Jotul North America Inc.

Model F 602 USA CB
EPA Certification Testing
Project # 001-WS-1-10

Prepared by Dirigo Laboratories, Inc.
July 7, 2011

DIRIGO LABORATORIES INC.

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Affidavit:

All testing and associated procedures were conducted at Dirigo Laboratories beginning 6/6/2011 and ending on 6/20/2011. Dirigo Laboratories is located at 11785 SE Highway 212 – Suite 305, Clackamas, OR 97015-9050. All EPA protocols from Methods 1, 2, 3, 4, 5 and 28 were followed in the testing, sampling, analysis, and calibrations for these tests and all results are based on these methods. Particulate measurements were made using EPA Method 28 5g Option 3. The following people were associated with the testing, analysis and report writing associated with this project.

John Steinert, President — Signature — Date 7/7/11

Gary Nelke CMfgE, Vice-President — Signature — Date 7/7/11

Ryan Smith, Q/A — Signature — Date 7/7/11

Introduction:

Jotul North America contracted with Dirigo Laboratories, Inc. to perform EPA certification testing on Jotul model 602 based upon updates to the secondary air supply. Efficiency testing was also performed per CSA B-415.1-10 "Performance Testing of Solid-Fuel Burning Heating Appliances". This unit was originally tested In May of 1994 to EPA Method 28 -5H by another test laboratory and had particulate emissions that were greater than the allowable limits for Washington state (>4.5 g/hr).

Updates were limited to the secondary air supply and can be viewed in Figure 9. All changes comply with the Combined Federal Register: Part 60, Subpart AAA in regards to requirements for resubmittal.

See Appendix C for a full description of updates to the secondary / baffle.

Technician Notes:

Jotul USA supplied a new secondary air / baffle set up and was installed prior to testing.

Prior to start of testing the Dilution tunnel was cleaned with a 6" Poly chimney brush.

Due to an equipment / software failure that resulted in a loss of data, Run #2 could not be used.

Test Run #5 (Category 4) exceeded the Delta "T" limits on the fire box resulting in an additional run being performed (#6).

Wood Heater Identification:

- Appliance Tested: *Jotul F 602 USA CB*
- Serial Number: *718213*
- Manufacturer: *Jotul North America, Inc.*
- Catalyst: *No*
- Heat exchange blower: *None*
- Type: *Wood Stove*
- Style: *Free Standing*
- Date Received: *Thursday, April 21, 2011*
- Wood Heater Aging: *Tuesday, May 31 2011 - 10hrs*
- Testing Period – Start: *Thursday, June 09, 2011* Finish: *Monday, June 20, 2011*
- Test Location: *Dirigo Laboratories, Inc. -11785 SE Highway 212 - Suite 305, Clackamas, OR 97015*
- Elevation: *130 Feet above sea level*
- Test Technician(s): *John Steinert Gary Nelke*

Results:

The overall weighted average emission rate based on the 4 certification runs is **3.4 g/hr**.

The weighted average efficiency rate for the 4 certification runs is **70.7 %** using the Higher Heating Value and **76.4 %** using the Lower Heating Value.

See Table 1 below for individual run results and Appendix E for full run information.

Results							
Category 1 <0.8 kg/hr *(1.76 lbs/hr)*		**Category 2 .80 to 1.25 kg/hr** *(1.76 to 2.76 lbs/hr)*		**Category 3 1.25 to 1.90 kg/hr** *(2.76 to 4.19 lbs/hr)*		**Category 4 Maximum Burn Rate**	
Date	6/12/2011	Date	6/9/2011	Date	6/10/2011	Date	6/20/2011
Run Number	4	Run Number	1	Run Number	3	Run Number	6
Emission Rate	**4.14 g/hr**	Emission Rate	**1.56 g/hr**	Emission Rate	**3.27 g/hr**	Emission Rate	**5.13 g/hr**
Burn Rate	**.75 kg/hr**	Burn Rate	**.82 kg/hr**	Burn Rate	**1.3 kg/hr**	Burn Rate	**3.89kg/ hr**
Overall Efficiency (HHV)	**72.7%**	Overall Efficiency (HHV)	**74.2%**	Overall Efficiency (HHV)	**71.2%**	Overall Efficiency (HHV)	**63.8%**

Table 1

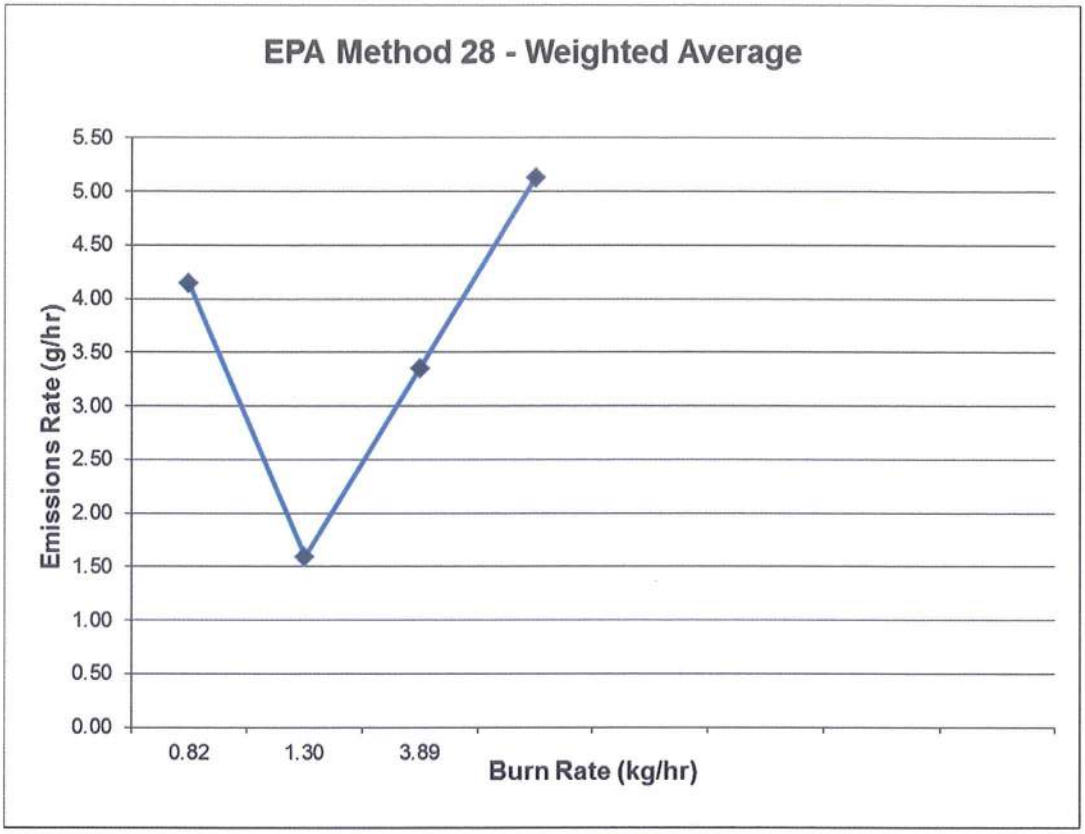


Chart 1

Test Condition Summary:

All testing conditions for runs 1, 3, 4 and 6 fell within allowable specifications of Method - 28. Run #2 had an equipment failure and run #5 exceeded the allowable Delta T. A summary of facility conditions, surface temperature averages, temperature averages, pre-test fuel weights, test fuel charge weights and run times is listed below in Table 2.

Runs	Ambient (Deg. F)		Relative Humidity (%)		Avg. Stove Temp		Barometric Pressure (In. Hg.)	Pre-Test Fuