314,9	391,6	393,4	315,8	0,13	84,11	82,49	83,14	0,13	84,15	83,11	83,37
115,0	312,0	0,5	0,5	2,9	263,0	80,3	102,1	386,8	314,1	389,6	390,6	313,5	0,13	84,18	82,56	83,18	0,13	84,23	83,18	83,43
116,0	313,0	0,5	0,5	3,0	261,4	80,2	102,3	384,3	313,2	387,5	388,5	311,7	0,13	84,25	82,65	83,27	0,13	84,29	83,25	83,49
117,0	314,0	0,5	0,5	2,9	260,4	80,2	102,4	381,6	312,8	385,3	385,8	309,2	0,13	84,36	82,75	83,33	0,13	84,40	83,34	83,57
118,0	315,0	0,4	0,5	2,9	258,9	80,1	102,6	379,7	312,0	383,5	384,3	308,0	0,13	84,42	82,81	83,41	0,13	84,48	83,40	83,64
119,0	316,0	0,5	0,5	2,9	257,6	80,1	102,9	377,2	311,5	381,5	382,2	306,9	0,13	84,49	82,90	83,49	0,13	84,56	83,48	83,70
120,0	317,0	0,5	0,5	2,9	256,3	79,9	103,1	374,9	310,4	379,7	380,1	306,0	0,13	84,55	83,01	83,57	0,13	84,64	83,57	83,76
121,0	318,0	0,4	0,5	2,9	255,1	80,0	103,4	373,1	309,7	378,2	378,4	304,0	0,13	84,63	83,07	83,60	0,13	84,71	83,63	83,80
122,0	319,0	0,4	0,5	3,0	254,8	80,5	103,5	370,7	309,2	376,5	376,6	302,3	0,13	84,69	83,14	83,69	0,13	84,79	83,71	83,88
123,0	320,0	0,4	0,5	3,0	254,5	80,4	103,6	368,8	308,6	374,7	375,3	301,2	0,13	84,80	83,24	83,76	0,13	84,88	83,78	83,97
124,0	321,0	0,4	0,5	3,0	253,9	80,7	103,9	366,8	308,0	373,1	373,5	300,1	0,13	84,89	83,32	83,83	0,13	84,95	83,86	84,01
125,0	322,0	0,4	0,6	3,1	253,2	80,8	103,9	365,5	307,6	371,8	372,2	299,3	0,13	84,94	83,38	83,90	0,13	85,04	83,94	84,09
126,0	323,0	0,4	0,6	3,1	253,1	80,7	104,1	364,2	307,4	370,2	370,2	297,8	0,13	85,01	83,47	83,97	0,13	85,11	84,01	84,16
127,0	324,0	0,4	0,6	3,0	252,3	80,8	104,3	362,6	307,0	368,4	368,9	296,2	0,13	85,09	83,55	84,05	0,13	85,20	84,09	84,22
128,0	325,0	0,3	0,6	3,0	251,6	80,8	104,3	361,2	306,6	367,1	367,5	294,7	0,13	85,16	83,65	84,11	0,13	85,27	84,15	84,30
129,0	326,0	0,3	0,6	3,0	250,6	80,9	104,6	359,8	306,6	365,8	366,0	293,2	0,13	85,25	83,74	84,19	0,13	85,36	84,23	84,36
130,0	327,0	0,3	0,6	3,0	249,5	81,0	104,7	358,3	306,6	364,7	365,3	292,8	0,14	85,33	83,82	84,27	0,13	85,43	84,31	84,42
131,0	328,0	0,3	0,5	3,0	249,1	80,9	104,8	356,7	306,1	363,5	364,2	291,7	0,14	85,41	83,89	84,36	0,13	85,51	84,38	84,50
132,0	329,0	0,3	0,5	3,0	248,5	81,0	105,0	355,0	305,8	362,1	362,9	290,3	0,14	85,45	83,97	84,42	0,13	85,58	84,46	84,58
133,0	330,0	0,3	0,5	3,0	247,6	81,2	105,2	353,7	305,6	360,8	361,7	289,2	0,14	85,51	84,05	84,49	0,13	85,66	84,54	84,62
134,0	331,0	0,3	0,5	2,9	246,6	80,8	105,5	352,3	305,2	359,2	360,6	287,8	0,13	85,58	84,13	84,55	0,13	85,73	84,63	84,68
135,0	332,0	0,3	0,5	2,9	246,4	80,8	105,4	351,1	304,7	358,4	359,8	286,9	0,13	85,65	84,20	84,63	0,13	85,80	84,68	84,75
136,0	333,0	0,2	0,5	2,9	246,0	80,9	105,7	349,9	304,5	356,9	358,2	285,8	0,13	85,68	84,28	84,69	0,13	85,86	84,75	84,81
137,0	334,0	0,2	0,5	2,9	244,5	81,1	105,8	348,8	304,1	355,9	357,3	284,2	0,13	85,75	84,36	84,71	0,13	85,92	84,81	84,88
138,0	335,0	0,2	0,5	2,8	243,6	81,2	105,9	347,1	303,8	354,7	356,1	283,2	0,13	85,81	84,43	84,80	0,13	86,01	84,90	84,91
139,0	336,0	0,2	0,5	2,8	242,2	81,0	106,1	345,9	303,4	353,5	355,5	282,3	0,13	85,90	84,53	84,88	0,13	86,08	84,97	84,98
140,0	337,0	0,2	0,5	2,8	241,9	81,1	106,4	344,7	302,9	352,2	354,5	281,2	0,13	85,99	84,61	84,93	0,13	86,18	85,04	85,05

141,0	338,0	0,2	0,5	2,8	241,4	81,3	106,6	343,3	302,3	350,9	353,5	279,7	0,13	86,03	84,69	85,02	0,13	86,23	85,13	85,11
142,0	339,0	0,2	0,5	2,8	241,2	81,3	106,6	342,3	301,8	349,8	352,6	279,1	0,13	86,10	84,77	85,06	0,13	86,31	85,20	85,17
143,0	340,0	0,2	0,5	2,8	240,4	81,5	106,6	341,3	301,3	349,0	352,0	278,7	0,13	86,19	84,86	85,15	0,13	86,39	85,27	85,24
144,0	341,0	0,2	0,5	2,8	240,0	81,5	106,8	340,6	301,0	348,3	350,9	277,4	0,13	86,27	84,94	85,19	0,13	86,47	85,36	85,30
145,0	342,0	0,2	0,5	2,8	239,3	81,5	106,8	339,7	299,9	346,4	350,2	275,8	0,13	86,33	85,02	85,27	0,13	86,54	85,44	85,39
146,0	343,0	0,2	0,6	2,9	239,2	81,2	107,1	338,7	299,1	345,3	349,3	274,9	0,13	86,42	85,08	85,32	0,13	86,60	85,50	85,39
147,0	344,0	0,2	0,6	2,9	238,6	81,5	107,1	337,5	298,8	344,0	348,8	273,8	0,13	86,49	85,17	85,40	0,13	86,70	85,57	85,49
148,0	345,0	0,1	0,6	2,9	237,5	80,7	107,3	336,6	298,7	343,5	347,5	273,1	0,13	86,52	85,23	85,44	0,13	86,73	85,63	85,53
149,0	346,0	0,1	0,6	2,9	236,8	80,5	107,5	335,8	298,6	342,1	346,5	272,2	0,13	86,53	85,31	85,46	0,13	86,79	85,72	85,57
150,0	347,0	0,1	0,6	2,8	236,7	80,3	107,6	335,2	298,4	341,2	346,1	271,9	0,13	86,55	85,38	85,49	0,13	86,84	85,77	85,59
151,0	348,0	0,1	0,6	2,9	235,9	80,4	107,7	334,5	298,2	340,2	344,7	271,1	0,13	86,56	85,45	85,55	0,13	86,88	85,84	85,62
152,0	349,0	0,1	0,6	2,9	235,7	80,6	107,6	333,2	298,1	339,0	344,1	269,9	0,13	86,61	85,52	85,62	0,13	86,94	85,92	85,70
153,0	350,0	0,1	0,6	2,9	236,4	81,2	107,9	332,4	298,2	338,2	343,6	269,1	0,13	86,67	85,60	85,65	0,13	87,01	85,98	85,73
154,0	351,0	0,1	0,6	2,9	235,5	81,3	108,1	331,8	298,0	337,0	342,4	267,5	0,13	86,74	85,68	85,69	0,13	87,07	86,05	85,80
155,0	352,0	0,1	0,6	2,9	234,8	81,3	108,1	331,0	298,2	336,2	341,3	266,6	0,13	86,84	85,75	85,75	0,13	87,14	86,12	85,86
156,0	353,0	0,1	0,6	2,9	234,4	81,4	108,3	330,1	297,9	335,8	340,8	266,0	0,13	86,92	85,83	85,82	0,13	87,21	86,19	85,90
157,0	354,0	0,1	0,6	2,9	234,1	81,4	108,3	329,8	298,0	334,8	340,1	265,3	0,13	86,98	85,92	85,88	0,13	87,28	86,27	85,96
158,0	355,0	0,1	0,6	2,9	234,4	81,6	108,3	329,3	298,1	334,4	339,1	264,4	0,13	87,06	85,97	85,92	0,13	87,36	86,34	86,04
159,0	356,0	0,0	0,6	2,9	233,9	81,7	108,5	328,1	297,8	333,6	338,7	264,1	0,13	87,13	86,06	85,98	0,13	87,43	86,41	86,09

Particulate calculation low

DATA 2019-01-08 EPA PI 20183 RUN 2 MEDIUM

Manufacturer: JOTUL
Model: F602

Combustion Efficiency: 98,88%

Heat Output:	52 685 Btu/h	55 539 kJ/h
Heat Input:	78 864 Btu/h	83 137 kJ/h
Burn Duration:	0,68 h	
Burn Rate:	9,07 lb/h	4,114 kg/h
Stack Temp:	723,7 Deg. F	384,3 Deg. C

Note: In the "Input data", "Calc. % O_2", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3

PI 20183 Heat Transfer Efficiency: 67,56%
Test Duration: 159 min

Ultimate CO_2
$CO_{2\text{-ult}}$ 19,86

F_0
1,051

	HHV	LHV
Eff	66,80%	71,88%
Comb Eff	98,88%	98,88%
HT Eff	67,56%	72,70%
Output	55 539	kJ/h
Burn Rate	4,11	kg/h
Grams CO	52	g
Input	83 137	kJ/h
MC wet	17,44	

Overall Heating Efficiency: 66,80%
Run: 2
Project #:

Air Fuel Ratio (A/F)	
Dry Molecular Weight (M_d)	30,19
Dry Moles Exhaust Gas (N_T):	325,90
Air Fuel Ratio (A/F)	9,33

Manufacturer: JOTUL
Model: F602

Combustion Efficiency: 95,56%

Heat Output:	18 506 Btu/h	19 508 kJ/h
Heat Input:	26 482 Btu/h	27 917 kJ/h
Burn Duration:	2,65 h	
Burn Rate:	3,04 lb/h	1,382 kg/h
Stack Temp:	394,8 Deg. F	201,6 Deg. C

Note: In the "Input data", "Calc. % O_2", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a]. [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3

PI 20183 Heat Transfer Efficiency: 73,13%
Test Duration: 159 min

Ultimate CO_2
$CO_{2\text{-ult}}$ 19,86

F_0
1,049

	HHV	LHV
Eff	69,88%	75,19%
Comb Eff	95,56%	95,56%
HT Eff	73,13%	78,69%
Output	19 508	kJ/h
Burn Rate	1,38	kg/h
Grams CO	240	g
Input	27 917	kJ/h
MC wet	17,40	

Overall Heating Efficiency: 69,88%
Run: 2
Project #:

Air Fuel Ratio (A/F)	
Dry Molecular Weight (M_d)	29,63
Dry Moles Exhaust Gas (N_T):	486,87
Air Fuel Ratio (A/F)	13,92

POLYTESTS
TESTING THROUGH YOUR REALITY

Date: 2019-01-08 Manufacturer: Jotul Model: F 602

Project #: PI 20183 Run: 2 Tech: M R Reviewer: DP

kindling 32 LBS start fire no paper
1 min torch
At 2 min close door
At 100 LBS insert load (High)
At 18 LBS stop pump
At 100 LBS insert load
- close door immediatly
At 2 min close air hold (to 0.075 in)

TEST LOAD CONFIGURATION

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE / POST CHECKS

Date: 2019-01-08 Manufacturer: Jotul Model: F 602
Project #: PI 20183 Run: 2 Tech: M M Reviewer: DP

	Equipment #	Time	12%	22%
Moisture Meter Calibration Check:	EM-191	7:50	ok	ok

	Pre-Test	Post-Test
Facility Conditions:		
Air Velocity from less than 2 feet	6 (max50 Fpm)	0 (max50 Fpm)
Smoke Capture Check	ok	ok
Picture	4 sides ok	ok

Wood Heater Conditions:

Date Wood Heater Stack Cleaned	2019-01-07
Date Dilution Tunnel Cleaned	2019-01-07
Induced Draft Check (max 0.005 H2O)	ok
Traverse before ignition	ok

Temperature System:

Ambient (65°-90°F)	ok °F

Proportional Checks:

Thermocouple check	ok
Pitot Clean	ok
Pitot verification	ok

Sampling Train ID Numbers:

	High fire test			Medium low fire test		
	1st hour	Train 1	Train 2	1st hour	Train 1	Train 2
Probe	3	5	13	10	11	20
Filter Front	414	416	418	421	423	425
Filter Back	415	417	419	422	424	426
Filter Thermocouple	11	11	12	11	11	12
Filter (80°F ≥ <90°F)	ok	ok	ok	ok	ok	ok

POLYTESTS
TESTING THROUGH YOUR REALITY

SAMPLING EQUIPMENT CHECK OUT

Date: 2019-01-08 Manufacturer: Jotul Model: F 602

Project #: PT 20183 Run: 2 Tech: MM Reviewer: DP

Leakage Checks Tunnel Samplers

High fire test	System 1st hour		System 1		System 2	
Unplugged Flow Rate = .25cfm	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)	83954.38	83974.63	83954.61	83974.71	790190.00	790390.56
Initial 1minute DGM (Liter)	83954.28	83974.53	83954.61	83974.69	790190.00	790390.56
Change © (Liter)	0.1	0.1	∅	0.02	∅	∅
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Low medium fire test	System 1st hour		System 1		System 2	
Unplugged Flow Rate = .25cfm	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.)	-18	-15	-18	-15	-15	-15
Final 1minute DGM (Liter)	83974.333	84037.35	83974.46	84037.46	790392.65	791020.65
Initial 1minute DGM (Liter)	83974.326	84037.34	83974.40	84037.46	790392.51	791020.61
Change © (Liter)	0.07	0.01	0.06	∅	0.14	
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

POLYTESTS
TESTING THROUGH YOUR REALITY

SAMPLING EQUIPMENT CHECK OUT

Date: 2019-01-08 Manufacturer: Joy[illegible] Model: F 602

Project #: PI 20 183 Run: 2 Tech: M M Reviewer: [illegible]

Leakage Checks Flue Gas Sampler

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

Leakage Checks Pitot

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

POLYTESTS
TESTING THROUGH YOUR REALITY

PRE-TEST SCALE AUDIT

Date: 2019-01-08 Manufacturer: Jotul Model: F602

Project #: PT 20183 Run: 2 Tech: MM Reviewer: DP

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Wood	EM-090	44 lbs, Class F	44 lbs
Analytical	EM-128	100mg, Class S	106 mg
Analytical	EM-128	200g, Class S	200g

LIMITS OF WEIGHT RANGES

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

POLYTESTS
TESTING THROUGH YOUR REALITY

CONTINUOUS ANALYZERS

Date: 2019-01-08 Manufacturer: Jofu1 Model: F602

Project #: PI 20183 Run: 2 Tech: MM Reviewer: DP

FOR TUNNELS < 12 in

Barometric pressure (P_{bar}) 100.9 (KPa.) Static pressure (P_q) 0.19 (inches w.c.)
Inside diameter: Port A _______ Port B _____.
Tunnel cross sectional area: .1963Ft^2
Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H_2O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.062	76.14
B - Centroid	3.00	3.50	4	0.061	76.81
A-1	0.40	0.50	0.50	0.059	75.58
A-2	1.50	1.75	2	0.063	75.77
A-3	4.50	5.25	6	0.070	75.60
A-4	5.60	6.5	7.5	0.067	75.40
B-1	0.40	0.50	0.50	0.062	77.91
B-2	1.50	1.75	2	0.066	78.99
B-3	4.50	5.25	6	0.053	80.01
B-4	5.60	6.5	7.5	0.050	80.53
				AVERAGE	

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

Where,
C_p = pitot tube coefficient, dimension less = 0.99 for standard pitot.
Δ_p = manometer reading (inches H_2O)
T_s = average absolute dilution tunnel temperature (°F + 460)
P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qg}$
P_q = static pressure $\frac{\text{in. } H_2O}{\{13.6\}}$
M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)
K_p = 85.49 pitot tube constant, (conversion factor for English units)

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

POLYTESTS
TESTING THROUGH YOUR REALITY

CONTINUOUS ANALYZERS

Date: 2019-01-08 Manufacturer: Jotul Model: F 602

Project #: PI 20183 Run: 2 Tech: MM Reviewer: DO

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
CO	0	0	2987	3000	1006	1 00
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO_2	0	0	17 98	18 00	9 90	10 00
Tolerance CO2		+/- 0.02		+/- 0.5		+/- 0.5
O_2 informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0	2996	1001	0	0.02	0.003	0.15	0.005	0.05	✓	
CO_2	0	1804	979	0	0.02	0.04	0.5	0.11	0.5	✓	

POLYTESTS
TESTING THROUGH YOUR REALITY

TEST DATA LOG

Date: 2019-01-08 Manufacturer: Jotul Model: F 602
Project #: PI 20183 Run: 2 Tech: MM Reviewer: DP

RAW DRY GAS METER READINGS

		System 1	System 2	Blank
High fire test	Final (Liter)	839740,60	790389,44	310,64
	Initial (Liter)	839541,86	790191,02	289,34
Low medium fire test	Final (Liter)	840370,40	791019,68	377,32
	Initial (Liter)	839743,98	790393,36	310,64

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	100,8	100,5
Dry Bulb (F):	73,88	85,82
Humidity (%):	17,0	18,2

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2019-01-08 Manufacturer: Jotul Model: F602
Project #: PJ 20183 Run: 2 Tech: MM Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

KINDLING AND START-UP LOAD

Piece Size	Weight	Meter Moisture Content (% dry)				
x x 10 in.	lbs.					
x x 6 in.	1.20 lbs.	9		9		9
x x in.	lbs.					
x x 10 in.	lbs.					
x x 6 in.	2.00 lbs.	20		20		20
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

HIGHFIRE TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)				
2.00 x 2.00 x 14 in.	1.798 lbs.	19.4		20		22.1
2.00 x 2.00 x 14 in.	1.566 lbs.	19.0		19.4		19.2
2.00 x 1.75 x 14 in.	1.614 lbs.	22.1		23.0		23.0
x x in.	lbs.					
2.50 x 2.50 x 14 in.	3.238 lbs.	19		23.1		22.8
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

POLYTESTS
TESTING THROUGH YOUR REALITY

FUEL DATA

Date: 2019-01-08 Manufacturer: Jotul Model: F 602

Project #: PT 20183 Run: 2 Tech: MM Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

LOW OR MEDIUM TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)				
200 x 2.25 x 14 in.	1 96.4 lbs.	231		22		225
250 x 2.25 x 14 in.	1 958 lbs.	20		211		210
200 x 2.50 x 14 in.	1 974 lbs.	190		192		192
x x in.	lbs.					
200 x 2.25 x 14 in.	1 354 lbs.	190		192		196
2.50 x 2.5 x 14 in.	2.51 lbs.	220		238		225
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2019-01-07 Manufacturer: Jotul Model: F602
Project #: PJ 60183 Run: 2 Tech: MM Reviewer: DP

		HIGHFIRE TEST FILTERS								
		SYSTEM 1 – 1st hour				SYSTEM 1				
Pre-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	3	414	415	15	5	416	417	19	420
2019-01-07	17:00	61,4560	00860	00855	35,4337	61,5045	00866	00853	34,9957	00858
2019-01-08	8:00	61,4559	00859	00855	35,4336	61,5044	00867	00853	34,9956	00858
	11									

		SYSTEM 1 – 1st hour				SYSTEM 1				
Post-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	3	414	415	15	5	416	417	19	420
2019-01-08	11:30	61,4561	00868 ~~08~~ MM	00857	35,4338	61,5044	00867	00853	34,9956	00860
2019-01-15	15:00	61,4560	00866	00856	35,4338	61,5044	00867	00853	34,9956	00859
2019-01-21	8:00	61,4560	00866	00856	35,4338	61,5044	00867	00853	34,9956	00859

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2019-01-07 Manufacturer: Jotul Model: F602

Project #: PT 20183 Run: 2 Tech: Mm Reviewer: DP

		HIGH FIRE TEST FILTERS			
		SYSTEM 2			
Pre-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	13	418	419	20
2019-01-07	17:00	95 1491	00857	00857	35 4333
2019-01-08	8:00	95 1492	00858	00856	35 4334

		SYSTEM 2			
Post-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	13	418	419	20
2019-01-08	11:30	95 1505	00847	00848	35 4366
2019-01-15	15:00	95 1496	00846	00848	35 4362
2019-01-21	8:00	95 1496	00846	00848	35 4362

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2019-01-07 Manufacturer: Jotul Model: F 602

Project #: PT 20183 Run: 2 Tech: MM Reviewer: BP

Pre-test Weight Record		LOW OR MEDIUM TEST FILTERS								
		SYSTEM 1 – 1st hour				SYSTEM 1				
		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	10	421	422	14	11	423	424	23	427
2019-01-07	17:00	94,6401	00850	00852	33 4618	93 7242	00868	00853	34 3049	00876
2019-01-08	8:00	94 6402	00851	00852 ~~00857~~	33 4619	93 7243	00868	00853	34 3050	00876

Post-test Weight Record		SYSTEM 1 – 1st hour				SYSTEM 1				
		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
Date	Time	10	421	422	14	11	423	424	23	427
2019-01-08	14:00	94 6408	00866	00856	33 4629	93 7243	00874	00856	34 3057	00880
2019-01-15	15:30	94 6405	00866	00853	33 4620	93 7243	00874	00855	34 3051	00877
2019-01-21	8:00	94 6404	00865	00853	33 4620	93 7243	00874	00854	34 3051	00877

POLYTESTS
TESTING THROUGH YOUR REALITY

DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2019-01-07 Manufacturer: Jo fi Model: FG02

Project #: pt 20183 Run: 2 Tech: m r Reviewer: DP

		LOW OR MEDIUM FIRE TEST FILTERS			
		SYSTEM 2			
Pre-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	20	425	426	34
2019-01-07	17:00	108.8431	0.0860	0.0860	34.2435
2019-01-08	8:00	108.8432	0.0859	0.0860	34.2436

		SYSTEM 2			
Post-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets
Date	Time	20	425	426	34
2019-01-08	14:00	108.8435	0.0877	0.0865	34.2444
2019-01-15	15:00	108.8432	0.0877	0.0863	34.2436
2019-01-21	8:00	108.8432	0.0878	0.0863	34.2437

TESTING THROUGH YOUR REALITY

St-jean-sur-Richelieu, January 25th 2019
Client: Jotul
Project: PI-20183
Model: F602 V2

APPENDIX 2: Proportionality results

DATA 2019-01-07 EPA PI 20183 RUN 1 LOW

Average	Average	Average	Proportional	Highfire				Average
17,05	Inlet +	Inlet +						0,245
	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	98,22	98,63	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	**Proportional Rates**		Vol.Std.	Vol.Std.		Delta-P
			PR1	**PR2**			Time	
	Deg. R	Deg. R	**%**	**%**	(ft3)	(ft3)	min	
16,195	539,2	539,3			0,134	0,128	0	0,2418315
16,131	538,9	539,2	96,62	96,74	0,134	0,128	1	0,2407797
16,063	538,8	539,0	96,98	97,43	0,134	0,128	2	0,2398827
Ft/Sec								(in H2O)2
16,044	538,6	538,9	97,46	97,95	0,134	0,128	3	0,2393004
16,136	538,5	538,8	97,07	97,65	0,134	0,128	4	0,2403587
16,247	538,4	538,7	96,95	97,54	0,134	0,128	5	0,2414113
16,224	538,4	538,7	98,23	98,54	0,134	0,128	6	0,2399381
16,166	538,4	538,7	99,95	100,17	0,134	0,128	7	0,2373848
16,284	538,5	538,8	100,38	100,97	0,134	0,128	8	0,2373845
16,296	538,6	538,8	101,77	102,36	0,134	0,128	9	0,2356687
16,876	538,8	539,0	99,41	99,86	0,133	0,128	10	0,2428209
17,954	539,1	539,2	93,65	94,34	0,134	0,128	11	0,2580733

17,936	539,3	539,4	93,59	94,00	0,134	0,128	12	0,2580738
16,694	539,6	539,6	100,14	100,69	0,133	0,128	13	0,2403591
17,129	539,8	539,8	97,62	98,07	0,133	0,128	14	0,2468178
16,884	540,0	540,0	101,79	102,06	0,134	0,128	15	0,2399362
17,070	540,3	540,2	97,18	97,75	0,133	0,128	16	0,2468154
17,036	540,5	540,4	97,04	97,61	0,133	0,128	17	0,2468159
17,139	540,6	540,6	96,29	97,02	0,133	0,128	18	0,24846
17,121	540,8	540,7	96,65	97,02	0,133	0,128	19	0,2478425
17,056	541,0	540,9	97,46	97,82	0,133	0,128	20	0,2464333
17,048	541,1	541,1	98,69	98,84	0,134	0,128	21	0,2457871
17,088	541,3	541,3	98,94	99,27	0,135	0,128	22	0,2457888
16,961	541,5	541,4	99,76	99,90	0,134	0,128	23	0,243297
16,908	541,7	541,6	100,50	100,76	0,134	0,128	24	0,2418342
16,930	541,9	541,8	101,12	101,33	0,134	0,128	25	0,2414137
16,738	542,1	542,1	102,62	103,00	0,134	0,128	26	0,2382404
16,902	542,3	542,3	101,80	101,91	0,134	0,128	27	0,2403613
16,936	542,6	542,5	100,85	101,36	0,133	0,127	28	0,2407822
17,068	542,7	542,7	99,48	99,87	0,133	0,127	29	0,2428818
16,832	542,8	542,8	101,22	101,89	0,132	0,127	30	0,2393038
16,961	542,8	542,9	101,03	101,40	0,133	0,127	31	0,240783
17,188	542,9	543,0	99,75	100,10	0,133	0,127	32	0,2439239
17,188	542,9	543,1	99,64	100,14	0,133	0,127	33	0,2439238
17,016	543,0	543,2	100,64	101,10	0,133	0,127	34	0,2414156
17,175	543,2	543,3	100,41	100,76	0,133	0,127	35	0,2432991
17,220	543,4	543,5	100,14	100,51	0,133	0,127	36	0,243921
17,251	543,6	543,6	99,86	99,88	0,133	0,127	37	0,2443405
17,425	543,8	543,8	98,67	98,96	0,133	0,127	38	0,2468204
17,049	544,0	544,0	100,52	100,99	0,132	0,127	39	0,2414165
17,178	544,2	544,2	100,26	100,37	0,133	0,127	40	0,2432873
17,288	544,4	544,4	99,59	99,62	0,133	0,127	41	0,2449641
17,376	544,6	544,6	98,56	99,17	0,133	0,127	42	0,2464101
17,270	544,8	544,8	99,41	100,21	0,133	0,127	43	0,2449507
17,469	544,9	544,9	97,77	98,11	0,133	0,127	44	0,2478483
17,367	545,1	545,1	98,22	98,69	0,132	0,126	45	0,2464142
17,448	545,2	545,3	98,03	98,45	0,132	0,127	46	0,247849
17,510	545,4	545,4	97,59	98,07	0,133	0,127	47	0,2488705
17,453	545,5	545,5	97,41	97,69	0,133	0,127	48	0,2484629
17,585	545,6	545,6	95,65	96,17	0,132	0,126	49	0,2509017
17,430	545,6	545,7	96,28	96,85	0,132	0,126	50	0,2492779
17,497	545,5	545,7	95,35	95,91	0,132	0,127	51	0,2509014
17,479	545,4	545,6	95,36	95,60	0,132	0,126	52	0,250902
17,621	545,2	545,6	94,02	94,48	0,132	0,126	53	0,2533178

17,382	545,1	545,5	94,92	95,78	0,132	0,126	54	0,2502953
17,462	545,0	545,5	94,54	94,96	0,132	0,126	55	0,2517102
17,500	544,9	545,4	94,43	94,69	0,132	0,126	56	0,2523073
17,658	544,8	545,3	93,69	93,78	0,132	0,126	57	0,2547165
17,542	544,7	545,2	93,72	94,23	0,132	0,126	58	0,2533187

Average	Average	Average	Proportional Rates Medium/low fire					Average
17,40	Inlet +	Inlet +						0,258
	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	99,12	99,66	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	**Proportional Rates**		Vol.Std.	Vol.Std.		Delta-P
			PR1	**PR2**			Time	
	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	
17,420	542,3	543,0			0,133	0,127	0	0,2537173
17,292	542,2	542,9	101,85	102,34	0,133	0,127	1	0,2541182
17,261	542,1	542,8	101,67	101,99	0,133	0,127	2	0,254117
Ft/Sec								(in H2O)2
17,375	542,1	542,8	100,61	101,21	0,133	0,127	3	0,2561056
17,323	542,1	542,7	101,17	101,96	0,133	0,127	4	0,2547151
17,433	542,0	542,6	100,98	101,47	0,133	0,127	5	0,2561055
17,369	542,0	542,6	101,70	101,82	0,133	0,127	6	0,2547145
17,308	541,9	542,5	102,22	102,67	0,133	0,127	7	0,2537163
17,323	541,9	542,5	102,18	102,84	0,133	0,127	8	0,253716
17,348	541,9	542,5	101,81	102,79	0,133	0,127	9	0,2541155
17,321	542,0	542,5	102,03	102,91	0,133	0,127	10	0,2537161
17,336	542,0	542,5	101,98	102,69	0,133	0,127	11	0,2539704
17,454	542,1	542,5	101,25	101,74	0,133	0,127	12	0,2557086
17,448	542,1	542,5	101,16	101,74	0,133	0,127	13	0,2557081
17,475	542,1	542,5	100,94	101,36	0,133	0,127	14	0,2561055
17,403	542,2	542,6	101,40	102,11	0,133	0,127	15	0,2550879
17,315	542,2	542,6	101,98	102,52	0,133	0,127	16	0,253716
17,302	542,3	542,6	102,29	102,80	0,133	0,127	17	0,2533148
17,419	542,3	542,6	101,36	102,38	0,133	0,127	18	0,2551127
17,393	542,3	542,6	101,82	102,33	0,133	0,127	19	0,2547143
17,408	542,3	542,6	101,54	101,72	0,133	0,127	20	0,2551125
17,399	542,2	542,6	101,44	101,87	0,133	0,127	21	0,2551127
17,292	542,2	542,6	101,83	102,56	0,133	0,127	22	0,2537155
17,479	542,3	542,6	100,79	101,32	0,133	0,127	23	0,2565011
17,452	542,3	542,6	101,25	102,10	0,133	0,127	24	0,25572
17,390	542,3	542,6	101,17	102,02	0,133	0,127	25	0,2551122
17,328	542,3	542,6	101,71	102,33	0,133	0,127	26	0,2541149
17,447	542,3	542,6	100,98	101,14	0,133	0,127	27	0,2561053
17,444	542,3	542,6	100,87	101,34	0,133	0,127	28	0,2561051
17,388	542,3	542,6	101,28	102,06	0,133	0,127	29	0,2551124
17,627	542,3	542,6	99,68	100,64	0,133	0,127	30	0,2587993
17,334	542,2	542,6	101,44	101,91	0,133	0,127	31	0,2547142
17,530	542,2	542,5	100,49	101,05	0,133	0,127	32	0,2574894
17,338	542,1	542,5	101,50	101,97	0,133	0,127	33	0,2547139
17,456	542,0	542,4	100,54	101,33	0,133	0,127	34	0,2565014
17,349	541,9	542,4	101,12	101,51	0,133	0,127	35	0,2551131
17,351	541,9	542,4	101,31	101,65	0,133	0,127	36	0,2551599
17,441	541,9	542,4	100,58	101,26	0,133	0,127	37	0,2565016
17,334	541,9	542,4	101,02	101,95	0,133	0,127	38	0,2550456
17,275	541,9	542,4	101,50	101,96	0,133	0,127	39	0,2541151
17,374	541,8	542,4	100,63	101,16	0,133	0,127	40	0,2557079
17,596	541,8	542,3	99,64	100,34	0,133	0,127	41	0,2588644
17,435	541,8	542,4	100,34	101,16	0,133	0,127	42	0,2565009
17,419	541,8	542,3	100,49	100,96	0,133	0,127	43	0,256501
17,511	541,7	542,3	99,59	100,66	0,133	0,127	44	0,258079
17,633	541,7	542,3	99,05	99,85	0,133	0,127	45	0,2598437
17,463	541,7	542,3	100,08	100,69	0,133	0,127	46	0,2574889
17,460	541,7	542,2	99,94	100,65	0,133	0,127	47	0,2574889
17,312	541,6	542,2	100,82	101,38	0,133	0,127	48	0,2552672
17,367	541,6	542,1	100,46	101,44	0,133	0,127	49	0,2561054
17,591	541,6	542,1	99,35	99,60	0,133	0,127	50	0,2594524
17,499	541,5	542,1	99,83	100,22	0,133	0,127	51	0,2580791
17,476	541,4	542,0	100,15	100,53	0,133	0,127	52	0,2574884

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17,373	541,3	541,9	100,49	101,00	0,133	0,127	53	0,2561054
17,229	541,3	541,9	101,36	101,98	0,133	0,127	54	0,2541159
17,358	541,2	541,8	100,55	100,84			55	0,2561051
17,383	541,2	541,8	100,33	101,03			56	0,2565012
17,375	541,1	541,7	100,30	100,89		0,127	57	0,2565003
17,439	541,1	541,7	100,23	100,24		0,127	58	0,2574882
17,536	541,1	541,7	99,43	99,94		0,127	59	0,2588637
17,364	541,1	541,6	100,13	100,97		0,127	60	0,2564999
17,483	541,0	541,6	100,11	100,73		0,127	61	0,2580785
17,570	541,0	541,6	99,34	99,91		0,128	62	0,2594522
17,471	540,9	541,5	99,80	100,48	0,133	0,127	63	0,2580782
17,353	540,9	541,4	100,14	100,73	0,133	0,127	64	0,2565005
17,345	540,8	541,4	100,21	100,53	0,133	0,127	65	0,2565003
17,416	540,8	541,4	99,91	100,38	0,133	0,127	66	0,2574881
17,409	540,8	541,4	99,84	100,26	0,133	0,127	67	0,2574877
17,447	540,7	541,4	99,52	99,96	0,133	0,127	68	0,2580777
17,463	540,7	541,3	99,47	100,26	0,133	0,127	69	0,2584502
17,482	540,6	541,3	99,50	99,64	0,133	0,127	70	0,2588642
17,517	540,6	541,2	99,03	99,58	0,133	0,127	71	0,2594511
17,255	540,5	541,2	100,52	101,07	0,133	0,127	72	0,2557074
17,424	540,4	541,2	99,48	100,03	0,133	0,127	73	0,2580775
17,417	540,4	541,1	99,50	99,92	0,133	0,127	74	0,2580781
17,419	540,3	541,1	99,50	99,91	0,133	0,127	75	0,2580773
17,503	540,3	541,1	98,91	99,36	0,133	0,127	76	0,2594511
17,406	540,3	541,0	99,52	100,18	0,133	0,127	77	0,2580779
17,448	540,2	541,0	99,22	100,00	0,133	0,128	78	0,2586402
17,368	540,1	540,9	99,61	100,38	0,133	0,128	79	0,2574875
17,450	540,1	540,9	99,31	99,75	0,133	0,127	80	0,2588632
17,554	540,0	540,8	98,50	99,13	0,133	0,127	81	0,2604273
17,351	540,0	540,8	99,58	100,02	0,133	0,127	82	0,2574877
17,410	540,0	540,8	98,94	99,69	0,133	0,127	83	0,2584709
17,245	540,0	540,7	100,01	100,32	0,133	0,127	84	0,2561044
17,592	539,8	540,7	98,02	98,81	0,133	0,127	85	0,2614004
17,383	539,8	540,6	98,85	99,52	0,133	0,127	86	0,2584708
17,512	539,7	540,6	98,41	98,90	0,133	0,127	87	0,2604267
17,441	539,7	540,5	98,54	98,89	0,133	0,127	88	0,2594504
17,465	539,6	540,4	98,48	98,72	0,133	0,127	89	0,2598424
17,434	539,5	540,4	98,61	98,97	0,133	0,127	90	0,2594494
17,425	539,5	540,3	98,48	99,23	0,133	0,127	91	0,2594498
17,358	539,4	540,3	99,03	99,27	0,133	0,127	92	0,2584699
17,424	539,3	540,2	98,59	99,04	0,133	0,127	93	0,2594499
17,388	539,2	540,1	98,86	99,09	0,133	0,127	94	0,2588619
17,377	539,1	540,0	98,68	99,36	0,133	0,127	95	0,2588619
17,487	539,0	540,0	98,17	98,92	0,133	0,128	96	0,260426
17,325	538,9	539,9	99,12	99,33	0,133	0,127	97	0,2580759
17,408	538,9	539,8	98,42	98,87	0,133	0,127	98	0,2594488
17,470	538,8	539,7	97,90	98,52	0,133	0,127	99	0,2604211
17,435	538,8	539,7	98,41	98,95	0,133	0,127	100	0,2598403
17,432	538,8	539,6	98,35	98,72	0,133	0,127	101	0,2598406
17,204	538,8	539,6	99,23	99,92	0,133	0,127	102	0,2564967

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					0,133			
17,355	538,7	539,6	98,45	99,08	0,133	0,127	103	0,2588609
17,418	538,7	539,6	98,23	98,70	0,133	0,127	104	0,2598397
17,486	538,6	539,5	97,64	98,45	0,133	0,127	105	0,2608143
17,336	538,6	539,5	98,72	99,29	0,133	0,127	106	0,2584675
17,350	538,6	539,4	98,65	99,11	0,133	0,127	107	0,258807
17,447	538,5	539,4	97,73	98,02	0,133	0,127	108	0,2604243
17,353	538,4	539,3	98,37	99,36	0,133	0,127	109	0,2588602
17,322	538,3	539,2	98,50	99,22	0,133	0,127	110	0,2584677
17,378	538,3	539,2	98,21	98,62	0,133	0,127	111	0,2594475
17,340	538,2	539,1	98,42	98,75	0,133	0,127	112	0,2588715
17,444	538,2	539,0	97,68	98,20	0,133	0,127	113	0,2604238
17,339	538,1	539,0	98,39	98,87	0,133	0,127	114	0,2588601
17,343	538,1	538,9	98,42	99,12	0,133	0,127	115	0,2588597
17,462	538,0	538,9	97,82	98,14	0,133	0,127	116	0,2608134
17,310	538,0	538,8	98,54	99,01			117	0,2584677
17,335	538,0	538,8	98,51	99,01			118	0,2588596
17,429	538,0	538,8	98,02	98,26		0,127	119	0,2604229
17,391	537,9	538,7	97,80	98,64		0,127	120	0,2598384
17,299	537,9	538,7	98,37	98,84		0,127	121	0,2584717
17,271	537,8	538,6	98,70	99,19		0,127	122	0,2580735
17,428	537,7	538,6	97,85	98,26		0,127	123	0,2604234
17,318	537,7	538,5	98,34	98,68		0,127	124	0,2588593
17,483	537,6	538,5	97,32	98,22	0,133	0,127	125	0,2612894
17,423	537,6	538,4	97,66	97,99	0,133	0,127	126	0,2604232
17,291	537,6	538,4	98,42	98,77	0,133	0,127	127	0,2584676
17,362	537,5	538,3	98,07	98,75	0,133	0,127	128	0,2594468
17,413	537,4	538,3	97,64	98,34	0,133	0,127	129	0,2604204
17,345	537,4	538,2	98,19	98,53	0,133	0,127	130	0,259446
17,418	537,3	538,1	97,76	98,20	0,133	0,127	131	0,2604223
17,791	537,3	538,1	95,65	96,18	0,133	0,127	132	0,2660154
17,352	537,4	538,1	98,15	98,49	0,133	0,127	133	0,2594459
17,254	537,3	538,1	98,52	99,24	0,133	0,127	134	0,2580732
17,381	537,3	538,0	97,94	98,19	0,133	0,127	135	0,2598373
17,401	537,4	538,1	98,04	98,58	0,133	0,127	136	0,2598376
17,304	537,5	538,1	98,80	99,00	0,133	0,127	137	0,258073
17,346	537,6	538,2	98,83	99,12	0,133	0,127	138	0,2584665
17,390	537,7	538,3	98,65	99,38	0,133	0,127	139	0,2588581
17,489	537,8	538,3	98,02	98,38	0,133	0,127	140	0,2604223
17,284	537,9	538,4	99,07	99,82	0,133	0,127	141	0,2574832
17,466	537,9	538,5	97,86	98,31	0,133	0,127	142	0,2604227
17,453	537,9	538,4	97,80	98,41	0,133	0,127	143	0,2604223
17,290	537,9	538,5	98,63	99,12	0,133	0,127	144	0,2580732
17,468	537,9	538,4	97,55	97,89	0,133	0,127	145	0,2608121
17,437	537,9	538,4	97,71	98,34	0,133	0,127	146	0,2604223
17,330	537,9	538,4	98,12	98,51	0,133	0,127	147	0,2588711
17,451	537,9	538,4	97,46	97,89	0,133	0,127	148	0,2608126
17,452	537,9	538,4	97,46	98,00	0,133	0,127	149	0,2608126
17,488	537,8	538,4	97,24	97,72	0,133	0,127	150	0,2613924
17,293	537,7	538,4	98,23	98,94	0,133	0,127	151	0,2584669
17,381	537,7	538,3	97,93	98,42	0,133	0,127	152	0,2598377

					0,133	0,127		
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					0,133			
					0,133			
17,318	537,6	538,3	98,24	98,80	0,133	0,127	153	0,2588586
17,372	537,6	538,2	97,73	98,35	0,133	0,127	154	0,2598381
17,366	537,6	538,2	98,11	98,44	0,133	0,127	155	0,2597424
17,429	537,5	538,2	97,48	98,09	0,133	0,127	156	0,2608126
17,471	537,5	538,2	97,28	97,77	0,133	0,127	157	0,2613944
17,373	537,5	538,1	97,86	98,05	0,133	0,127	158	0,2598373
17,501	537,5	538,1	97,06	97,64	0,133	0,127	159	0,2617834
17,435	537,5	538,1	97,40	97,90	0,133	0,127	160	0,2608127
17,406	537,4	538,0	97,65	98,08	0,133	0,127	161	0,2604231
17,466	537,4	538,0	97,36	97,92	0,133	0,127	162	0,2613959
17,401	537,4	537,9	97,61	98,13	0,133	0,127	163	0,2604227
17,428	537,3	537,9	97,68	97,97	0,133	0,127	164	0,2608131
17,519	537,3	537,8	96,80	97,45	0,133	0,127	165	0,2622115
17,487	537,3	537,8	97,26	97,64	0,133	0,127	166	0,2617838
17,547	537,3	537,8	96,63	97,34	0,133	0,127	167	0,2627518
17,457	537,3	537,8	97,33	97,60	0,133	0,127	168	0,2613963
17,351	537,2	537,7	97,81	98,49	0,133	0,127	169	0,2598379
17,387	537,2	537,7	97,53	97,86	0,133	0,127	170	0,2604231
17,451	537,1	537,7	97,22	97,78	0,133	0,127	171	0,2613934
17,412	537,1	537,7	97,53	97,93	0,133	0,127	172	0,2608124
17,346	537,1	537,6	97,66	98,17	0,133	0,127	173	0,2598376
17,316	537,0	537,6	97,80	98,47	0,133	0,127	174	0,2594462
17,272	537,0	537,5	98,11	98,71	0,133	0,127	175	0,258859
17,385	536,9	537,5	97,50	98,05	0,133	0,127	176	0,260423
17,340	536,9	537,5	97,87	98,28	0,133	0,127	177	0,2598377
17,409	536,9	537,4	97,47	98,00	0,133	0,127	178	0,2608121
17,377	536,9	537,4	97,78	98,07			179	0,260421
17,246	536,9	537,3	98,37	99,00			180	0,2584662
17,347	536,8	537,3	97,86	98,61		0,128	181	0,2598372
17,414	536,8	537,3	97,80	98,18		0,127	182	0,2604217
17,433	536,8	537,3	98,01	98,27		0,127	183	0,2604221
17,455	536,9	537,4	98,19	98,55		0,127	184	0,260422
17,368	537,0	537,4	98,58	99,38		0,127	185	0,2588582
17,405	537,1	537,5	98,53	99,21		0,128	186	0,2594459
17,390	537,2	537,6	98,28	98,92	0,133	0,128	187	0,2594453
17,340	537,2	537,7	98,34	99,21	0,133	0,127	188	0,2588581
17,494	537,3	537,7	97,46	97,97	0,133	0,127	189	0,261395
17,414	537,3	537,7	97,51	98,26	0,133	0,127	190	0,260421
17,369	537,2	537,7	98,03	98,28	0,133	0,127	191	0,2598369
17,403	537,2	537,7	97,72	98,11	0,133	0,127	192	0,2604216

DATA 2019-01-08 EPA PI 20183 RUN 2 MEDIUM

Average	Average	Average	Proportional	Highfire				Average
17,15	Inlet +	Inlet +						0,246
	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	98,35	98,24	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	**Proportional Rates**		Vol.Std.	Vol.Std.		Delta-P
			PR1	**PR2**			Time	
	Deg. R	Deg. R	**%**	**%**	(ft3)	(ft3)	min	
16,573	536,1	536,3			0,131	0,124	0	0,2474246
16,510	536,1	536,3	95,81	95,62	0,131	0,124	1	0,2449515
16,346	536,1	536,3	97,93	97,23	0,131	0,124	2	0,241405
Ft/Sec								(in H2O)2
16,447	536,1	536,3	98,82	98,84	0,131	0,124	3	0,2407732
16,415	536,1	536,4	100,60	100,35	0,131	0,124	4	0,2382391
16,442	536,2	536,4	102,11	101,81	0,131	0,124	5	0,2367362
16,356	536,3	536,5	103,70	103,50	0,131	0,124	6	0,2341516
16,313	536,4	536,7	104,55	104,13	0,131	0,124	7	0,2330658
16,142	536,6	536,8	105,21	105,03	0,131	0,124	8	0,231099
16,244	536,8	536,9	106,47	106,67	0,131	0,124	9	0,2299994
16,520	536,9	537,0	101,57	101,53	0,131	0,124	10	0,2378069
16,555	537,0	537,1	100,44	100,48	0,131	0,124	11	0,2392946
16,484	537,1	537,2	101,04	101,14	0,131	0,124	12	0,2378073
16,423	537,1	537,3	102,13	102,12	0,131	0,124	13	0,2363085
16,462	537,2	537,4	102,59	102,25	0,131	0,124	14	0,2363089
16,441	537,3	537,5	103,12	103,25	0,131	0,124	15	0,2352333
16,264	537,4	537,6	105,12	104,65	0,131	0,124	16	0,2319765
16,666	537,5	537,7	102,64	102,50	0,131	0,124	17	0,2373791
17,295	537,6	537,8	99,17	98,70	0,131	0,124	18	0,2464081
17,247	537,8	537,9	99,04	98,89	0,131	0,124	19	0,2457806
17,482	538,0	538,1	97,61	97,45	0,131	0,124	20	0,2492653
17,514	538,2	538,3	97,23	97,24	0,131	0,124	21	0,2498761
17,436	538,3	538,4	97,84	97,67	0,131	0,124	22	0,2485649
17,347	538,4	538,5	98,23	98,01	0,131	0,124	23	0,2474274
17,456	538,5	538,6	97,91	98,09	0,131	0,124	24	0,2484505
17,334	538,6	538,7	99,08	98,86	0,131	0,124	25	0,2464008
17,246	538,8	538,8	99,49	99,60	0,131	0,124	26	0,2449544
17,435	538,9	539,0	98,81	98,75	0,131	0,124	27	0,2474288
17,372	539,1	539,1	98,69	98,54	0,131	0,124	28	0,2468128
17,502	539,2	539,2	97,64	97,71	0,130	0,124	29	0,2488605
17,498	539,4	539,3	97,73	97,48	0,130	0,124	30	0,2492687
17,538	539,5	539,5	97,05	96,79	0,130	0,123	31	0,2498778
17,479	539,7	539,6	97,15	97,12	0,130	0,123	32	0,249268
17,533	539,7	539,7	96,49	96,66	0,130	0,123	33	0,2502849
17,618	539,8	539,8	96,01	95,78	0,130	0,123	34	0,2516995
17,714	539,8	539,8	95,39	95,16	0,130	0,123	35	0,2533077
17,596	539,8	539,9	95,87	95,97	0,130	0,123	36	0,2516998
17,740	539,9	540,0	95,07	95,34	0,130	0,124	37	0,2537086
17,722	539,9	540,0	94,91	95,02	0,130	0,124	38	0,253709
17,650	540,0	540,1	95,49	95,50	0,130	0,123	39	0,252707
17,704	540,0	540,1	95,14	95,00	0,130	0,124	40	0,253709
17,680	540,1	540,2	95,27	95,21	0,130	0,124	41	0,2533083
17,756	540,1	540,2	94,66	94,52	0,130	0,124	42	0,2547074
17,777	540,2	540,3	94,38	94,36	0,130	0,124	43	0,2551053
17,579	540,2	540,4	95,49	95,50	0,130	0,124	44	0,2523046
17,580	540,2	540,4	95,16	95,11	0,130	0,124	45	0,2527083
17,724	540,3	540,4	94,28	94,36	0,130	0,124	46	0,2547076
17,704	540,4	540,5	94,44	94,09	0,130	0,123	47	0,2547084
17,619	540,3	540,5	94,66	94,43	0,130	0,123	48	0,2537107
17,628	540,3	540,5	94,52	94,38	0,130	0,123	49	0,2537101

17,753	540,3	540,5	93,73	93,65	0,130	0,123	50	0,2557028

Particulate calculationHighFire

Average	Average	Average	Proportional Rates Medium/low fire					Average
17,62	Inlet +	Inlet +						0,257
	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	100,05	99,82	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	**Proportional Rates**		Vol.Std.	Vol.Std.		Delta-P
			PR1	**PR2**			Time	
	Deg. R	Deg. R	**%**	**%**	(ft3)	(ft3)	min	
17,631	539,3	539,9			0,130	0,123	0	0,2561058
17,663	539,3	539,9	99,61	99,36	0,130	0,123	1	0,2580741
17,583	539,3	539,9	99,70	99,19	0,130	0,123	2	0,2574843
Ft/Sec								(in H2O)2
17,593	539,3	539,9	99,69	99,40	0,130	0,123	3	0,2574845
17,611	539,3	539,9	99,83	99,77	0,130	0,123	4	0,2574857
17,622	539,4	539,9	99,97	99,53	0,130	0,123	5	0,2574837
17,465	539,3	539,9	101,02	100,45	0,130	0,123	6	0,2551076
17,658	539,4	539,9	100,13	99,67	0,130	0,123	7	0,2574838
17,577	539,5	539,9	100,59	100,32	0,130	0,123	8	0,2561008
17,445	539,5	539,9	101,48	101,34	0,130	0,123	9	0,2541109
17,627	539,5	540,0	100,42	100,45	0,130	0,123	10	0,2564957
17,585	539,5	540,0	101,15	100,55	0,130	0,123	11	0,2557027
17,481	539,6	540,1	101,89	101,76	0,130	0,123	12	0,2537108
17,532	539,7	540,1	101,82	101,62	0,130	0,123	13	0,2541101
17,532	539,7	540,2	101,94	101,83	0,130	0,123	14	0,2541105
17,601	539,9	540,2	101,64	101,09	0,130	0,123	15	0,2551077
17,637	540,0	540,3	100,90	100,92	0,130	0,123	16	0,2557035
17,580	540,1	540,4	101,70	101,40	0,130	0,123	17	0,2547093
17,669	540,1	540,4	101,02	100,93	0,130	0,123	18	0,2561004
17,605	540,2	540,5	101,50	101,32	0,130	0,123	19	0,2551085
17,693	540,3	540,5	100,80	100,65	0,130	0,123	20	0,2564966
17,601	540,4	540,6	101,38	101,42	0,130	0,123	21	0,2551082
17,519	540,5	540,7	101,88	101,88	0,130	0,123	22	0,2541116
17,534	540,6	540,7	101,79	101,64	0,130	0,123	23	0,2541114
17,584	540,5	540,8	101,90	101,53	0,130	0,123	24	0,2547101
17,523	540,5	540,8	102,20	101,79	0,130	0,123	25	0,253712
17,525	540,5	540,8	102,46	102,04	0,130	0,123	26	0,2535833
17,552	540,6	540,9	102,04	101,89	0,130	0,123	27	0,2541116
17,593	540,7	540,9	102,04	101,59	0,130	0,123	28	0,2547105
17,441	540,8	541,0	102,63	102,51	0,130	0,123	29	0,2527104
17,643	540,9	541,1	101,36	101,20	0,130	0,123	30	0,2556011
17,600	541,0	541,1	101,51	101,08	0,130	0,123	31	0,2551089
17,431	541,1	541,2	102,33	102,05	0,130	0,123	32	0,2527108
17,505	541,1	541,3	102,07	101,98	0,130	0,123	33	0,2537128
17,522	541,1	541,3	101,58	101,61	0,130	0,123	34	0,2541117
17,466	541,1	541,3	102,30	101,61	0,130	0,123	35	0,2533122
17,539	541,0	541,3	101,87	101,46	0,130	0,123	36	0,254107
17,598	541,0	541,4	101,51	101,42	0,130	0,123	37	0,2551062
17,507	541,1	541,4	101,57	101,63	0,130	0,123	38	0,2541119
17,567	541,1	541,4	101,64	101,06	0,130	0,123	39	0,2547109
17,454	541,1	541,4	102,01	101,64	0,130	0,123	40	0,2533119
17,575	541,1	541,5	101,17	100,95	0,130	0,123	41	0,2551094
17,429	541,2	541,5	101,88	101,55	0,130	0,123	42	0,2533119
17,592	541,2	541,5	100,77	100,82	0,130	0,123	43	0,2557099
17,552	541,2	541,5	101,17	101,11	0,130	0,123	44	0,2551099
17,642	541,2	541,5	100,63	100,18	0,130	0,123	45	0,2564985
17,527	541,1	541,5	100,67	100,36	0,130	0,123	46	0,2553001

17,707	541,1	541,5	99,76	99,38	0,130	0,123	47	0,2580762
17,459	541,1	541,5	100,84	100,74	0,130	0,123	48	0,2547112
17,678	541,0	541,5	99,57	99,27	0,130	0,123	49	0,2580767
17,794	541,0	541,5	98,86	98,62	0,130	0,123	50	0,2598414
17,490	541,0	541,4	100,48	100,13	0,130	0,123	51	0,2557057
17,397	540,9	541,4	101,14	100,92	0,130	0,123	52	0,2541128
17,711	540,9	541,4	99,18	99,04	0,130	0,123	53	0,2588622
17,630	540,8	541,3	99,36	99,09	0,130	0,123	54	0,258077
17,656	540,8	541,3	99,16	98,92	0,130	0,123	55	0,2584703
17,488	540,7	541,3	99,93	99,86	0,130	0,123	56	0,2561026
17,609	540,6	541,2	99,10	98,94	0,130	0,123	57	0,2580759
17,497	540,6	541,2	99,91	99,59	0,130	0,123	58	0,256498
17,553	540,5	541,1	99,22	99,18	0,130	0,123	59	0,257486
17,610	540,4	541,1	99,14	98,73	0,130	0,123	60	0,2584696
17,603	540,4	541,0	98,86	98,68	0,130	0,123	61	0,2584698
17,460	540,3	541,0	99,74	99,46	0,130	0,123	62	0,2564978
17,651	540,3	541,0	98,57	98,11	0,130	0,123	63	0,2594488
17,611	540,3	540,9	98,69	98,34	0,130	0,123	64	0,2588613
17,643	540,2	540,9	98,54	98,24	0,130	0,123	65	0,2594492
17,563	540,2	540,8	98,89	98,35	0,130	0,123	66	0,2584693
17,564	540,1	540,8	98,89	98,64	0,130	0,123	67	0,2584689
17,619	540,1	540,8	98,35	98,21	0,130	0,123	68	0,2594478
17,365	540,1	540,8	99,51	99,02	0,130	0,123	69	0,2561007
17,631	540,0	540,7	97,93	98,01	0,130	0,123	70	0,2598394
17,604	540,0	540,7	98,38	98,29	0,130	0,124	71	0,2594481
17,688	539,9	540,6	97,73	97,41	0,130	0,124	72	0,2608145
17,308	539,8	540,5	99,89	99,62	0,130	0,123	73	0,2553156
17,652	539,7	540,5	97,69	97,35	0,130	0,123	74	0,2604246
17,529	539,7	540,4	98,53	98,27	0,130	0,123	75	0,2587693
17,641	539,6	540,4	97,81	97,56	0,130	0,124	76	0,2604244
17,596	539,6	540,3	98,16	97,64	0,130	0,123	77	0,2598394
17,680	539,5	540,3	97,47	97,29	0,130	0,123	78	0,2608143
17,734	539,6	540,3	97,59	97,56	0,130	0,123	79	0,2613973
17,688	539,8	540,4	97,97	97,66	0,130	0,123	80	0,2604247
17,659	539,9	540,4	98,15	98,04	0,130	0,123	81	0,2598398
17,671	540,0	540,5	98,38	98,06	0,130	0,123	82	0,259839
17,725	540,1	540,6	98,27	97,74	0,130	0,123	83	0,2604247
17,592	540,3	540,7	98,94	98,75	0,130	0,123	84	0,2584685
17,666	540,4	540,8	98,33	98,32	0,130	0,123	85	0,2594478
17,637	540,6	541,0	98,61	98,38	0,130	0,123	86	0,2588604
17,587	540,7	541,1	99,15	98,93	0,130	0,123	87	0,2580552
17,618	540,8	541,2	99,00	98,75	0,130	0,123	88	0,2584683
17,779	540,9	541,3	97,88	97,82	0,130	0,123	89	0,260814
17,758	541,1	541,4	98,09	98,06	0,130	0,123	90	0,2604244
17,650	541,2	541,5	98,64	98,55	0,130	0,123	91	0,2588609
17,631	541,3	541,6	98,91	99,00	0,130	0,123	92	0,258469
17,632	541,4	541,7	98,89	98,78	0,130	0,123	93	0,2584693
17,704	541,5	541,8	98,56	98,39	0,130	0,123	94	0,259449
17,731	541,6	541,9	98,42	98,22	0,130	0,123	95	0,2598403
17,613	541,7	542,0	98,81	98,68	0,130	0,123	96	0,2580764
17,799	541,8	542,1	98,01	98,01	0,130	0,123	97	0,260816
17,670	541,9	542,2	98,81	98,59	0,130	0,123	98	0,2588619
17,650	542,0	542,3	98,79	98,61	0,130	0,123	99	0,2584702
17,651	542,1	542,4	99,03	98,56	0,130	0,123	100	0,2584707
17,721	542,2	542,5	98,70	98,58	0,130	0,123	101	0,25945
17,679	542,3	542,6	98,98	98,55	0,130	0,123	102	0,2588623
17,752	542,4	542,7	98,76	98,42	0,130	0,123	103	0,2598417
17,498	542,5	542,8	99,77	99,60	0,130	0,123	104	0,2561034
17,728	542,6	542,9	98,62	98,56	0,130	0,123	105	0,2594497
17,761	542,7	543,0	98,31	98,10	0,130	0,123	106	0,259842
17,642	542,7	543,1	99,03	98,88	0,130	0,123	107	0,2580778
17,673	542,8	543,1	99,10	98,62	0,130	0,123	108	0,2584708

17,498	542,9	543,2	99,93	99,97	0,130	0,123	109	0,2559464
17,487	543,0	543,3	100,10	99,73	0,130	0,123	110	0,2557069
17,704	543,1	543,4	98,80	98,76	0,130	0,123	111	0,2588639
17,747	543,1	543,5	98,48	98,31	0,130	0,123	112	0,2594504
17,615	543,2	543,6	99,35	99,06	0,130	0,123	113	0,257488
17,781	543,3	543,6	98,44	98,35	0,130	0,123	114	0,2598426
17,661	543,4	543,7	99,25	99,09	0,130	0,123	115	0,2580782
17,759	543,5	543,8	98,80	98,67	0,130	0,123	116	0,2594518
17,437	543,6	543,9	100,50	100,46	0,130	0,123	117	0,254728
17,670	543,6	543,9	99,32	99,22	0,130	0,123	118	0,2580784
17,673	543,7	544,0	99,49	99,24	0,130	0,123	119	0,2580786
17,704	543,8	544,1	99,45	99,05	0,130	0,123	120	0,258472
17,641	543,8	544,2	99,96	99,72	0,130	0,123	121	0,2574887
17,683	543,9	544,2	100,00	99,71	0,130	0,123	122	0,2580785
17,684	544,0	544,3	99,94	99,51	0,130	0,123	123	0,2580795
17,527	544,1	544,4	100,77	100,67	0,130	0,123	124	0,2557085
17,460	544,2	544,5	101,53	101,15	0,131	0,124	125	0,254714
17,490	544,2	544,6	101,53	101,34	0,131	0,124	126	0,2551126
17,655	544,3	544,6	100,69	100,29	0,131	0,124	127	0,2574887
17,588	544,4	544,7	100,97	100,81	0,131	0,124	128	0,2565004
17,795	544,5	544,8	99,99	99,79	0,131	0,124	129	0,2594518
17,705	544,6	544,9	100,88	100,81	0,131	0,125	130	0,2581098
17,758	544,7	544,9	100,78	100,49	0,132	0,125	131	0,2588659
17,436	544,7	545,0	102,47	102,27	0,132	0,125	132	0,2541162
17,507	544,8	545,1	102,57	102,41	0,132	0,125	133	0,2551136
17,836	544,9	545,2	99,83	99,81	0,132	0,125	134	0,2598448
17,577	544,9	545,2	101,03	100,72	0,131	0,124	135	0,2561062
17,772	545,0	545,3	100,14	99,92	0,131	0,124	136	0,258866
17,584	545,1	545,4	101,08	100,88	0,131	0,124	137	0,2561063
17,491	545,1	545,5	101,82	101,46	0,131	0,124	138	0,2547153
17,683	545,2	545,5	100,42	100,23	0,131	0,124	139	0,2574907
17,593	545,3	545,6	100,96	100,87	0,130	0,124	140	0,2561071
17,597	545,4	545,7	100,76	100,55	0,130	0,124	141	0,2561069
17,596	545,4	545,8	101,08	100,76	0,130	0,123	142	0,2561072
17,691	545,5	545,8	100,44	100,08	0,131	0,124	143	0,2574907
17,762	545,6	545,9	99,80	99,82	0,130	0,124	144	0,2584749
17,600	545,7	546,0	100,72	100,52	0,130	0,123	145	0,2561073
17,739	545,8	546,0	99,94	99,88	0,130	0,123	146	0,2580793
17,834	545,8	546,1	99,73	99,22	0,130	0,123	147	0,2594545
17,635	545,9	546,2	100,46	100,39	0,130	0,123	148	0,2565035
17,774	545,9	546,3	99,64	99,48	0,130	0,123	149	0,2584753
17,640	546,0	546,3	100,66	100,38	0,130	0,123	150	0,2565037
17,749	546,0	546,4	100,51	100,27	0,130	0,124	151	0,258082
17,640	546,1	546,4	101,13	100,76	0,131	0,124	152	0,2565036
17,712	546,1	546,5	100,47	100,47	0,131	0,124	153	0,2574918
17,782	546,2	546,6	100,12	100,07	0,130	0,124	154	0,2584755
17,756	546,3	546,6	100,24	100,22	0,130	0,124	155	0,2580821
17,650	546,4	546,7	100,64	100,32	0,130	0,123	156	0,2565041
17,622	546,5	546,8	101,09	101,08	0,130	0,123	157	0,2561085
17,718	546,5	546,8	100,59	100,53	0,130	0,124	158	0,2574927
17,653	546,6	546,9	101,11	100,59	0,131	0,124	159	0,2565041

St-jean-sur-Richelieu, January 25th 2019
Client: Jotul
Project: PI-20183
Model: F602 V2

APPENDIX 3: Calibration data

APPENDIX 4: Unit pre burn

[redacted]

[redacted]

November 20, 2018

Mr. Roger Purinton
Jøtul North America
55 Hutcherson Drive
Gorham, ME 04038-2644

Dear Roger,

This letter provides the necessary documentation for the pre-conditioning of the F602 test stove that will be sent to Polytests Services, Inc. for EPA certification testing in December. We have followed the requirements of Section 8.1 in ASTM E3053. Although no minimum flue gas temperature is specified in ASTM E3053, we used a 200°F cut-off temperature for determining hours of operation. Using this criterion, we accumulated 58 hours of operation at a medium air setting over five separate days of operation. 233 pounds of hardwood cordwood were consumed during the pre-conditioning.

There are three attachments included with this letter. The handwritten data sheet documents fuel additions, fuel moisture and flue gas temperature at loading/reloading points. The table includes flue gas temperature data extracted from our data logger and showing date and time as well as accumulated hours. The chart is a visual representation of the data.

By my signature below, we attest that this information is in compliance with EPA and ASTM requirements for pre-conditioning of the referenced test stove model.

[redacted]

Attachments (3)

Stove Model E602 Jøtul NA Preconditioning Record

Date	Time	Fuel Wt. Added (lb)	Flue Gas Temp (°F)	# of Pcs. Added	Pc 1 %DB	Pc 2 %DB	Pc 3 %DB	Pc 4 %DB	Pc 5 %DB
11/7/18	10:03	3.2		K+Su					
	10:10		419						
	10:20	5.0	473	2	19.5	27			
	10:33	4.9	391	2	23.8	27			
	10:45	10.2	404	4	26	21.4	23	21.5	
	13:02	7.5	430	3	25	19.5	21		
	1430	7.5	250	3	19	18.6	20	21.5	
	1610	7.0	232	3	20	18.5	18	19.2	
	1932	7.5	173	3	19	20.5	19.5	21	
11/8/18	0845	3.9	72	K+Su					
	0902	8.0	332	4	19.5	20	20.3	20	
	1000.	8.1	313	4	18.5	22	20.7	19.7	
	1130.	8.3	320	4	19.8	21	20	20	
	1304	8.8	263	4	20.1	21.2	19	19	
	1651	9.4	162	4	23	22	18	19	
	1930	8.9	184	4	21	18	18	22	
11/12/18	1021	4.2	68	K+Su					
	1040	8.8	303	4	20	18	18	19	
	1130	5.5	367	3	21	18	19		
	1305	8.2	228	3	20	20	21		
	1625	9.7	232	3	20	18.5	20		
	1900	8.8	189	3	20	21	21		
11/14/18	0900	5.3	46	K+Su					
	0915	10.2	480	3	21.5	18.2	19		
	1331	11.5	145	4	20	20.5	19	18	
	1502	8.5	350	3	21	19	19		
	1641	7.0	258	3	23	18	19		
	1901	6.3	202	3	20	19	20		
11/15/18	0900	7.0	85	K+Su					
	910	2.7	730	2	19	18			
	1025	9.0	240	4	18	18	20	21	
	1309	8.3	200	2	19	20			
	1530	4.1	270	1	19				

[redacted]

Attachment 1

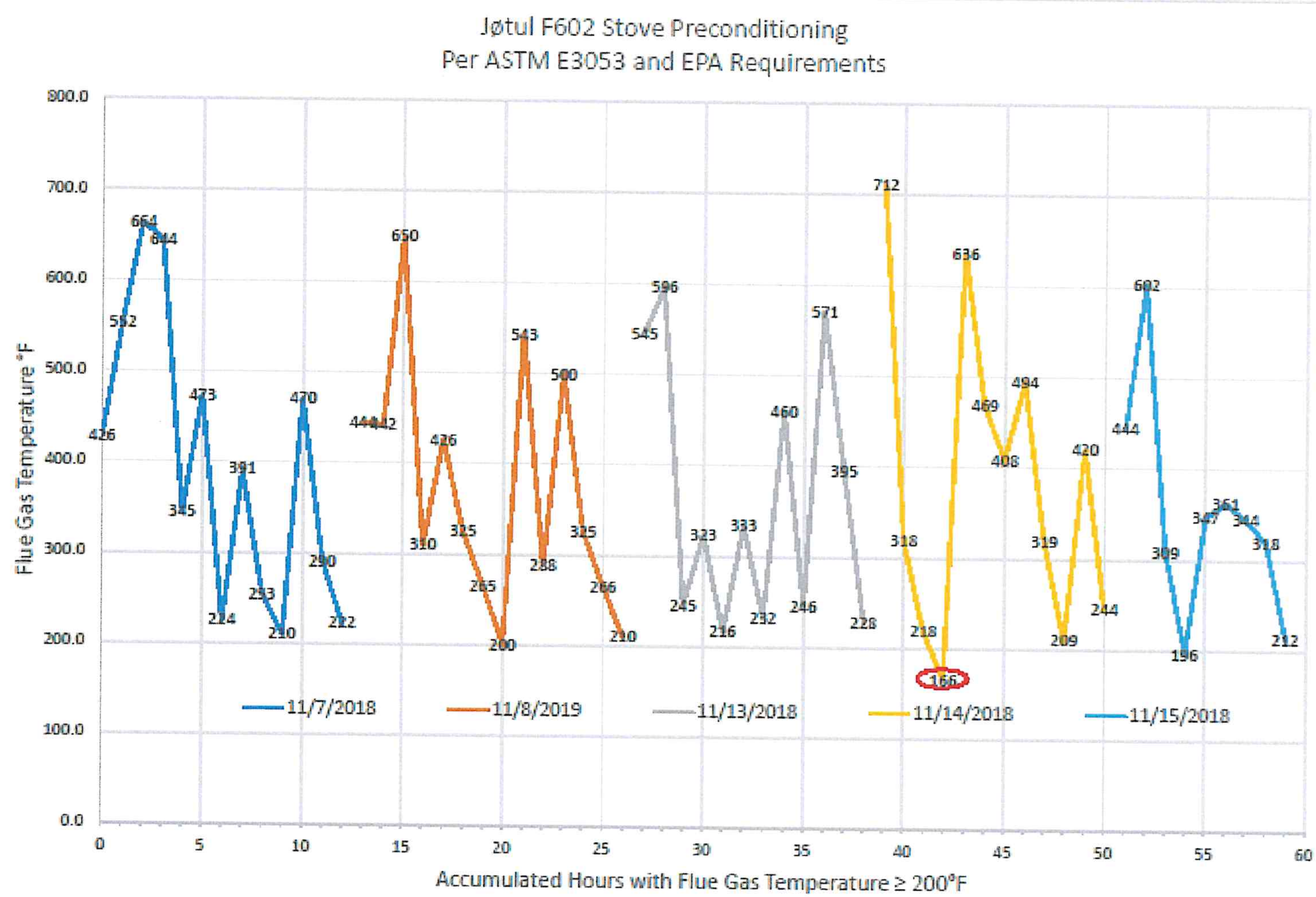
Jøtul F602 Preconditioning Data (extracted from datalogger)
Ferguson, Andors & Company

Date mm/dd/yyyy	Time hh/mm/ss	Accumulated Hours	Flue Gas Temp °F
11/7/2018	10:10:07	0	426
	11:10:07	1	552
	12:10:07	2	664
	13:10:07	3	644
	14:10:07	4	345
	15:10:07	5	473
	16:10:07	6	224
	17:10:07	7	391
	18:10:07	8	253
	19:10:07	9	210
	20:10:07	10	470
	21:10:07	11	290
	22:10:07	12	222
11/8/2018	9:40:07	13	444
	10:40:07	14	442
	11:40:07	15	650
	12:40:07	16	310
	13:40:07	17	426
	14:40:07	18	325
	15:40:07	19	265
	16:40:07	20	200
	17:40:07	21	543
	18:40:07	22	288
	19:40:07	23	500
	20:40:07	24	325
	21:40:07	25	266
	22:40:07	26	210
11/13/2018	11:16:41	27	545
	12:16:41	28	596
	13:16:41	29	245
	14:16:41	30	323
	15:16:41	31	216
	16:16:41	32	333
	16:53:23	33	232
	17:53:23	34	460
	18:53:23	35	246
	19:53:23	36	571
	20:53:23	37	395
	21:53:23	38	228

Date mm/dd/yyyy	Time hh/mm/ss	Accumulated Hours	Flue Gas Temp °F
11/14/2018	9:54:18	39	712
	10:54:18	40	318
	11:54:18	41	218
	12:54:18	*	166
	13:54:18	42	636
	14:54:18	43	469
	15:54:18	44	408
	16:54:18	45	494
	17:54:18	46	319
	18:54:18	47	209
	19:54:18	48	420
	20:54:18	49	244
11/15/2018	9:56:51	50	444
	10:56:51	51	602
	11:56:51	52	309
	12:56:51	53	196
	13:56:51	54	347
	14:56:51	55	361
	15:56:51	56	344
	16:56:51	57	318
	17:56:51	58	212

* Flue Gas Temperature under 200°F

Attachment 2



Preconditioning conducted by Ferguson, Andors & Company for Jøtul NA.

Attachment 3

POLYTESTS
TESTING THROUGH YOUR REALITY

St-jean-sur-Richelieu, January 25th 2019
Client: Jotul
Project: PI-20183
Model: F602 V2

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

[redacted]

POLYTESTS
TESTING THROUGH YOUR REALITY

St-jean-sur-Richelieu, January 25th 2019
Client: Jotul
Project: PI-20183
Model: F602 V2

APPENDIX 6: Drawings and specifications

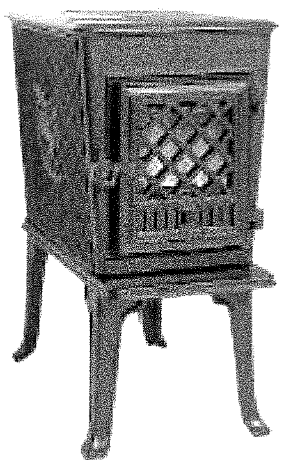
APPENDIX 7: Operator's manual

JøtulF 602 V2

Jøtul F 602 V2

Non-catalytic Wood Heater

Installation and Operating Instructions
for the United States and Canada



- **The JøtulF 602 V2 non-catalytic stoveis listed to burn solid wood only. Do not burn any other fuels.**
- **Read this entire manual before you install and use this appliance.**
- **Save these instructions for future reference and make them available to anyone using or servicing the stove.**
- **This wood heater requires periodic inspection and repair for proper operation. See this manual for specific maintenance information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in this owner's manual.**

JØTUL

Table of Contents

Standards

The Jøtul F 602 V2 solid fuel heater has been tested and listed to :
U.S. Standards: ANSI/UL 737 and ANSI/UL 1482. Canadian Standards:
CAN/ULC-S627-M00 and CAN/ULC-S628-M93

Certified Safety Tests performed by:
Intertek Testing Services, Middleton, Wisconsin U.S.A.

Manufactured by:
Jøtul North America, Inc.
55 Hutcherson Drive
Gorham, Maine 04038, USA and
Jøtul AS, P.O. Box 1411, Fredrikstad, Norway

C US
Intertek

WARNING !
THIS WOOD HEATER HAS A MANUFACTURER-SET MINIMUM LOW BURN RATE THAT MUST NOT BE ALTERED. IT IS AGAINST FEDERAL REGULATIONS TO ALTER THIS SETTING OR OTHERWISE OPERATE THIS WOOD HEATER IN A MANNER INCONSISTENT WITH OPERATING INSTRUCTIONS IN THIS MANUAL.

THIS HEATER MEETS THE 2020 U.S. ENVIRONMENTAL PROTECTION AGENCY EMISSION LIMITS FOR CORDWOOD HEATERS MANUFACTURED AFTER MAY 15, 2020.

THE JØTUL F 602 V2 IS NOT APPROVED FOR USE IN MOBILE HOMES.

NOTE: ***It is normal*** **for a new, painted stove to emit odor and smoke during initial fires, depending on temperatures over time. This is caused by the curing of the high temperature paint and manufacturing materials. This condition can be alleviated by opening a window or door to provide additional ventilation.**

Also, please note that metal undergoes thermal expansion and contraction in response to fluctuation of fire intensity. It is normal to hear some "ticking" sounds associated with this action.

Combustion Specifications

Jøtul F 602 V2[1] 15,200 to 49,576 BTU/hr. **Heat Output Range:**

Heating Capacity:[2] Up to 800 sq. ft.

Maximum Burn Time:[2] Up to 5 hours

EPA Efficiency:[3] **HHV:** 69.83% **LHV:** 75.14%

CO Emissions:[4] 1.18 g/min.

Pariculate Emissions:[5] 2.11 g/hr

Fuel: Up to 16" Logs (330 mm)

1 ***Heat Output Range*** results are determined during specific emissions tests established by the EPA.

The ***Maximum Heat Output*** value is representative of a more frequent re-fueling cycle than specified in the EPA High Heat Output test method.

2 ***Heating Capacity and Maximum Burn Time*** will vary depending on design of home, climate, wood type and operation

3 ***EPA Tested Efficiency:***

High Heat Value and Low Heat Value efficiencies are determined per the CSA B415.1-10 test method. The difference between the HHV and LHV is in how the energy in the exhaust gas water vapor is accounted for.

LHV efficiency assumes all the water vapor in combustion gases was condensed and the heat from such was recovered and transferred to the dwelling. HHV calculations do not assume all water vapor is condensed, therefore the HHV value is less than the LHV value

4 ***Carbon Monoxide Emissions*** rate results from Test Method CSA B415.1-10.

5. ***Particulate Emissions*** rate was obtained using EPA Test Method ALT-125 (Cordwood Fuel)., ASTM E2515-11 and ASTM E3053-17.

Check Building Codes

When installing, operating and maintaining your Jøtul F 602 V2 woodstove, follow the guidelines presented in these instructions, and make them available to anyone using or servicing the stove.

Your city, town, county or province may require a building permit to install a solid fuel burning appliance.

In the U.S., the National Fire Protection Association's Code, NFPA 211, *Standards for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances*, or similar regulations, may apply to the installation of a solid fuel burning appliance in your area.

In Canada, the guideline is established by the CSA Standard, CAN/CSA-B365-M93, *Installation Code for SolidFuel-Burning Appliances and Equipment.*

Always consult your local building inspector or authority having jurisdiction to determine what regulations apply in your area.

1.0 Safety Notices

- **BURN SOLID, NATURAL WOOD FUEL ONLY. DO NOT BURN ANY OTHER FUEL.**
- **DO NOT USE CHEMICALS OR FLUIDS TO START A FIRE. DO NOT BURN GARBAGE OR FLAMABLE FUELS.**
- **DO NOT USE A GRATE OR ELEVATE THE FIRE. BUILD THE FIRE DIRECTLY ON THE HEARTH.**
- **IF THIS ROOM HEATER IS NOT PROPERLY INSTALLED, A HOUSE FIRE MAY RESULT. TO REDUCE THE RISK OF FIRE, FOLLOW THE INSTRUCTIONS IN THIS MANUAL. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PROPERTY DAMAGE, BODILY INJURY, OR LOSS OF LIFE.**
- **CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION REQUIREMENTS IN YOUR AREA.**
- **ANY EXISTING CHIMNEY SYSTEM MUST BE INSPECTED BEFORE INSTALLATION OF THIS APPLIANCE.**
- **DO NOT CONNECT THIS STOVE TO ANY AIR DISTRIBUTION DUCT OR SYSTEM.**
- **EXTREMELY HOT WHILE IN OPERATION! KEEP CHILDREN, CLOTHING, AND FURNITURE AWAY. CONTACT WILL CAUSE SKIN BURNS. USE A CHILD GUARD SCREEN TO PREVENT ACCIDENTAL CONTACT BY SMALL CHILDREN.**
- **INSTALL SMOKE DETECTORS IN THE LIVING AREA AND BEDROOMS OF YOUR HOME. TEST THEM REGULARLY AND INSTALL FRESH BATTERIES TWICE ANNUALLY.**

WHEN INSTALLED IN THE SAME ROOM AS THE STOVE, A SMOKE OR CARBON MONOXIDE DETECTOR SHOULD BE LOCATED AS FAR FROM THE STOVE AS POSSIBLE TO PREVENT THE ALARM SOUNDING WHEN ADDING FUEL.

- **DO NOT OPERATE THIS APPLIANCE WITH CRACKED OR BROKEN GLASS. REPLACE GLASS ONLY WITH JØTUL PART NUMBER 128101.**
- **Avoid creating a low pressure condition in the room where the stove is operating. Be aware that operation of an exhaust fan or clothes dryer can create a low pressure area and consequently promote flow reversal through the stove and chimney system. In some cases, the optional Fresh Air Adaptor #156408 can be used to alleviate this condition. The chimney and building, however, always work together as a system - provision of outside air, directly or indirectly to an**

atmospherically vented appliance will not guarantee proper chimney performance. Consult your local Jøtul authorized dealer regarding specific installation/ performance issues.

- **Jøtul strongly recommends that this stove be installed by a professional solid fuel technician, or that you consult one if you do the work yourself. Also, consult your insurance company regarding any other specific requirements.**

NATIONAL FIREPLACE INSTITUTE® NFI CERTIFIED www.nficertified.org

We suggest that our woodburning hearth products be installed and serviced by professionals who are certified in the U.S. by the National Fireplace Institute® (NFI) as NFI Woodburning Specialists or who are certified in Canada by Wood Energy Technical Training (WETT).

Wood Energy Technical Training www.wettinc.ca

2.0 Initial Assembly

2.1 Inspect Contents

Inspect the stove for damage. Contact your dealer immediately if any damage is found. Do not install the stove if any damage is evident.

Contents:

- Door Knob Kit
- Flue Collar Adaptor
- Flue Collar
- Hardware Kit

2.2 Flue Collar Position

The Flue Collar may be installed in either a top-exit or rear-exit position. For Top Exit, use the pre-installed screws to secure the flue collar to the top plate.
For Rear Exit, first remove the screws and 10mm nuts that attach the rear cover plate to the back plate. Reach throught the top outlet to access the nuts. Use these same fasteners to attach the flue collar to the stove. Secure the cover plate to the top plate using the pre-installed screws.

3.0 Installation

A safe stove installation includes several elements:

1) the chimney connector
2) the chimney itself
3) the connection between the chimney connector and chimney, and
4) protection of combustible materials in the vicinity of the stove.

Each of these elements is equally important for a safe stove installation.

3.1 Chimney Connector (Stove Pipe)

Use 6" single wall or listed 6" double-wall stovepipe to connect the stove to the chimney. Single wall stovepipe must be black iron or stainless steel and have a minimum thickness of 24 gauge. Do not use aluminum or galvanized steel pipe for chimney connection - these materials are not suitable for use with solid fuel.

- **DO NOT USE CHIMNEY CONNECTOR AS A CHIMNEY. IT IS INTENDED ONLY TO BE USED A CONNECION DEVICE.**
- Each connector section must be oriented with t (crimped) end pointing toward the stove. See **fig. 2, page 12**.
- Secure all connector joints with three sheet metal screws.
- For the best performance, the chimney connector should be as short and direct as possible, including no more than two 90° elbows.
- **The maximum vertical run of single wall stovepipe should not exceed 10 ft. (305 cm). The maximum horizontal run should not exceed 3 ft. (92 cm) with a 1/4" rise per foot.**
- No part of the chimney connector may pass through an attic or roof space, closet or other concealed space, or through a floor or ceiling. All sections of the chimney connectors must be accessible for cleaning. Where passage through a wall or partition of combustible construction is desired, the installation must conform with NFPA 211 or CAN/CSA-B365, and is also addressed in this manual.
- **DO NOT CONNECT THIS HEATER TO ANY CHIMNEY SERVICING ANOTHER APPLIANCE.**

3.2 Wall Pass-Throughs

In the U.S.

The National Fire Protection Association's publication, NFPA 211, Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances permits four methods for passing through a combustible wall. Before proceeding with any method be sure to consult with your local building officials to discuss any local code requirements.

Common Method / U.S.

- See **figure 3, page 12**. Remove all combustible materials from the pass-through area (around the chimney connector), a minimum 12" (30.5 cm). A 6" (15.2 cm) diameter connector will require a 31" x 31" (78.7 x 78.7 cm) square opening.
- The opening must be filled with at least 12" (30.5 cm) of brick around a fireclay liner. The liner must be ASTM C35 or equivalent, having a minimum wall thickness of 5/8" (16 mm).
- The Pass-through must be at least 18" (45.7 cm) from combustible ceiling materials.
- It will be necessary to cut wall studs, install headers, and construct a sill frame to maintain the proper dimensions and to support the weight of the brick.
- The bricks must be solid brick with a minimum of 3 ½ inches thick (nominal 4" / 102 mm).
- Refractory mortar must be used at the junction of the chimney and the pass-through liner. The pass-through liner must not penetrate the chimney liner beyond the inner surface of the

chimney liner. Use extreme care when constructing the hole in the chimney liner as the tiles can shatter easily.

In Canada

The installation must conform to CAN/CSA-B365, *Installation Code for Solid Fuel Burning Appliances and Equipment.* Before proceeding be sure to consult your local building inspector.

Common Method / Canada

- This method requires the removal of all combustible materials from at least 18" (45.7 cm) around the chimney connector's proposed location. A 6" round liner requires a minimum opening 43" x 43" (109.2 x 109.2) square.
- Locate the pass-through at least 18" from combustible ceiling materials.
- The space that is cleared of combustible materials must remain empty. Sheet metal panels can be used to cover the area. However, when using a panel on both sides of the wall, each cover must be installed on noncombustible spacers at least 1" from the wall. If one panel of sheet metal is to be used it may be installed flush to the wall.

See section 5.3.1 and 5.3.2 of CAN/CSA - B365-M91. Consult your local building inspector, authorized Jøtul Dealer, NFPA 211 in the U.S. or CAN/CSA-B635 in Canada for other approved wall pass-through methods.

3.3 Chimney Requirements

There are two types of chimneys suitable for the Jøtul F 602 V2:

1. A code-approved masonry chimney with a ceramic tile or listed steel flue liner.
2. A prefabricated chimney complying with the requirements for Type HT (2100°F) chimneys per UL 103 or ULC S629.

The minimum chimney height is 15 feet (4.57 m).

When selecting a chimney type and the location for the chimney in the house, keep this in mind: it is the chimney that makes the stove work, not the stove that makes the chimney work. This is because a chimney actually creates suction, called draft, which pulls air through the stove.

Several factors affect draft: the height, cross-sectional area, and temperature of the chimney, as well as the proximity of surrounding trees or buildings.

In general, a short prefabricated chimney on the exterior of the house will give the poorest performance. This is because it can be very difficult to warm up from a cold start and maintain effective draft.

A centrally-located, interior masonry chimney will be easier to keep warm and will perform well under a variety of conditions.

This guideline gives the necessary chimney requirements based on the U.S. national code (NFPA-211). However, many local codes differ from the national code to take into account climate, altitude, or other factors. It is important that you check with your local building officials to find out what codes apply in your area before constructing a chimney.

Masonry Chimneys

The minimum requirements for a properly constructed chimney include the following:

- The foundation must be large enough to support the intended chimney without settling.
- The masonry wall of the chimney, if brick or modular block, must be a minimum of 4" nominal thickness. A mountain- or rubble-stone wall must be at least 12" thick.
- The chimney must have a fireclay flue liner (or equivalent with a minimum thickness of 5/8" and must be installed with refractory mortar. There must be at least 1/2" air space between the flue liner and chimney wall.
- The preferred fireclay flue liner size has a nominal size of 8" x 8", and should not be larger than 8" x12". If round fireclay liners are used, the inside diameter should be 6" and not larger than 8". If an existing chimney with larger tiles is used it should be relined with an appropriate liner.
- No other appliance can be vented into the same flue.
- An airtight cleanout door should be located at the base of the chimney.

A chimney inside the house must have at least 2" of clearance to the combustible structure. A chimney outside the house must have at least 1" clearance to the combustible structure. Fire stops must be installed at the spaces where the chimney passes through floors and/or ceilings. Remember that there must be air space around the chimney, and that insulation must be 2" or more from the chimney. A chimney, whether masonry or prefabricated metal, must be the required height above the roof or other obstruction for safety and for proper draft function. The chimney must beat least 3' higher than the highest point where it passes through the roof, and at least 2' higher than the highest part of the roof or structure that is within 10' of the chimney, measured horizontally. **See fig. 4, page 12**.

Chimneys shorter than 15 feet may not provide adequate draft. This can result in smoke spilling the room from the door or joints in the stove or pipe. In addition, inadequate draft can cause backpuffing. Overly-strong draft, on the other hand, causes excessive temperatures and can shorten burn times. If you suspect you have draft problem, consult your dealer.

When connecting to a masonry chimney, the chimney connector must slide completely inside the chimney thimble (or breach) to the inner surface of flue liner, make sure the connector does not protrude past the inside of the flue liner as that will reduce the flow area available for the smoke and ultimately cause problems with your chimney system. The chimney connector should be sealed into the thimble with refractory cement and the connector should also be mechanically fastened to the chimney. **See fig. 6, page 13**.

3.4 Hearthmount into a Masonry Fireplace

The Jøtul F 602 V2 may be installed into a masonry fireplace provided the height of the lintel is at least 25 1/2". See fig. 19, page 15 for clearance specifications that must be maintained to combustible mantel and trim materials.

Building code requires that the fireplace damper plate be removed or securely fixed in the open position. A connector pipe must then extend from the stove's flue exit through the damper area of the fireplace and into the chimney tile liner.

The inside area of the flue liner must not be less than the area of the stove flue collar and cannot be more than three times greater than the cross sectional area of the stove flue collar.

If the chimney liner is too large to accommodate the stove, an approved relining system must be installed to resize the flue. A new sheet metal damper block-off plate must be_installed around the connector pipe at the damper frame and sealed with the proper sealant (usually High-Temp Silicone).

3.5 Listed Metal Prefabricated Chimney

The heater must be connected to a listed Type HT per UL 103 or ULC S629 prefabricated (factory-built) chimney. When a metal prefabricated chimney is used, the manufacturer's installation instructions must be followed precisely. You must also purchase (from the same manufacturer) and install the ceiling support package or wall pass through, the "T" section package, the firestops (when needed), the insulation shield, the roof flashing, the chimney cap, etc. Maintain all clearances to the structure as recommended by the manufacturer. This clearance is usually a minimum of 2", although it may vary by manufacturer or for certain components.
See fig. 5, page 13.

4.0 Clearances to Combustibles

4.1 Floor Protection

A bottom heat shield is required in all installations. In addition, the stove must be placed on a noncombustible surface that extends 8" beyond the sides and back of the stove and 16" in the front of the stove. This will result in an overall base that is 28 1/2" wide x 45- 1/2" deep . This is the minimum floor protector size. Floor protection must also be used under the stove pipe and must extend 2" beyond either side of the pipe **(fig. 7, page 13)**.

The floor protection must have a minimum R value of 0.45. Warning! Never put any type of floor protection on top of carpeting.

4.2 Alternate Floor Protection

All floor protection materials must be non-combustible (i.e., metals, brick, stone, mineral fiber boards, etc.). Any organic materials (i.e., plastics, wood, paper products, etc.) are combustible and must not be used. The floor protector specified may include some form of thermal designation such as R-value (thermal resistance), k-factor (thermal conductivity), or C-factor (thermal conductance).

See 8.0 Appendix A on page 17 for the procedure to determine alternate floor protection materials that meet the thermal requirements for this stove.

4.3 Clearance to Adjacent Combustible Materials

The diagrams in **figures 8-13, pages 13-14,** specify the required clearances that must be maintained from unprotected combustible materials or objects.

A combustible material is anything that can burn, and in the case of stove installations, these material may not be visible. If you are not sure of the combustible nature of any material in the vicinity of your planned stove installation, you should check with your local fire officials. Remember that "fire resistant" materials are considered combustible; they are difficult to ignite, but they will burn.

If you have recently purchased a home that has a stove hearth in it that you plan to use, it is extremely important that the entire system be examined for safety. Many older homes may have faulty chimneys, or previous owners may have covered combustible walls or studs with brick veneers. Heat is conducted readily through brick and could ignite combustible materials hidden behind it.
Contact local building or fire official about restrictions and installation requirements in your area.

4.4 Using a Rear Heat Shield to Reduce Clearance

The Jøtul F 602 V2 optional rear heat shield, PN HS50,may be used only in top-exiting installations to reduce clearance as shown in **figures 11,12,13, page 14.**

4.5 Using Wall Protectors to Reduce Clearances

The wall protector must be non-combustible, such as a minimum 24 gauge galvanized steel or its equivalent. The wall protector must be elevated 1" from the floor to provide an air space of at least 1" between the shield and the combustible wall. See **figures 14-18 on pages 14-15** for approved sizing specifications.

4.6 Alcove installation

When installed with a listed double wall pipe and with wall protection, the Jøtul F 602 V2 can be placed in an alcove that has a minimum height of 96"[1] and a maximum depth of 48", and a minimum width of 41". **See fig. 14, page 14**.

When installed with a listed double wall pipe and with a stove heat shield, the Jøtul F 602 V2 can be placed in an alcove that has a minimum height of 96"[1] and a maximum depth of 24"[2], and a minimum width of 55". The clearances for this installation are shown in **fig. 13 page 14.**

4.6 Alcove wall protection

In an alcove, the height of the wall protector, including the air space at the bottom, must be at least 41" (104 cm). **See fig. 15, page 16**. Both side walls and the rear wall must be protected by the wall protector. **See fig. 15, page 14.**

4.7 Fireplace Clearances

For a fireplace installation, refer to the clearance specifications as shown in fig. 19, page 15.

5.0 Operation

Please read the following section completely before building a fire in your new stove.

5.1 Combustion Efficiency

The Jøtul F 602 V2 has an EPA tested High Heating Value (HHV) efficiency rate of **69.83.** There are, however, aspects of efficiency that you should be aware of in order to get the most from your stove. Operation habits and fuel moisture can have a significant effect on efficiency. Poorly seasoned wood having a higher than optimum moisture content, can reduce heat energy transferred to the living area as a result of the energy expended to evaporate excess moisture in order for the wood to burn. Operational habits - such as not building a robust kindling fire to readily ignite the larger fuel pieces - can result in an inefficient, smouldering fire. Additionally, most modern wood heaters' optimum performance and efficiency are at the medium to medium-low burn rates.

The location of the stove can have a significant effect on heating efficiency, primarily in regard to distribution of the heat. For example, a wood heater centrally located in the residence in an open living area will likely provide better circulation of heat than will a stove located in a room adjacent to the larger living area.

5.2 Minimize Carbon Monoxide Emissions

Testing the F 602 V2 to CSA B414.1-10 resulted in a carbon monoxide emission rate of **1.18 grams per minute**. Most means of combustion produce CO, including wood fires. Maintaining a well-established fire and avoiding operation that produces a smoldering, smoky fire, will greatly minimize CO levels.

We highly recommend that a CO monitor (detector) be installed in the same room as the stove. The monitor, however, should be located as far away as possible from the stove to avoid alert sounding when adding fuel to the fire.

5.3 Wood Fuel and Performance

The F 602 V2 is designed to burn natural cordwood only. Higher efficiencies and lower emissions generally result when burning air-dried, seasoned hardwoods, as opposed to softwoods, green or freshly cut hardwoods. Wood that has been air-dried for a period of 6 to 14 months will provide the cleanest, most efficient heat. Wood seasoned more than 2 years will burn too quickly to take advantage of the stove's low end efficiency strength.

A seasoned log will have check marks on the ends and be lighter than an unseasoned log which will show little or no check marks.
Cordwood should be stacked to allow the free flow of air circulation necessary to promote the seasoning process. Securely cover the stack to ensure it remains as dry as possible.

Check Moisture Content

We recommed using a moisture meter to determine the moisture content of your wood. For purposes of home heating, your fuel should have a moisture content between 12 - 20%. Wood with higher moisture content will burn, however, very inefficiently. Most of its heat value will be lost to driving water out of the wood. Worse, that moisture will condense as creosote in the relatively cool chimney flue, increasing the potential for a chimney fire. Use of unseasoned wood defeats the purpose of any modern wood-burning stove.

DO NOT BURN:

- Coal;
- Garbage;
- Synthetic fuel or logs;
- Material containg rubber, including tires;
- Material containing plastics;
- Waste petroleum products, asphalt products, paints, paint thinners or solvents; • Materials containing asbestos;
- Construction or demolitioin debris;
- Railroad ties or pressure-treated wood;
- Manure or animal remains;
- Salt water driftwood or other previously salt-water; saturated materials;
- Unseasoned wood; or
- Paper products, cardboard, plywood, or particle board. (The prohibition against burning these materials does not prohibit the use of fire starters made from paper, cardboard, saw dust, wax or similar substances for the purpose of
starting a fire.)

The burning of any of these materials can result in the release of toxic fumes, or render the heater ineffective and cause smoke.Never use gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fluid, or similar liquids to start or "freshen-up" the fire. Always keep such liquids away from the heater at all times.

NOTE: Avoid letting logs rest directly on the glass panel. The logs should be spaced off of the glass enough to allow for proper air flow within the firebox.

5.4 Air Flow and Control

Your Jøtul F 602 V2 is designed to support efficient combustion and heat transfer by directing air through the stove in two separate channels; **Primary and Secondary**.

Primary air is manually regulated by a sliding valve located in the load door under the glass pane. The valve position controls the volume of primary air entering the firebox and thereby affects fire intensity, heat output and burn time. Primary air is directed to the main body of the fire through that air inlet.

Secondary air allows combustion of volatile gas and other byproducts of primary combustion that would otherwise enter the atmosphere unburned. This unregulated air is preheated as it passes through a manifold at the back of the stove and is then directed to the fire through a stainless steel manifold at the top of the firebox. This additional hot oxygen allows any unburned gasses to be burned inside the stove. The action of secondary combustion can be readily seen through the viewing glass a slow, rolling flames suspended over the main fuel bed and smaller jets of flame extending from the secondary manifold ports. At the same time, no smoke will be observed exiting the chimney. This is evidence that the stove is operating at the so-called "sweet-spot" wherein optimum efficiency is realized.

When first starting or reviving the fire: the primary control lever should be set to the far right position, which permits the maximum amount of air into the stove. The greater the amount of air entering the stove, the hotter and faster the fire will burn. ***Moving the lever to the left*** reduces the airflow into the stove which prolongs the fire at a lower heat output. See figure 20, page 15.

Using a Stove-top Thermometer

Determining the primary air setting for the best overall performance for your particular needs and installation will be established over time through trial and error. Each installation has unique characteristics that will affect stove performance. You should use a stove-top thermometer to monitor the status of the fire. Once the temperature has reached 400°F - 600°F, set the air control to a mid-range position to allow adequate oxygen to support efficient combustion throughout the burn cycle.

5.5 New Stove Break-In Procedure

The Jøtul F 602 V2 is constructed of cast iron and stove furnace cement. Cast iron, while very durable, expands and contracts as it is heated and cooled. This type of construction requires the stove to be "broken-in" gradually so that thermal expansion does not occur too quickly. The following steps describe the proper break-in procedure for the Jøtul F 602 V2:

1. Light a small fire of newspaper and kindling. Only allow the stove to reach a maximum surface temperature of 200°F (93° C). Burn for approximately 1 hour.
2. Allow the stove to cool to room temperature.
3. Light a second fire, allowing the stove to reach a maximum temperature of 300°F (149°C) for 1 hour.
4. Cool the stove to room temperature.
5. Light a third fire and gradually allow the stove to reach a surface temperature of 400°F (204°C).
6. Cool stove to room temperature. This completes the "break-in" procedure.

Note: Keep the stove under 400°F (204°C) surface temperature during any "break-in fire", with the exception of the last "break-in" fire. If the temperature exceeds 400°F, move the primary air control lever all the way to the left to shut off the air supply completely. It is normal that the stove top temperature will continue to climb until the fuel burns down somewhat. Once the fire is out and the stove has cooled to room temperature, continue the break-in procedure. **Never attempt to reduce the temperature by removing burning logs from the fire.**

NOTE: *It is normal* for a new, painted stove to emit an odor and smoke during the first several fires. This is caused by the seasoning of the high temperature paint and will diminish with each fire. Opening a window or door to provide additional ventilation will alleviate this condition.

5.6 Building a Fire

The most important element is seasoned, dry fuel. A well-built fire will burn efficiently, keep the door glass clean, minimize emissions, and require less time and attention to maintain. We recommend using the top-down method of fire-starting as that will quickly warm the flue and establish a strong draft.

- Set the air control lever fully to the right (fully open). Place two, quarter-split logs to either side of the firebox, oriented front-to-back.
- Criss-cross three or four smaller splits on top of the bottom logs.
- Criss-cross several thin, dry kindling sticks across the second layer of logs.
- Place a few balls of crumpled paper on top of the kindling, followed by a handful or two of logpile tinder.
- Ignite the paper evenly and close the door.

- The burning paper and tinder will fall and quickly ignite the kindling. As the burning kindling sticks fall, the second layer of logs will ignite and fall between the base logs.
- Now you can add a couple more quarter-splits and let the fire become established for several minutes before adjusting the air valve position or adding more fuel.

5.7 Reloading

Reload the stove while it is still hot and there are plenty of hot to ignite the fresh fuel load. It is a good idea to include a smaller piece or two of wood at the base of the new load to help the stove recover more quickly to its operating temperature.

Reloading Procedure

- Always wear gloves when tending your stove.
- Push the air control to the right to the full open position.
- Wait a few seconds and open the door.
- Use a stove shovel or similar tool to break up any remaining charcoal and to drag some live embers toward the front where combustion air enters.
- Load the fuel (Smaller pieces first) and close the door.
- Wait 5-10 minutes and adjust the air control to desired setting.

Note: If the charcoal bed present at reloading time is relatively deep (2"-3") and your wood is well seasoned, it is possible to add the fresh fuel load, close the door and reset the air control for the desired heat output rate within 5 minutes.

WARNING: DO NOT OVERFIRE THIS HEATER. IF ANY PART OF THE STOVE OR CHIMNEY CONNECTOR GLOWS, YOU ARE OVERFIRING. A HOUSE FIRE OR SERIOUS DAMAGE TO THE STOVE OR CHIMNEY COULD RESULT.

ATTEMPTS TO ACHIEVE HEAT OUTPUT RATES THAT EXCEED HEATER DESIGN SPECIFICATIONS CAN RESULT IN PERMANENT DAMAGE TO THE HEATER.

Creosote and Soot Formation and the Need for Removal

When wood is burned slowly, it produces tar and other organic vapors which combine with expelled moisture to form creosote. These creosote vapors condense in the relatively cool chimney flue of a slow burning fire. The creosote that accumulates in the flue is highly flammable and is the fuel of chimney fires. To prevent a chimney fire, the creosote needs to be removed by sweeping the chimney and flue connector. The frequency of sweeping will depend on how you operate your stove. An accumulation of 1/4" or more on the sides of the flue or connector is considered hazardous and should be removed.

In the event that creosote in your chimney or flue connector ignites, the resulting fire is often accompanied by a roaring noise and a crackling sound as flakes of burned creosote break loose. If you suspect you are having a chimney fire, immediately close the primary air control and make sure the stove door is closed. Call the fire department and get everyone safely out of the house.

Trying to extinguish the fire in the stove will not help. In fact it can make the matter worse by allowing more oxygen through the door, which then accellerates the fire in the chimney. When the roaring and crackling has stopped, you should resist the temptation to open the door and look at the fire. The fire may have suffocated, but could rekindle when you open the door. After a chimney fire, do not use your stove until the chimney and the flue connector has been cleaned and inspected to ensure that no damage has occured.

5.8 Open Door Fire-viewing

Warning: This stove should be operated with the door either fully open with a spark screen in place or with the door fully closed.

Avoid risk of overfiring. Do not operate the stove with the door left partially open. Exhaust gas and flame may be drawn out of the fireplace door opening, creating risks from both fire and smoke. Be aware that even when operating with the door open, there exists the possibility of generating carbon monoxide by some fuels (e.g. charcoal), along with the associated hazards. Be sure adequate fresh air and ventilation is available to the stove when burning with the door open.

5.9 Ash Removal

Always use stove gloves and a long-handled shovel to clear hot ashes. Ash removal will be required every day or two during normal operation and is most easily done when the fire has burned down to coals. Use a shovel to push coals first to one side, shovel out the exposed ash, and then repeat on the other side. Spread the remaining hot coals evenly across the firebox floor to quikly ignite a new fire.

Store ashes in a metal container with a tight fitting lid and use it exclusively to store ashes. The closed container should be placed outdoors, well away from all combustible materials, pending final disposal. Regardless of how the ashes are finaly disposed, they should be kept in the closed container until all cinders have thoroughly cooled.

6.0 Maintenance

6.1 Glass Cleaning

From time to time, clean off the accumulated ash from the inside surfaces of the glass panels. If this fly ash is allowed to remain on the surface for extended periods, it could eventually cause the glass to become permanently etched and somewhat cloudy. Any soot deposit on the glass will burn off during the next hot fire.

DO NOT clean the glass while it is hot .
DO NOT use abrasive materials to clean the glass. Cool water and a soft cloth or paper towel are usually all that is required. Rinse thoroughly with clean water after washing and dry completely before burning your stove.

6.2 Glass and Gasket Replacement

To prevent cracking of the glass operate the doors gently. Do not shut the door by striking or slamming.

NEVER OPERATE THE STOVE WITH CRACKED OR BROKEN GLASS. Replace the panel only with the correct Jøtul replacement glass, PN 128101. Do not use substitutes.

The glass can be replaced with the door still mounted to the stove or the door can be removed and placed on a flat working surface.

The replacement glass gasket is self-adeshive. Measure enough gasket to go from the upper right corner of the glass, down the right side, across the bottom and back up to the upper left corner and then add about 2-1/2".

NOTE: THE TOP OF THE GLASS IS NOT GASKETED. This allows a small amount of air to enter through that area to help keep the glass clean.

- Peel off about 10" of the self-adhesive backing strip. Leaving about 1-1/4"of gasket "tail" overlapping, apply the gasket to the groove on the door, making sure that the adhesive is facing the door.
- Press the gasket firmly in place.
- Peel off the remaining adhesive backing and apply the remaining gasket, again leaving a "tail" at the upper left corner.
- Press the gasket firmly in place.
- Center the glass panel left and right on top of the gasket. Slide the glass toward the bottom of the door until it contacts the stops.
- Hold the glass in place with your hand and wrap the gasket "tails" over the top of the glass and down the outer edges. You will have to twist the gasket so the adhesive will face the glass. Press the "tails" firmly on the glass.
- Replace the air control slide and the upper and lower retainer manifolds and screws.

Glass retainers should be tightened gradually, following an alternating pattern similar to tightening vehicle lug nuts. Do not over-tighten. It may be necessary to retighten once again after the stove has been burned and the new gasket has seated.

6.3 Door Gasket

Gaskets are a wear item which must be replaced ocassonally. To check the front door gasket, put a dollar bill halfway into the stove, close and latch the door, and try pulling the dollar out. If it can be removed easily, the seal is too loose. Check several spots around the door. To replace the gasket, scrape out all old gasket material and gasket cement. Spread a 1/8" bead of stove cement into the bottom of the groove and press in new gasket.

Universal Gasket Kit 157050 includes all the gasket needed for replacement of the F 602 V2 door and glass panel. The door requires 36" of 1/4" diameter high density gasket. The gasket between the glass panel and the door receives very little wear. The best indication that it needs to be replaced is streaks on the glass caused by air leaking around the sides of the glass.

6.4 General

As with your car, regular maintenance will prolong the life of your stove and ensure satisfactory performance. A good time to do this is when you are cleaning the chimney and the connector. Thoroughly clean the entire stove. Make sure the stove and ash bed are stone cold and use a shop vac to thorougly remove fly ash from around air inlets and the baffle at the top of the firebox.

In a darkened room, use a strong light to inspect the stove inside and out for cracks or leaks at corners and joints. Cracked pants should be replaced. Leaks at joints can be patched with high-temperature furnace cement.

6.5 Chimney Cleaning

The Jøtul F 602 V2 is designed to burn cleanly and efficiently when used according to the guidelines in this manual. In order to maintain proper performance, you should inspect the chimney and chimney connector at the beginning of each heating season and then every other month during the heating season. Clean the chimney whenever creosote and fly ash accumulation exceeds 1/4 inch in any part of the system.

Chimney brushes are available from your local Jøtul dealer or hardware supply store. Your dealer can also refer you to a reputable, professional chimney sweep who will have all the equipment to ensure a complete and proper job. Failure to keep the chimney system free of creosote and build up could result in a chimney fire.

7.0 Jøtul F 602 V2 Clearances Table

Stove clearances Top vent/vertical	**Unprotected surfaces**			**Protected surfaces (NFPA 211)**		
	Side	**Rear**	**Corner**	**Side**	**Rear**	**Corner**
Single wall pipe W/out rear heatshield	21" 535mm	13.5" 345mm	13" 330mm	13" 330mm	11" 280mm	9" 230mm
Single wall pipe With rear heatshield	21" 535mm	11" 280mm	11" 280mm	13" 330mm	11" 280mm	9" 230mm
Shielded single wall pipe With rear heatshield	21" 535mm	9" 230mm	9" 230mm	13" 330mm	8" 205mm	8" 205mm
Double wall pipe With rear heatshield	24" 610mm	9" 230mm	9" 230mm	13" 330mm	8" 205mm	8" 205mm
Double wall pipe W/out rear heatshield	24" 610mm	15" 380mm	15" 380mm	12" 305mm	8" 205mm	8" 205mm

Connector Pipe	**Unprotected surface** **Vertical installation**	**Protected surface (NFPA 211)** **Vertical installation**
Single wall pipe	18" 460mm	6" 150mm
Double wall pipe	pipe mfgr.listing	pipe mfgr.listing

Connector Pipe	**Unprotected surface** **Horizontal installation**	**Protected surface (NFPA 211)** **Horizontal installation**
Single wall pipe	18" 460mm	9" 230mm
Double wall pipe	pipe mfgr.listing	pipe mfgr.listing

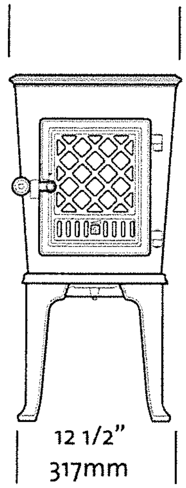
Minimum alcove dimensions:

	Unprotected surface **Vertical venting.** **Assumes top exit:**	**Protected surface (NFPA 211)** **Vertical venting** **Assumes top exit:**
Minimum alcove width	55" (1400mm)	41" (1040 mm)
Maximum alcove depth	48" (1220mm)	48" (1220 mm)
Height above the top of the stove	71" (1805mm)	71" (1805 mm)

Fig. 1. 12 5/8"

Fig. 2.

Connector



320mm

points toward stove.

Chimney

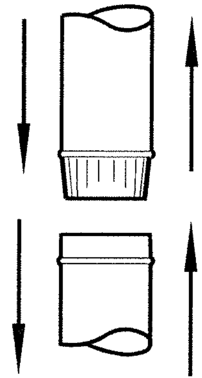
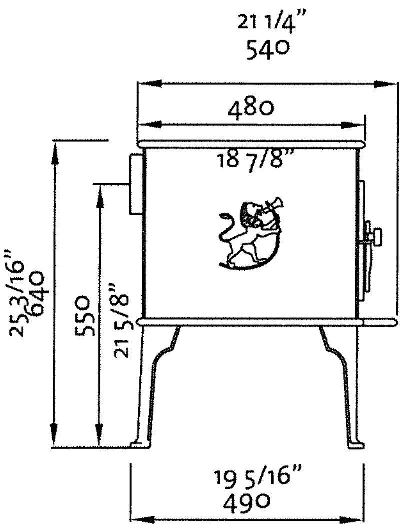
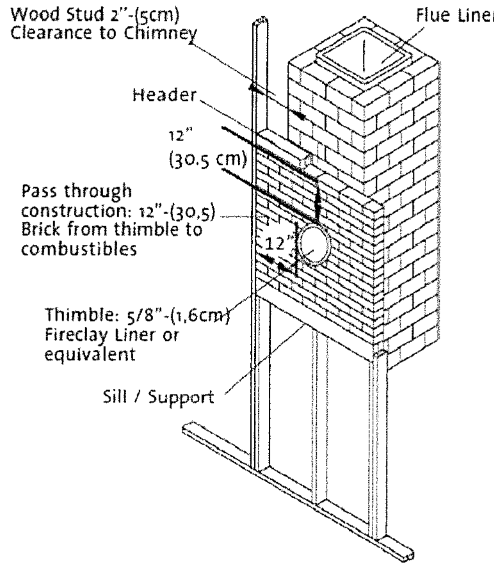


Fig. 3.





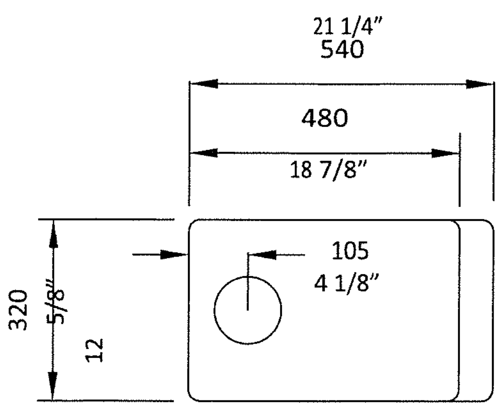


Fig. 4.

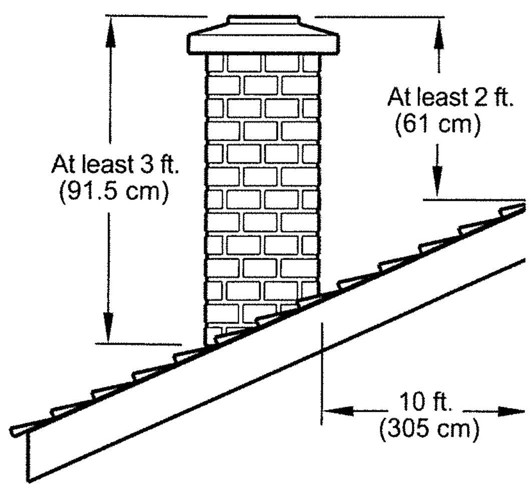


Fig Hearth Protection

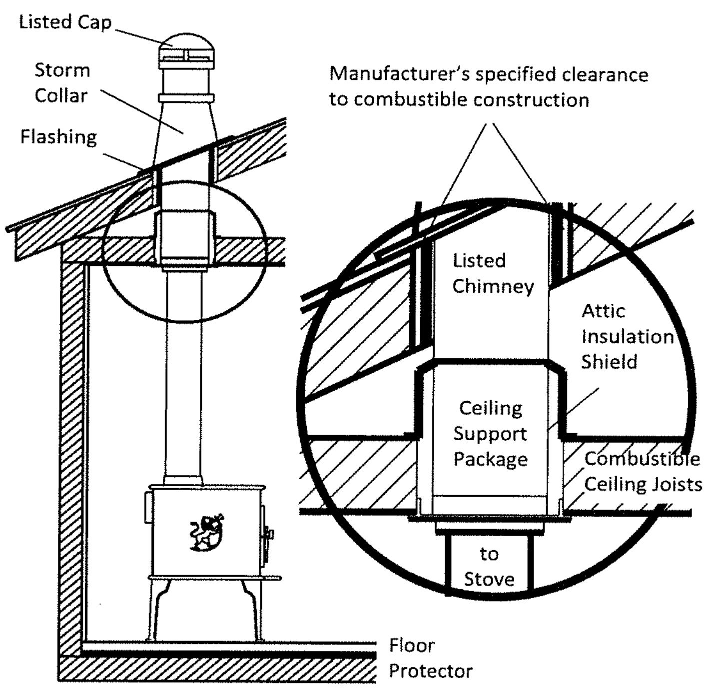


Fig. 6.

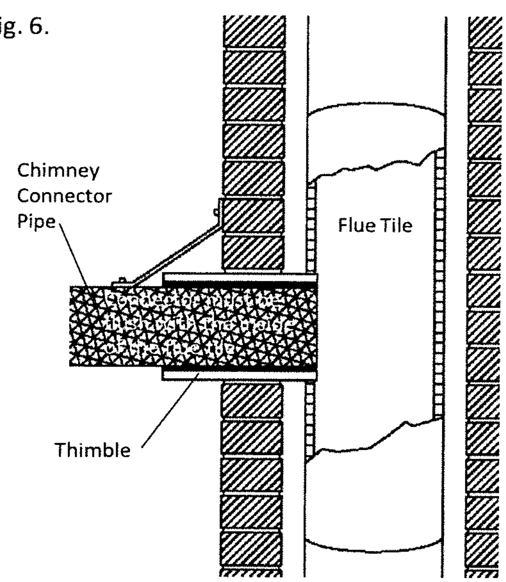
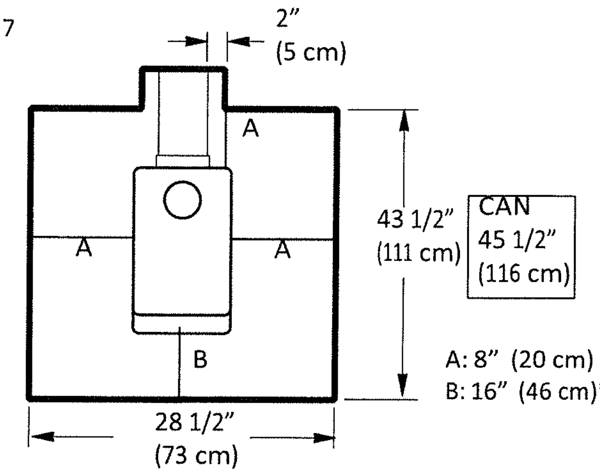
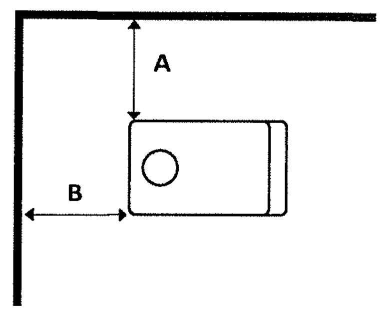
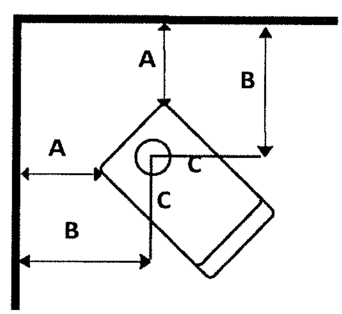
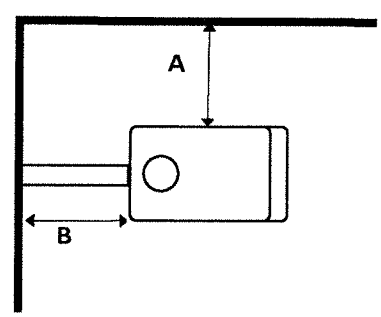


Fig. 7









* (Measurements in centimeters pertain to Canada.)

Clearance to Adjacent Combustibles

Fig. 8

A: 21" (53,5cm)
B: 13,5 " (34,5 cm)

Fig. 9

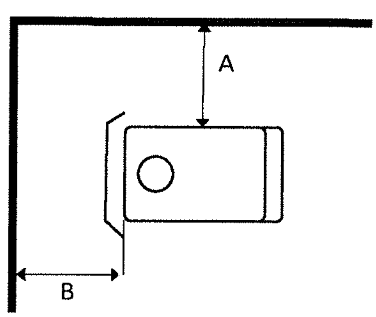
A: 13" (33,5 cm)
B: 20 1/4" (51,5cm)

Fig. 10

A: 24" (61 cm)
B: 19" (48,3cm)

Fig. 11 **Rear Heat Shield to reduce clearance**

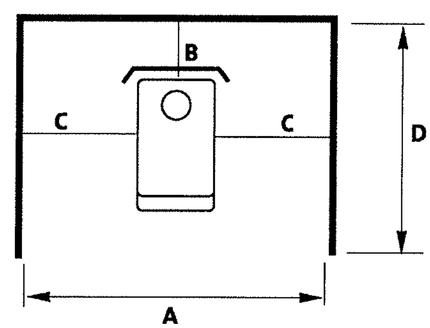
Single wall pipe, top exit only



A: 21" - (53,5 cm)
B: 11" -(28 cm)

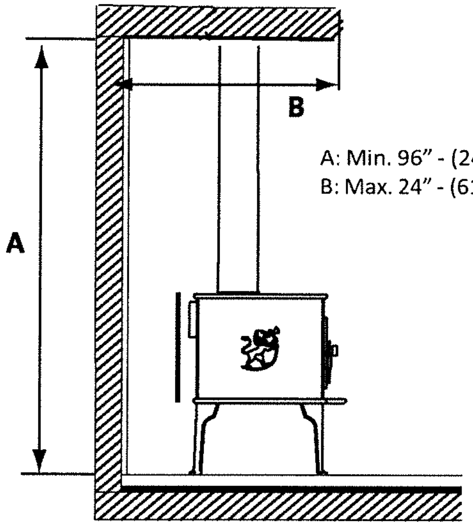
Fig. 12 **Alcove Installation**

Double wall pipe and stove heat shield



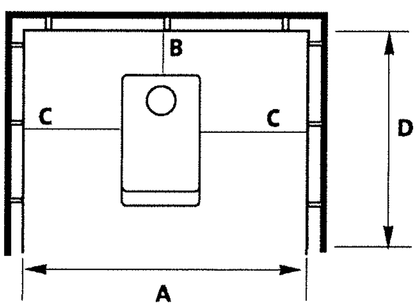
A: 55" - (140 cm)
B: 15" - (39,5 cm)
C: 21" - (53,5 cm)
D: 48" - (122 cm)

Fig.13 **Alcove with rear heatshield**



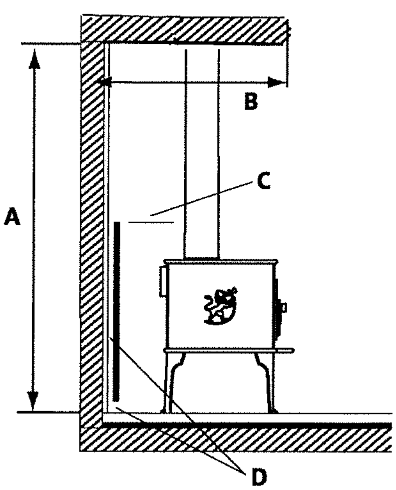
A: Min. 96" - (244 cm)
B: Max. 24" - (61 cm)[1]

Fig. 14 **Alcove - double wall pipe and wall protection**



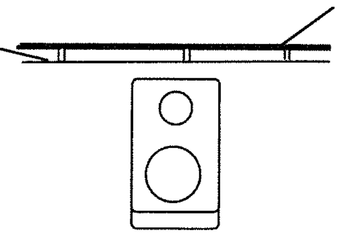
A: 41" - (104 cm) B: 8" - (20,5cm) C: 14" - (36 cm)
D: 48" - (122 cm)

Fig. 15 **Alcove with wall protection**



A: Min. 96" - (244 cm) B: Max. 48" - (122 cm) C: Min. 41" - (104 cm)
D: 1" - (2,5 cm)

Fig. 16 **Parallel installation with wall shield**



Wall shield

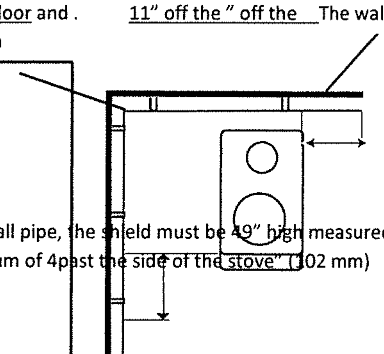
- Must be 27" wide and centered behind the stove.
- Must be 1" off the wall and 1" off the floor.
- With single wall pipe, the shield must be 49" high measured off the floor.
- With double wall pipe, the shield must be 37" high measured off the floor.

* (Measurements in centimeters pertain to Canada.)

Fig. 17 **Parallel installation in a corner with wall shield**

Combustible wall

Wall Shield



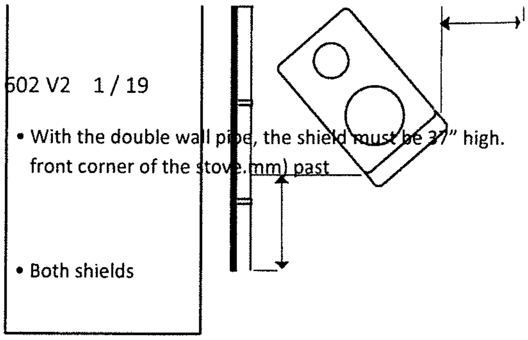
- Must be wallfloor and . must extend a 11" off the " off the The wall shield
- With single wall pipe, the shield must be 49" high measured off the floor. minimum of 4past the side of the stove" (102 mm)
- With double wall pipe, the shield minimust be 37" high measured off the The wall shield must extend a mum of 7" (178mm) past the ash lip of the stove floor.
- Both shields MUST extend and join in the corner.

Fig. 18 **Corner installation with wall shield**

Wall Shield Combustible wall

- Must be 1" off the wall and 1" off the floor.
- With single wall pipe, the shield must be 49". The wall shield must extend a minimum of 7"

F 602 V2 1 / 19

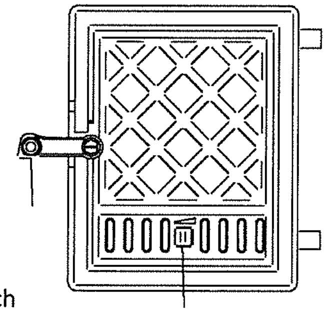


- With the double wall pipe, the shield must be 37" high. (178the front corner of the stove. mm) past
- Both shields

MUST and join in the corner extend 'The wall shield must extend a minimum of 7" (178mm) past the front

corner of the stove.

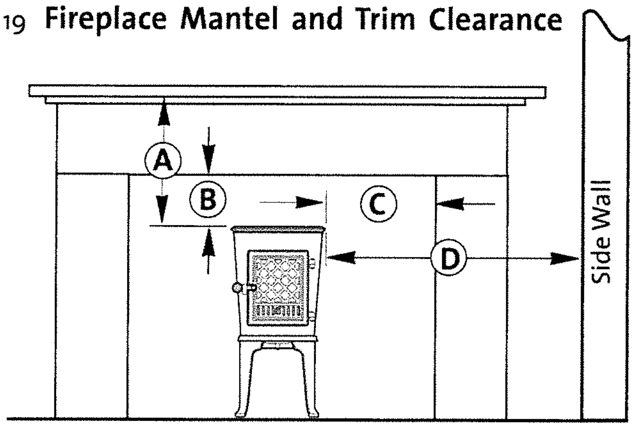
Fig. 20 **Controls**



Door Latch

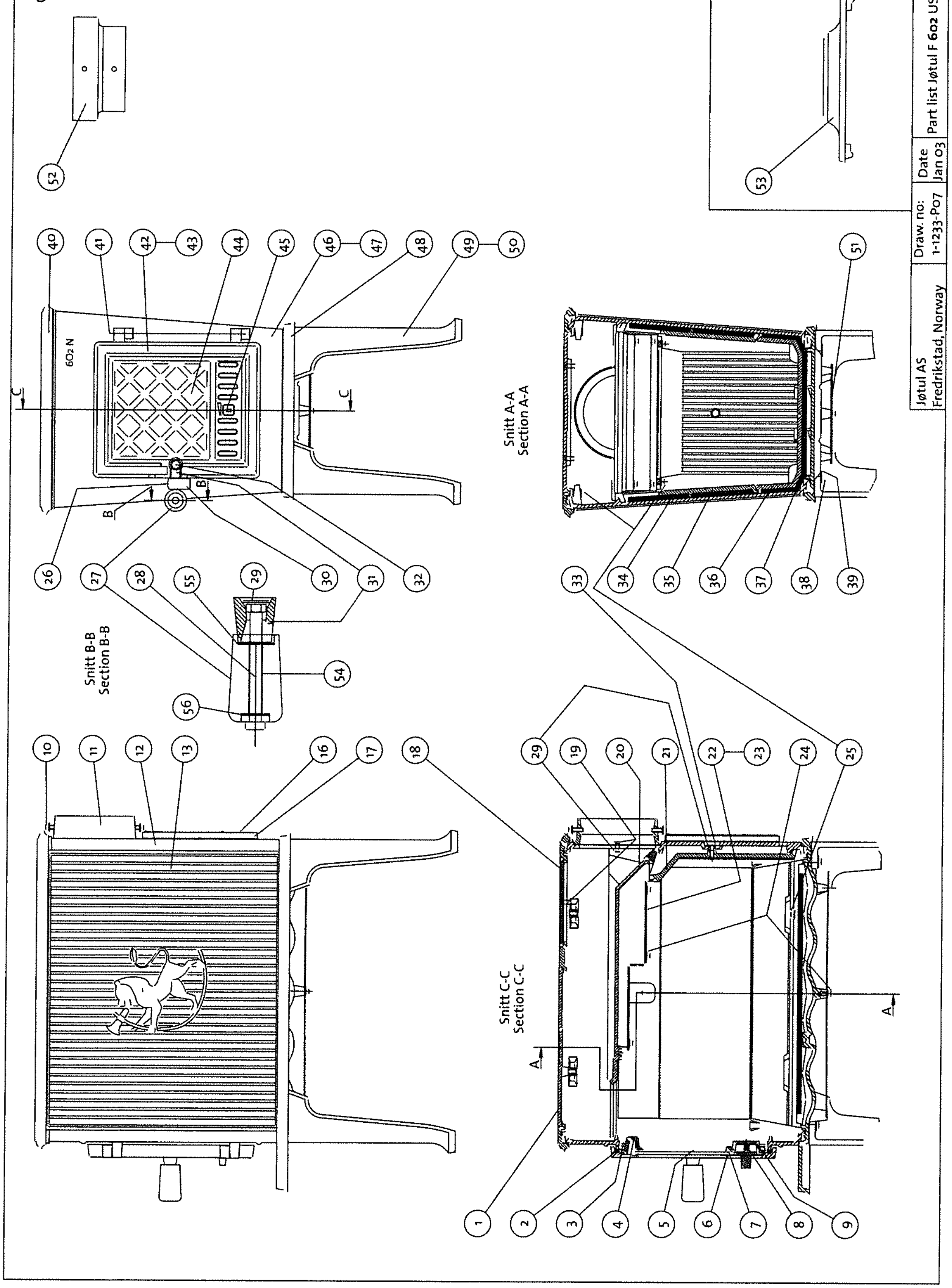
Air Valve: Left = Closed, Minimum Fire Middle = Medium Fire
Right = Full Open, Maximum Fire

Fig. 19 **Fireplace Mantel and Trim Clearance**



A: Unit to 8" Wide Mantel - 30 in. (76 cm)
B: Unit to Top Trim - 21 in. (53.5 cm)
C: Unit to Side Trim - 18 in. (46 cm)

Fig.21


Snitt B-B
Section B-B
Snitt A-A
Section A-A
Snitt C-C
Section C-C
602 N
Jøtul AS
Fredrikstad, Norway
Draw. no:
1-1233-P07
Date
Jan 03
Part list Jøtul F 602 USA

8.0 Illustrated Partlist

Pos Description ....Dim./Spec.

1 Hot plate .... 240 mm
2 Gasket .... LD 360 Ø8.7x850
3 Screw, panhead .... M6x12 DIN 7985
4 Air deflector
5 Nut M8
6 Gasket .... LD 187-1 Ø4.8x600
7 Gasket V-125 8x150
8 Spring for glass-door Ø7.6x13
9 Door vent baffle
10 Screw, self thread .... M6 x 16
11 Flue outlet 12 Back plate
13 Side panel
14 Rivet Ø3x12
15 Rivet Ø2,4x4
16 Label
17 Label shield
18 Cover for smoke outlet
19 Countersunk screw M6x16
20 Baffle plate
21 Air manifold
22 Air chamber, complete
23 Air chamber
24 Screw, collar head .... M6x10 25 Screw, collar head M6x25
26 Rivet .... Ø8x16 mm
27 Knob, wood
28 Screw, filister head M6x70
29 Nut w/ collar M6
30 Door catch
31 Door handle
32 Screw, flat head, socket .... M8x25 33 screw, collar head .... M 6x35
34 Insulating blanket 360x185
35 Burnplate, side, with insulation
36 Burnplate, bottom
37 Insulating blanket .... 360x330 38 Screw, hex M6x25
39 Washer Ø18x06,4x1.6
40 Top plate
41 Pin, door
42 Glass door, complete incl. handle
44 Glass, ceramic 4x147x154
45 Air slide vent
46 Front plate, complete 47 Front plate 48 Base plate
49 Legs, package of four 50 Leg, 1 pcs
51 Heatshield - bottom
52 Increaser .... Ø 126xØ154 mm
53 Decorative top 54 Casing
55 Washer
56 Washer, black crom.

9.0 Appendix A Alternate floor protection

All floor protection materials must be non-combustible ie. Metal, brick, stone, mineral fiber boards). Any combustible material may not be used.

The easiest means of determining if a proposed alternate floor material meets requirements listed in this manual is to follow this procedure.

R-value = thermal resistance
K-value = thermal conductivity
C-value = thermal conductance

1. Convert the specification to r-value;
   a. If r-value is given, no conversion is needed.
   b. If k-value is given with a required thickness (t) in inches:
   R=1/k X T.
   c. If c-value is given: R=1/C.
2. Determine the r-value of the proposed alternate floor protector.
   a. Use the formula in step 1 to convert values not expressed as "R".
   b. For multiple layers, add r-values of each layer to determine overall r-value.
3. If the overall R-value of the sustem is greater than the R-value of the specified floor protector, the alternate is acceptable.

Example:
The specified floor protector should be 3/4" thick material with a k-factor of 0.84. The proposed alternate is 4" brick with a c-factor of 1.25 over 1/8" mineral board witha k-factor of 0.29. **Step A.** Use formula above to convert specifications to
R-value. R=1/k x t= 1/.84 x .75 = .893 **Step B.** Calculate r of proposed system.
4" brick of c-1.25, therefore
R brick = 1/c = 1/1.25 = 0.80
1/8" mineral board of K = 0.29 therefore
R mineral board = 1/.29 x 0.125 = 0.431
Total R = R brick + R mineral board= 0.8 + 0.431=1.231
Step C. Compare proposed system R = 1.231 to specified R of 0.893.
Since R is greater than required, the system is acceptable.

Definitions:
Thermal conductance =
$$C = \frac{btu}{(Hr)(ft2)(f)} = \frac{W}{(m2)(k)}$$
Thermal conductivity =
$$K = \frac{btu}{(Hr)(ft2)(f)} = \frac{W}{(m2)(k)} = \frac{(btu)}{(hr)(ft)(f)}$$
Thermal resistance =
$$R = \frac{btu}{(Hr)(ft2)(f)} = \frac{(m2)(k)}{W} = \frac{(btu)(inch)}{(hr)(ft2)(f)}$$

10.0 Jøtul F 602 V2 Warranty

A. LIMITED LIFETIME WARRANTY, parts only:

Jøtul North America Inc. (JØTUL) warrants, to the original retail purchaser, that those baffle and air manifold components of the Jøtul or Scan Stove or Fireplace Insert specified above will be free of defects in material and workmanship for the life of the product. This warranty is subject to the terms, exclusions and limitations set forth below.

B. LIMITED FIVE YEAR WARRANTY - Cast Iron and Steel Components:

JØTUL warrants, to the original retail purchaser, that those components of the Jøtul Stove or Fireplace Insert specified above will be free of defects in material and workmanship for a period of five (5) years from the date of purchase. This warranty is subject to the terms, exclusions and limitations set forth below.

C. LIMITED TWO YEAR WARRANTY - Enamel Finish:

JØTUL warrants, to the original retail purchaser, the enamel finish on cast iron components of the Jøtul Stove or Fireplace Insert specified above against peeling or fading for a period of two (2) years from the date of purchase. This warranty is subject to the terms, exclusions and limitations set forth below.

D. LIMITED ONE YEAR WARRANTY - Electrical Components (blowers, thermostatic switches):

JØTUL warrants, to the original retail purchaser, that those components of the Jøtul or Scan Stove or Fireplace Insert specified above will be free of defects in material and workmanship for a period of one (1) year from the date of purchase. This warranty is subject to the terms, exclusions, and limitations set forth below:

JØTUL will repair or replace, at its option, any of the above components determined by JØTUL to be covered by this warranty. You must, at your own expense, arrange to deliver or ship the component to an authorized Jøtul or Scan dealer and arrange for pickup or delivery of the component after repairs have been made. If, upon inspection, JØTUL determines that the component is covered by this warranty, the repair or replacement will be made as set forth above. This warranty is not transferable and is extended only to, and is solely for the benefit of, the original retail purchaser of the Jøtul or Scan Stove or Fireplace Insert. This paragraph sets forth the sole remedy available under this warranty in the event of any defect in the Jøtul Stove or Fireplace Insert.
The warranty period for any replaced component will be the remaining unexpired portion of the warranty period for the original component.

Please retain your dated sales receipt in your records as proof of purchase.

EXCLUSIONS AND LIMITATIONS

NOTICE: This warranty is void if installation or service is performed by someone other than an authorized installer or service agency, or if installation is not in conformance with the installation and operating instructions contained in this owner's manual or local and/or national fire and building regulations. A listing of local authorized installers, service agencies and gas suppliers can be obtained from the National Fireplace Institute at http://www.nficertified.org/. **This warranty does not cover the following:**

1. Repair or replacement of parts that are subject to normal wear and tear during the warranty period or to parts that may require replacement in connection with normal maintenance. These parts include paint, gaskets, burn plates, ceramic insulation blankets, skamol baffles and panels, firebricks, fire grates, or glass (Ceramic glass is warranted against thermal breakage only).
2. Damage due to incorrect installations not in conformance with the installation instructions contained in this owner's manual or local and/or national fire and building regulations.
3. Damage, including damage to enamel surfaces, caused by improper operation, over-firing, and/or misuse. Improper operation, such as burning the stove with the ash door open, can damage the stove. Over-firing occurs when any part of the stove glows red. Over-firing can also be identified by warped plates, rust-colored cast iron, paint pigment that has turned dusty white, or bubbling, cracking and discoloration of the enamel finish. Misuse includes, without limitation, use that is not in conformance with the operating instructions contained in this owner's manual.

4. Damage to enamel finish including chipping, mechanical or chemical abrasion, crazing, staining, or rust caused by high humidity or salt air environments.
5. Damage from or repair of rust. Use of a stove-top steamer can cause rust.
6. Damage due to service performed by an installer or service agency, unless otherwise agreed to in writing by JØTUL.
7. Damage caused by unauthorized modification, use or repair.
8. Costs incurred by travel time and/or loss of service.
9. Labor or other costs associated with the repair of components beyond the warranty period.
10. Damage incurred while the Jøtul or Scan Stove or Fireplace is in transit.

IN NO EVENT SHALL JØTUL, ITS PARENT COMPANY, SHAREHOLDERS, AFFILIATES, OFFICERS, EMPLOYEES, AGENTS OR REPRESENTATIVES BE LIABLE OR RESPONSIBLE TO YOU FOR ANY SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR OTHER SIMILAR DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOST PROFITS, LOST SALES, INJURY TO PERSON OR PROPERTY, OR DAMAGES TO A STRUCTURE OR ITS CONTENTS, ARISING UNDER ANY THEORY OF LAW WHATSOEVER. ALL IMPLIED WARRANTIES, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE, ARE LIMITED IN DURATION TO THE LENGTH OF THIS WRITTEN WARRANTY. EXCEPT AS EXPRESSLY SET FORTH HEREIN, JØTUL MAKES NO ORAL, WRITTEN OR OTHER WARRANTY WITH RESPECT TO JØTUL OR SCAN STOVES OR FIREPLACES.

Some states do not allow the exclusion or limitation of incidental or consequential damages, or limitations on the length of implied warranties. Therefore, the above exclusions or limitations may not apply to you. This warranty gives you specific legal rights, and you may have other rights, which vary from state to state.

JØTUL reserves the right to discontinue, modify or change the materials used to produce the Jøtul or Scan Stove or Fireplace Insert. JØTUL shall have the right to replace any defective component with substitute components determined by JØTUL to be of substantially equal quality and price.

The dollar value of JØTUL's liability for breach of this warranty shall be limited exclusively to the cost of furnishing a replacement component. JØTUL may at its discretion discharge all obligations by refunding the wholesale price of any defective part or appliance. JØTUL shall in no event be liable for any special, indirect or consequential damage of any nature which is in excess of the original wholesale purchase price of the product. JØTUL shall not in any event be liable for the cost of labor expended by others in connection with any defective component. Any costs or expenses beyond those expressly assumed by JØTUL under the terms of this warranty shall be the sole responsibility of the owner(s) of the Jøtul Stove or Fireplace.

No dealer, distributor, or other person is authorized to modify, augment, or extend this limited warranty on behalf of JØTUL. **NO MODIFICATION OR CHANGE TO THIS WARRANTY WILL BE EFFECTIVE UNLESS IT IS MADE IN A WRITTEN DOCUMENT MANUALLY SIGNED BY AN AUTHORIZED OFFICER OF JØTUL.** An authorized installer may have been provided with certain information related particularly to the Jøtul or Scan Stove or Fireplace; however, no authorized installer or other person who may service the appliance is an agent of JØTUL. No inference should be made that JØTUL has tested, certified, or otherwise pronounced any person as qualified to install or service the appliance. JØTUL shall not be liable or otherwise responsible for any error or omission by a person installing or servicing a Jøtul or Scan Stove or Fireplace Insert.

If you believe your Jøtul or Scan Stove or Fireplace Insert is defective, you should contact your nearest authorized Jøtul dealer, who will process a warranty claim. **IN ORDER TO QUALIFY FOR WARRANTY COVERAGE, JØTUL MUST RECEIVE NOTICE OF A POSSIBLE DEFECT WITHIN SIXTY (60) DAYS OF THE DATE THE DEFECT IS FIRST DISCOVERED, OR REASONABLY COULD HAVE BEEN DISCOVERED.**

This warranty is given by Jøtul North America, Inc., 55 Hutcherson Drive, Gorham, Maine 04038 USA

139953
January2019

We appreciate your trust in welcoming our product into your home and invite your comment and appraisal of our efforts to provide you with the finest in home hearth products. Jøtul maintains a policy of continuous product development. Products supplied may therefore differ in specification, color, and type of accessories from those illustrated and described in this manual.

For Your Records...

Record the following information to help your dealer determine what you will need should your stove ever require parts or service.
The serial number and manufacturing date are indicated on the permanent label located on the back of the stove. You may also wish to attach your sales receipt to this manual for future reference.

Model: Jøtul F 602 V2 __________

Serial Number: __________

Purchase Date: __________

Dealer: __________

____

____

Phone: __________

Installed by: __________

Date: __________

Jøtul North America Inc.
55 Hutcherson Drive
Gorham, Maine 04038
USA

Jøtul AS,
P.o. box 1411
N-1 Fredrikstad,
Norway

JØTUL®

Listed Solid Fuel Room Heater & Fireplace

for use in the United States and Canada.

Inscrite Heater solides Salle de carburant et Cheminée

pour une utilisation aux États-Unis et au Canada.

Conforms to / Conformé à:

ANSI-UL 1482 and UL 737 / U.S.

Certified to: / Certifié norme:

ULC-S627 and ULC-S628-M93 / CA.

Manufactured by / Manufacturé par:

Jøtul North America, Inc.

55 Hutcherson Dr.

Gorham, ME U.S.A.

Intertek Testing Laboratories, Inc.

Middleton, WI U.S.A

Model / Modéle: Jøtul F 602 V2

Serial No. / Nu. de Série:

F H

A C G

B D

C

E Consultez le manuel d'installation pour d'autres options.

See installation manual for other options.

- **FOR USE WITH SOLID WOOD FUEL ONLY.**
- Install and use only in accordance with the Installation and Operating Instructions manual. In absense of local codes, installation must meet minimum requirements of NFPA 211 in the U.S. and CAN/CSA-B365 in Canada. Always contact your local building or fire officials about restrictions and installation inspections in your area.
- Do not connect this appliance to a chimney flue serving another appliance.
- This heater must be installed on the legs provided - the space beneath the heater may not be obstructed.
- Do not use a grate or elevate the fire - build wood fire directly on hearth.
- Risk of smoke or flame spillage - operate only with door fully closed, or fully open with optional screen in place.
- **DO NOT OVERFIRE** - if heater or chimney connector glows, you are overfiring.
- Chimney connector must be 6" dia. 24 MSG black or 26 MSG blued steel.
- Chimney must be a minimum 6" dia. factory-built, listed UL 103HT or lined masonry in the U.S. or listed ULC S629 factory-built or lined masonry in Canada.
- When passing the chimney or chimney connector through a combustible wall, always consult the Installation and Operating Manual, NFPA 211 or CAN/CSA-B 365 and your local codes.
- **INSPECT AND CLEAN CHIMNEY FREQUENTLY** - Under certain conditions of use, creosote buildup may occur rapidly.
- NOTE: Replace glass only with glass supplied by the manufacturer or distributor of this appliance.

Minimum Clearances to Combustibles: A: 13 1/2" / 345 mm
Minimum des Surfaces Combutibles: B: 21" / 535 mm
C: 13" / 330 mm

Floor Protection / Protection de Plancher:
The stove must be placed on a protector that extends: **D:** 8" / 200 mm non-combustible floor **E:** 16" U.S. 18 po. CAN. 460 mm
Le poêle doit être placé sur un protecteur de plancher incombustible qui s'étend: **F:** 2" / 50 mm

Minimum Clearances from Chimney Connector to Combustibles:
Dégagements Minimaux à Partir du Connecteur de Cheminée à Combustibles:
G: 18"/ 457 mm
H: 18"/ 457 mm

DO NOT REMOVE THIS LABEL.

NE PAS ENLEVER CETTE ÉTIQUETTE. W/N

- **POUR L"USAGE AVEC LE BOIS SOLIDE SEULEMENT.**
- Installez et utilisez seulement en accord avec les instructions d'insatllation et d'operation du manufacturier et des codes locaux. Dans l'absence des codes locaux, l'installation doit être conforme auz exiggences de NFPA 211 aux États-Unis, et Can/CSA B365 au Canada. Référez vous auz instructions du manufacturier et des codes locaux pour les précautions exigées pour passer une cheminée travers un mur ou un plafond combustibles.
- Ne connectez pas ce poêla à une cheminée servant un autre appariel.
- Cet appareil doit être installé sur les jambes fournis - l'espace sous le poêle ne peut pas être obstruées.
- U'utilisez pas un atre et n'élevez pas le feu. Édifiez le bois de feu directement ur le foyer.
- Risque de fumée ou de déversement de flammes - avec la porte fermée ne fonctionnent. que, ou avec écran optionnelle complètement ouverte en place.
- **NE PAS SURCHAUFFER:** Si le poêle ou la cheminée commence à rougeoyer, c'est a cause du fait que vous suchauffez le poêle.
- Le connecteur de cheminée doit être de 6 "dia. 24 MSG noir ou acier 26 MSG bleui.
- La cheminée doit être au minimum de 6 po de diamètre fabriquée en usine, de la maçonnerhomologué UL 103HT ou doublé aux États-Unis ou ULC S629 énumérés fabriqués en usine, ou revêtues de maçonnerie au Canada.
- Lors du passage de la cheminée ou tuyau de cheminée à travers un mur, toujours consulter le manuel d'installation et d'exploitation, NFPA 211 ou CAN / CSA-B 365 et les codes locaux.
- **PRÉVENEZ LES FEUX DE CRÉOSOTE:** Inspectez et nettoyez le cheminée fréquemment. Sous certaines conditions d'usage, lerésidu de créosote peut se faire rapidement.
- NOTE: Remlacez la vitre seulement avec de la céramique fournie par l'usine.

U.S. ENVIRONMENTAL PROTECTION AGENCY - CERTIFIED TO COMPLY WITH

2020 PARTICULATE EMISSIONS STANDARDS USING CORDWOOD.

CERTIFIED EMISSION VALUE 2.11 g/hr.

CERTIFIED CO EMISSIONS VALUE 1.18 g/min.

EPA test method ASTM E2515-11, ASTM E3053-17 and ALT-125.

This wood heater needs periodic inspection and repair for proper operation.

Consult the owner's manual for further information.

It is against federal regulations to operate this wood heater in a manner inconsistent with the operation instructions in the owner's manual.

Manufacture Date / Date du Manufacturier

2019	2020	2021	2022	2023	2024
1	2	3	4	5	6
7	8	9	10	11	12

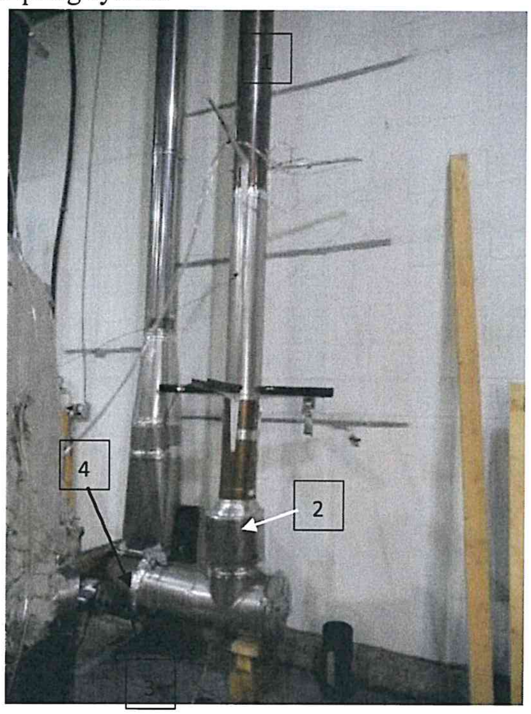
CAUTION: **Hot while in operation. Do not touch. Keep children, clothing, and furniture away. Contact may cause burns - See instruction manual.** **AVEC:** **Chaud pendant le fonctionnement. Ne touchez as. Tenir les enfants, les vêtements et les meubles à l' écart. Le contact peut causer des brûlures cutanées. Voir la plaque signalétique et les instructions.** 226578

St-jean-sur-Richelieu, January 25th 2019
Client: Jotul
Project: PI-20183
Model: F602 V2

APPENDIX 8: Photographs of test set up

Dilution picture Dia 8

Picture 1: Sampling system



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

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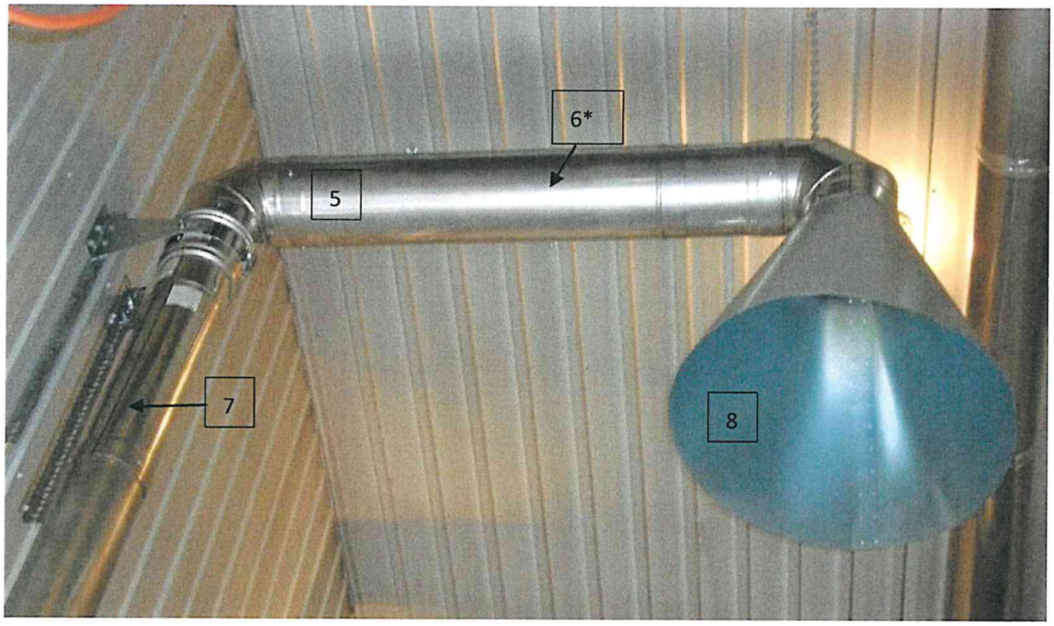
Picture2 :Hoodandmixingbaffle



*Thearrowpointthedeflectorsinsideofthepipe

5 :8 in.dia.Stainlesssteelpipe

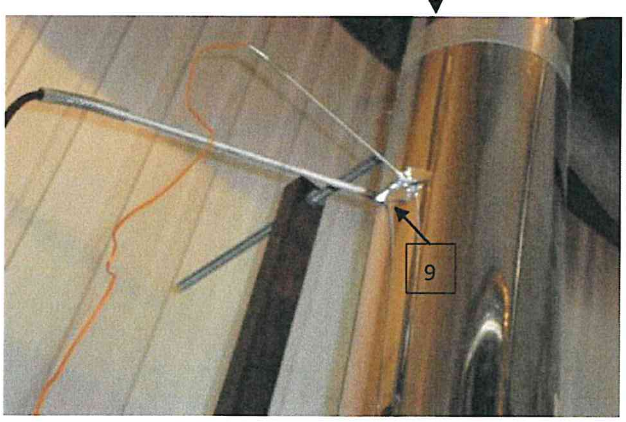
6 : Mixingbaffle(2)location1footbetweenbaffles

7 :10 feetlongbetweenvelocityportandupperelbow

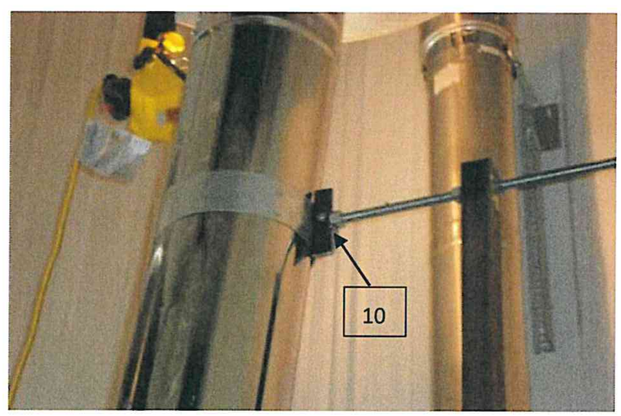
8 :48 in.dia.Galvanizedsteelsmokecaptureshood

Picture3 :Stacksampling

Picture3.1 : Gasanalysisand temperatureprobe



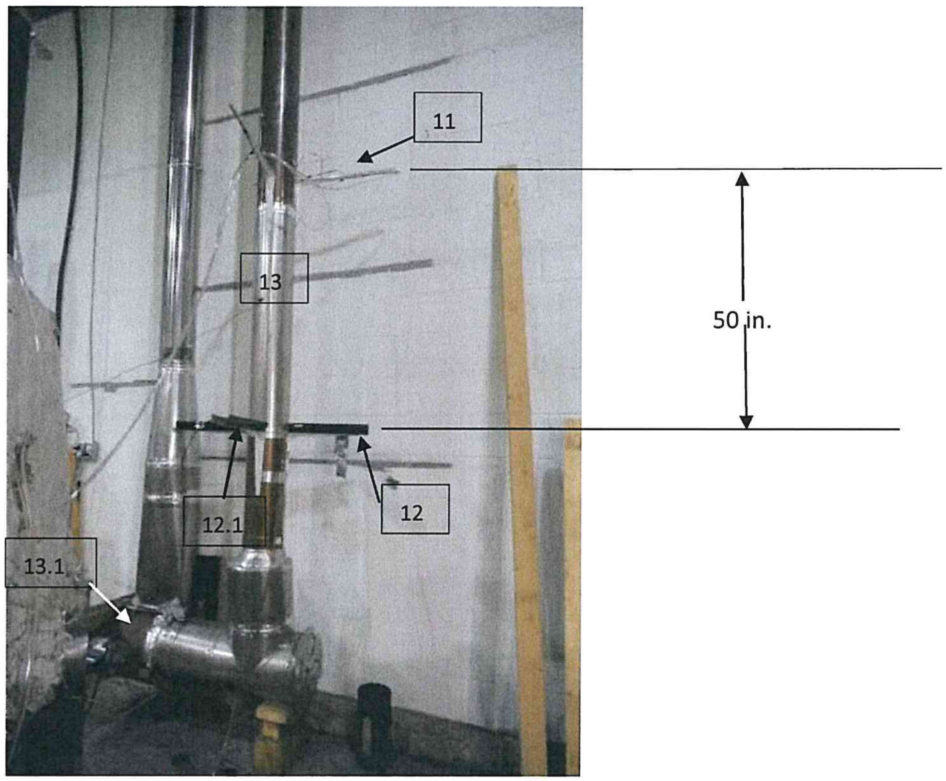
Picture3.2 : chimneysupport



9 : Temperatureandgasanalysersamplingportslocated9feetaboveplatform

10 : Exhaustsystemsupportbracket

Picture 4: Tunnel flow measurement and sampling probe



11 : Velocity port

12 :Sampling port, 2 sampling probes with 2x48 mm. dia.filter each. Filter used: Millipore AP4004700

12.1 :Sampling port, sampling probes with 2x48 mm. dia.filter each. Filter used: Millipore AP4004700, for first hour sampling

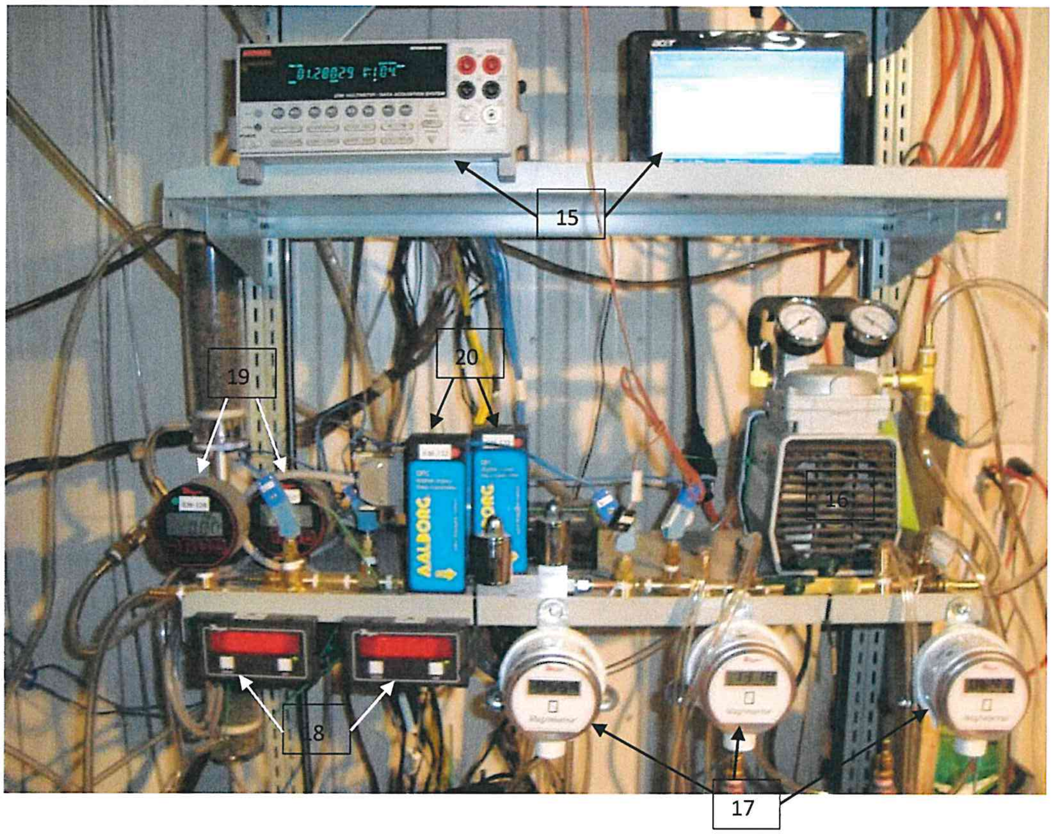
13 :18 feet long dilution tunnel

13.1 :Extraction blower

Picture 5: Draft sampling

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

Picture6 :Equipments



15 : Acquisitionsystem

16 : Vacuumpump

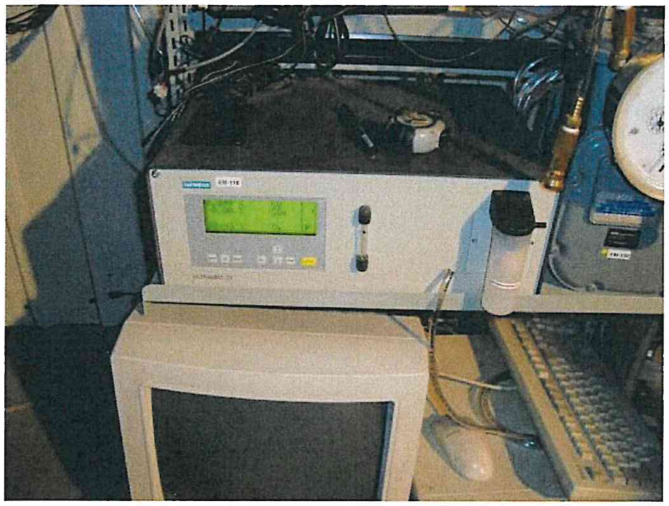
17 : Digitalmanometer

18 : Digitalreadoutformassflowmeter

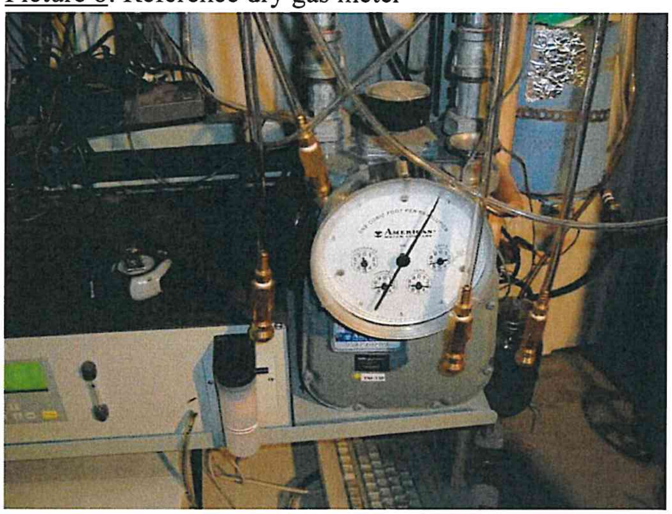
19 : Digitalvacuumgage

20 : Massflowmeter

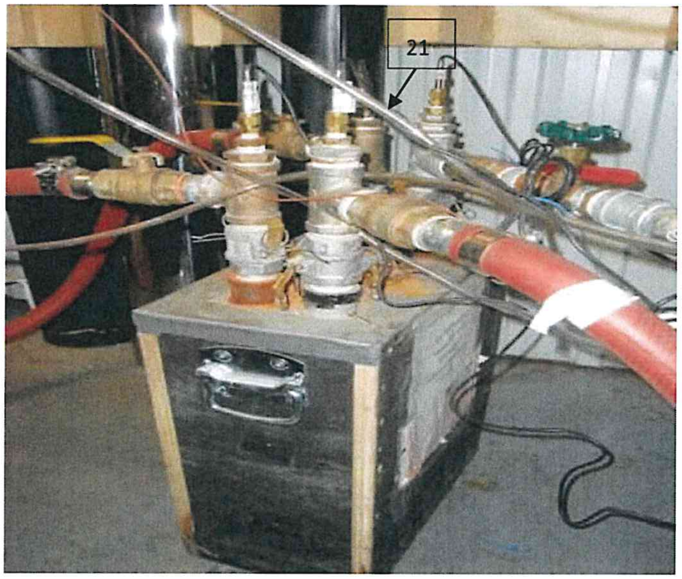
Picture 7: Gaz analyser



Picture 8: Reference dry gas meter

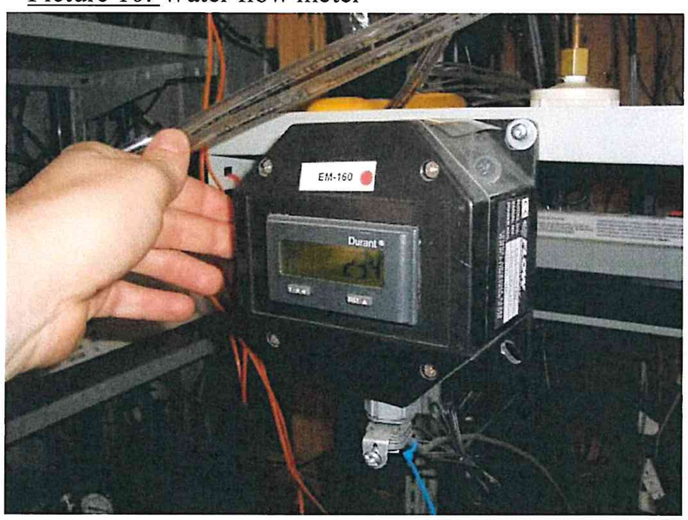


Picture 9: Heat exchanger

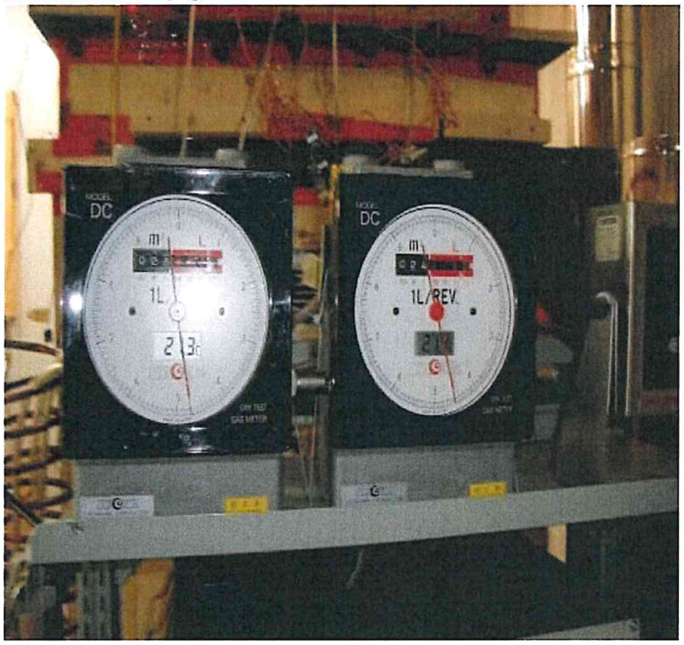


21 : PT 100 insertion probe

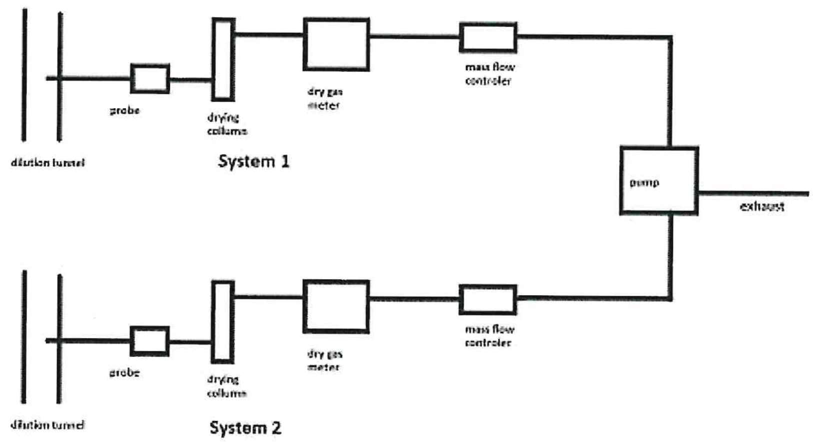
Picture 10: Water flow meter



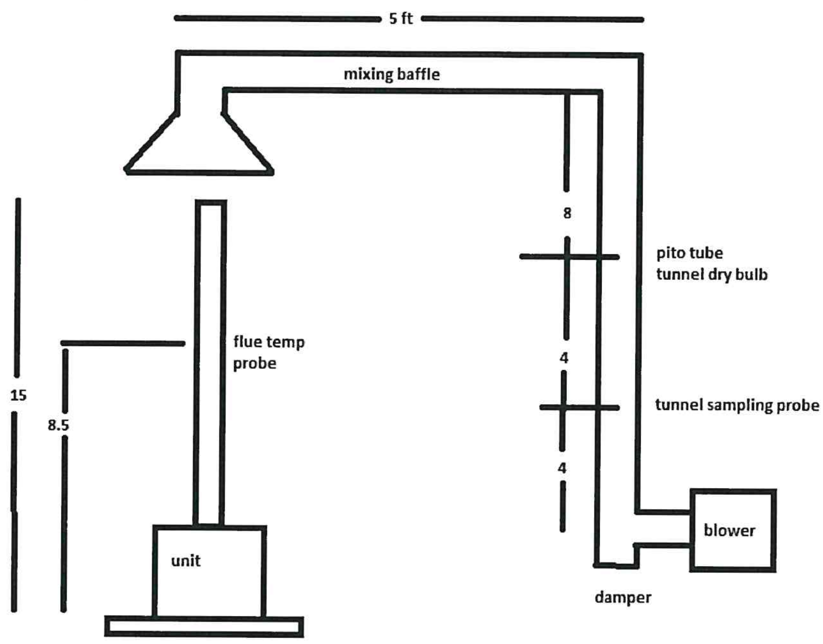
Picture 11: Dry gas meter



Picture 12 : Dilution tunnel sample system



Picture 13: Dilution tunnel



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St-jean-sur-Richelieu, January 25th 2019
Client: Jotul
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APPENDIX 9: Test load photographs

Run 1.1




Run 1.2

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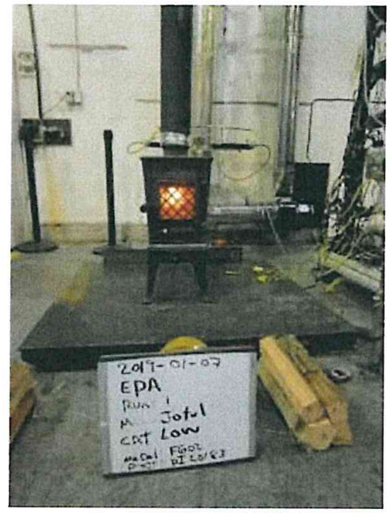

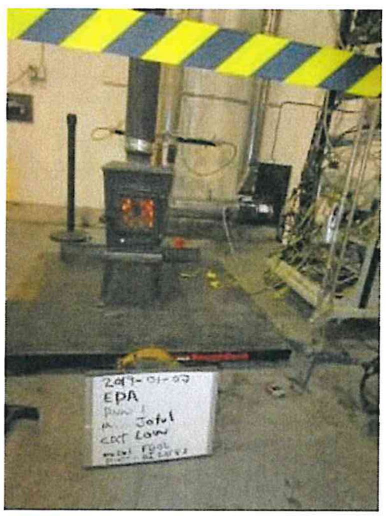

Run 2.1

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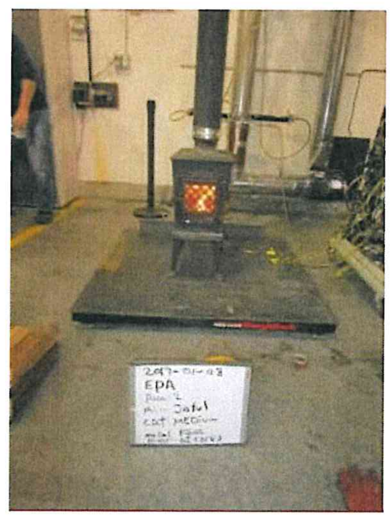
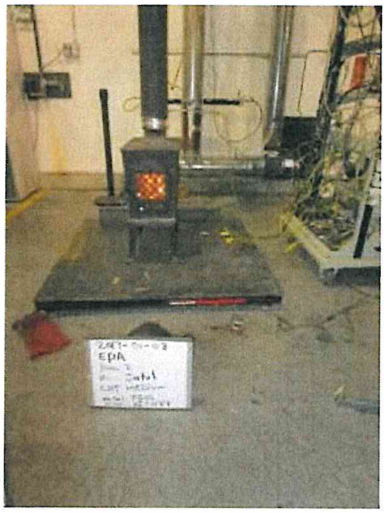


Run 2.2


EPA


EPA

St-jean-sur-Richelieu, January 25th 2019
Client: Jotul
Project: PI-20183
Model: F602 V2

APPENDIX 10: Laboratory Operating Procedures

POLYTESTS Services inc.

SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

INTRODUCTION

This document provides a step by step guide for the technician conducting tests to EPA standard requirements. Procedures outlined here, when followed, will result in tests in conformance with EPA Methods 28R, ASTME2780, ASTME2515, ASTM E2618, Method 28WHH, Method 28 PTS, Method ALT-125, ASMTE 3053.

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

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

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

EPA METHODS

1. EPA METHODS 28R
2. ASTME2780
3. ASTME2515
4. ASTM E2618
5. METHOD 28WHH
6. METHOD 28 PTS
7. ALT-125
8. ASMTE 3053

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

repairs will not affect the unit's performance. If damage is irrepairable, a new unit will need to be obtained.

3. Note whether unit is catalytic of non-catalytic.
4. Mark unit with manufacturer's name, model number, work order number and date received.
5. If unit is safety listed, note label data including listing agency and serial number. If unit is not listed, mark all data sheets "UNLISTED". Test results will not be released until unit passes safety tests without modification unless authorized by laboratory manager.

B. UNIT SET-UP

1. All new units must be operated for a breaking in period as follows.

   a) Non-catalytic units: Ten (48) hours at medium burn rate with Douglas Fir scrap or cordwood.
   b) Catalytic units: Fifty (50) hours at medium burn rate with Douglas Fir scrap or cordwood.

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

   Record catalyst temperature at 1-hour intervals or on chart recorder. Operating should continue until data shows at least fifty (50) hours of operation with catalyst temperature in excess of 500 degrees Fahrenheit (active range).

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

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

2. Unit is to be placed on scale for testing. Prior to proceeding with verification process, scale should be turned on and allowed to warm up for one (1) hour minimum. Zero scale and check calibration with standard weights. One (1) 1 kg weight and one (1) 2 kg weight are provided for this purpose. Use scale verification test form no. EPA-7-TP to record results. If scale fails to reproduce weights within tolerance, check with laboratory manager before proceeding.
3. If scale checks out, place unit on scale and align so chimney will be centered in hood.
4. Attach chimney connector and chimney. Be sure all joints are sealed below sampling points. Chimney and connector should be cleaned with a wire brush. Be sure chimney connector terminates and chimney starts at proper level above scale platform. Chimney must be supported from scale so that it does not touch test enclosure or hood walls.
5. Thermocouples should be attached to surfaces of unit prior to testing. EPA requires a thermocouple on the bottom of the firebox. This must be installed prior to putting the unit

construction. Check with the laboratory manager if problems are encountered in proper thermocouple attachment.

6. Measure firebox dimensions and record on data forms nos. EPA-2-TP. Make a three-dimensional sketch of the firebox including firebrick, baffles and obstructions. Calculate firebox volume in cubic feet with both addition and subtraction methods using forms nos. EPA-3-TP and EPA-4-TP. See Section 6.2.4 of EPA Method 28 for details of firebox volume determination.
7. If unit is catalytically equipped, additional thermocouples must be installed upstream and downstream of catalyst. Thermocouples should also be placed in the primary and secondary combustion chambers of all units.
8. Plug thermocouples into data acquisition system jacks making a check of locations and jack numbers for each test on data form no. EPA-5-TP.
9. Note that inserts are tested as if they are freestanding stoves.
10. Dilution tunnel should be cleaned prior to each certification test series and at anytime a higher burn rate follows a lower test burn rate.

II. SAMPLING SYSTEM – SET-UP

A. GAS ANALYSIS

1. Instruments should be turned on and allowed to warm up for one (1) hour minimum.

2. Calibrate analyzers as follows:

   NOTE : Prior to proceeding with calibration, make sure to use NIST 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 CO_2 and CO analyzers are "ZEROED" on nitrogen. The O_2 analyzer is spanned on air and set for 20.9%. It is zeroed on nitrogen as well.

3. Check for response time synchronization.

b) Flow the calibration gas in the unit and start stop watch. Note the time required for each unit to reach .90 of the calibration gas bottle value. If all three analyzers reach this value within 15 seconds of each other, synchronization is adequate. If not, contact the laboratory manager. Synchronization is adjusted by internal instrument setting.

4. Set-up sample clean-up and water collection train as follows.

a) Load impingers as follows:
Impinger #1: 100 ml distilled water and 5 ml H_2SO_4
Impinger #2: 100 ml distilled water and 5 ml H_2SO_4
Impinger #3: Empty
Impinger #4: 200 – 300 grams silica gel (dry)

b) Place impingers in container and connect with "U TUBES". Grease carefully on bottom half of ball joint so that grease will not get into tubes.

c) Connect filter to first impinger and sample line to last impinger.

e. Leak check system as follows.

1) Plug probe.
2) Turn on sample system.
3) Observe sample flow rotometer and vacuum gauge. If necessary, use vacuum; adjust valve to set vacuum to the maximum inches Hg.
4) If the float in rotometer does not stabilize below 10 on scale, system must be resealed.
5) Repeat leak check procedure until satisfactory results are obtained.

f) Just prior to starting test, fill impinger container with water and ice and record ambiant conditions on data form no. EPA8-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.

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.)

c) Allow vacuum indication to stabilize for two (2) minutes, then record time and dry gas (DGM_1) and (DGM_2) meter readings. Wait ten (10) minutes and record dry gas meter readings again (DGM_3, DGM_4). NOTE: If mark, system is leaking too much and all seals should be checked.

d) Calculate leakage rate as follows.

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

2) System 2: $\frac{(DGM_4 - DGM_2)}{10} = CFM_2$

If CFM_1 or CFM_2 is greater than .02 CFM, leakage is unacceptable and system must be resealed.

If CFM_1 or CFM_2 is greater than 0.04 X sample rate, leakage is unacceptable. For most tests, the sample rate will be about 0.15 CFM, thus leakage rates in excess of 0.04 X 0.15 = 0.006 CFM are not acceptable. Record leakage rates on form no. EPA-5-TP

e) Once leakage check is satisfactory, unplug probe and set flow to appropriate rate for test. This should be done in the minimum amount of time necessary and with the probes in ambient air. Do not insert probes in tunnel until the start of the test run. When flow is established, replug probes to prevent contamination.

III. TEST CONDUCT

POLYTESTS Services inc.

SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY OPERATING PROCEDURE

1. Determine optimum load weight by multiplying firebox volume in cubic feet by 7 or (10 and 12 for cordwood method). This is the load weight on an as-fired basis.
2. Determine piece size to obtain the requested load configuration and meet the test load weight criteria. The load should consist of the following: TO BE DETERMINED
3. Weigh out test load and adjust weight by shortening all pieces equally if necessary. Record individual piece load on form no. EPA11-TP.
4. Measure and record moisture content of each fuel piece using Delmhorst moisture meter. Determine if fuel load moisture content is in required range. If not, construct new load using wood with required moisture content. All wood in the humidity chamber should be within range. Contact project manager if you cannot find suitable pieces. Record moisture of each individual piece load on form no. EPA-11-TP.

B. UNIT START-UP

1. Before lighting a fire, turn on dilution tunnel and set tunnel velocity to 500ft/min Record readings on data form no. EPA-9-TP.
2. Check draft imposed on cold stove with all inlets closed and a draft gauge in the chimney. If draft is greater than 0.005 inches water column, adjust tunnel to stack gap until draft is less than 0.005.
3. Check for ambient airflow around unit with hot wire anomometer. Must be less than 50 ft/min.
4. Check all equipment for proper operation. Analyzers should be on and in sample mode. Computer should be loaded with test program and awaiting test start command.
5. Zero scale and start fire with uncolored newspaper and kindling representing 10 % of test load with the same type of fuel.
6. Once kindling is burning well after 5 minutes, add splitted pieces having a bottom surface around 4 sq. inches and representing 25% of test load weight. Operate at high fire for 15 minutes. Then adjust settings to intended test run levels as per the manufacturer's.
7. Following addition of pretest fuel load (splitted pieces), start computer for data logging.
8. All fuel additions, air intake settings and operational characteristics shall be noted with associated time stamp on form no. EPA-1-TP.

C. TEST RUN

1. Once the targeted test fuel bed weight is obtained, the test is to be started as follows:

b) Check tunnel pitot tube for proper position. (Pitot should be carefully cleaned prior to each test.)

c) Turn on probe sample systems and stack sampler.

d) Open stove door, rake coals and load stove as follows: TO BE DETERMINED

e) Close door or follow manufacturer's start-up procedures. (Five (5) minutes maximum time before all doors and controls must be set to final positions for duration of test. 15 minutes allowed for ALT-125 method))

f) An alarm will sound an audible signal at the (10) minutes intervals. This signal a reading interval. You must verify at each interval that the following readings are correctly logged by the data acquisition system and make observations of any unusual or non-routine events that could occur.

1) Rotometer readings.
2) Tunnel pitot tube reading. (Zero regularly between readings) 3) Gas meter readings.
4) Temperature readings.
5) Draft reading
6) Test laod weight
7) CO, CO_2 and O_2 readings
8) Observations of any unusual or non-routine events.

g) During the test, any condition approaching unacceptable limits will be noted. The filter probes and housings are installed in small holders just outside the tunnel. If the filter temperature gets too high, you will have to increase the water flow through the cooling unit until acceptable temperatures are obtained. In between readings, check on other equipment. Be sure dryers and filters are working and monitor impinger train for proper water and ice levels etc.

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

IV. POST TEST PROCEDURES

A. SAMPLE RECOVERY – FILTER TRAINS

1. Carefully clean outside of probes and filter housings with alcohol.
2. Disassemble filter holder and transfer filters to clean petri dish. Scrape gasket with scalpel and collect any loose material on filters

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

APPENDIX 12: Volume calculations

APPENDIX 13: Operating instruction

Jøtul F602 Fueling and Operation Instructions **January 4, 2019**

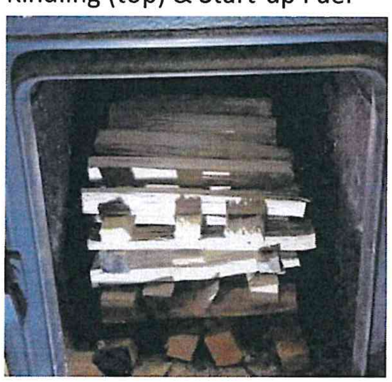
High Fire with a Cold Start

To start the fire from a "cold" stove:

1. Cut and split 10 kindling pieces that are approximately 6 inches long and 6 kindling pieces that are approximately 10 inches long. The kindling should be very dry and total kindling weight should be approximately 1 lb.
2. Cut and split 10 start-up fuel pieces that are approximately 6 inches long and 6 start-up fuel pieces that are approximately 10 inches long. These can be spilt from larger fuel pieces that are in the range of 19 – 25% moisture (dry basis). The total weight of the start-up fuel should be approximately 2.3 lb. Start-up pieces typically have a larger cross section than kindling pieces.
3. Arrange the start-up fuel pieces in a grid on the bottom of the firebox, with long pieces running front-to-back and short pieces running side-to-side.
4. Next, arrange the kindling pieces on top of the start-up fuel pieces using the same grid pattern. (see photos below)

Kindling (top) & Start-up Fuel

Start-up Fuel Grid in Firebox



Jøtul F602 Fueling and Operation Instructions **January 4, 2019**

6. Using a propane torch, light the top front of the kindling grid. The torch should be operated for 60 seconds.
7. Close the door until it hits the latch. This will leave the door in a slightly open position.
8. After one minute, close the door fully and secure the door latch.
9. Make sure the air control is still in the maximum open position.

Adding the High Fire fuel load.

1. When the kindling and start-up fuel have burned down by approximately two-thirds, rake the remaining coals and fuel pieces forward until they are equally distributed and level.
2. Place the fuel load pieces tightly packed in the center of the firebox making sure there is space on either side of the load for good air flow.

Low Fire Fueling and Operation (loading on coals after High Fire operation)

1. At the end of the high fire, rake the remining coals forward until they are equally distributed and level.
2. Place the biggest fuel load pieces on top of the leveled coals and centered in the firebox making sure there is some space on either side of the fuel pieces to insure good air flow.
3. Place the remaining (smaller) fuel load pieces on top of the bottom logs. Keep them tightly spaced together.
4. Immediately close the load door and open the air control to the maximum air setting (fully to the right).
5. After 1 minute set the air control to the minimum air flow position (fully to the left). There will still be some small openings visible in the air inlet slots.

Medium Fire Fueling and Operation (loading on coals after High Fire operation)

1. At the end of the high fire, rake the remining coals forward until they are equally distributed and level.
2. Place the biggest fuel load pieces on top of the leveled coals and centered in the firebox making sure there is some space on either side of the fuel pieces to insure good air flow.
3. Place the remaining (smaller) fuel load pieces on top of the bottom logs. Keep them tightly spaced together.
4. Immediately lose the load door and open the air control to the maximum air setting (fully to the right).
5. After 1 minute set the air control to the medium air flow position. The control lever should be in

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

FEB 2 8 2018

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. Justin White
Hearthstone QHPP, Inc.
#17 Stafford Ave.
Morrisville, VT 05661

Dear Mr. White,

I am writing in response to your letter dated January 12, 2018, regarding wood heaters manufactured by Hearthstone QHPP, Inc. (Hearthstone). This response, dated February 28, 2018, supercedes our previous response (dated February 26, 2018) to correct an inaccuracy regarding required changes to ASTM E3053-17.

You are requesting to use an alternative test method, using cord wood, as referenced in section 60.532(c) of 40 CFR part 60, Subpart AAA, Standards of Performance for New Residential Wood Heaters (Subpart AAA) to meet the 2020 cord wood alternative compliance option. The 2020 cord wood alternative compliance option states that each affected wood heater manufactured or sold at retail for use in the United States on or after May 15, 2020, must not discharge into the atmosphere any gases that contain particulate matter in excess of 2.5 g/hr. Compliance must be determined by a cord wood test method approved by the Administrator along with the procedures in 40 CFR 60.534. You have requested approval to use the procedures and specifications found in ASTM Method E3053-17, a cord wood test method titled, "Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters using Cordwood Test Fuel," in conjunction with ASTM E2515-11 and Canadian Standards Administration (CSA) Method CSA-B415.1-10, which are specified in 40 CFR 60.534.

We understand that Hearthstone is also requesting that the alternative method proposed above be approved to apply broadly to all wood heaters manufactured by Hearthstone meeting the requirements of Subpart AAA, from the approval date of this request until such time that Subpart AAA is revised or replaced to require a different cord wood certification method, providing all requirements of section 60.533 of Subpart AAA are met.

With the caveats set forth below, we approve your alternative test method request for certifying wood heaters using ASTM E3053-17 in conjunction with section 60.534 of Subpart AAA to meet the 2020 cord wood compliance option until such time that Subpart AAA is revised or replaced to require a different cord wood certification method. We also approve application of this alternative method to all wood heaters manufactured by Hearthstone meeting the

As required in Subpart AAA, section 60.354(d), you or your approved test laboratory must also measure the first hour of particulate matter emissions for each test run using a separate filter in one of the two parallel sampling trains. These results must be reported separately and also included in the total particulate matter emissions per run. Also, as required by Subpart AAA, section 60.534(e), you must have your approved laboratory measure the efficiency, heat output, and carbon monoxide emissions of the tested wood heater using CSA-B415.1-10. For measurement of particulate matter emission concentrations, ASTM 2515-11 must be used.

The following change to ASTM E3053-17 must be followed:

1. Coal bed conditions prior to loading test fuel. The coal bed shall be a level plane without valleys or ridges for all test runs in the high, low, and medium burn rate categories.

The following changes to ASTM E2515-11 must be followed:

1. The filter temperature must be maintained between 80 and 90 degrees F during testing.

2. Filters must be weighed in pairs to reduce weighing error propagation; see ASTM 2515-11, Section 10.2.1 Analytical Procedure.

3. Sample filters must be Pall TX-40 or equivalent Teflon-coated glass fiber, and of 47 mm, 90 mm, 100 mm, or 110 mm in diameter.

4. Only one point is allowed outside the +/- 10 percent proportionality range per test run.

A copy of this letter must be included in each certification test report where this alternative test method is utilized.

It is reasonable that this alternative test method approval be broadly applicable to all wood heaters subject to the requirements of 40 CFR part 60, Subpart AAA. For this reason, we will post this letter as ALT-125 on our website at *http://www3.epa.gov/ttn/emc/approalt.html* for use by other interested parties. As noted earlier in this letter, this alternative method approval is valid until such time that Subpart AAA is revised or replaced to require a different cord wood certification method, and at such time, this alternative will be reconsidered and possibly withdrawn.

If you have additional questions regarding this approval, please contact Michael Toney of my staff at 919-541-5247 or toney.mike@epa.gov.

Sincerely,

Steffan M. Johnson, Group Leader
Measurement Technology Group

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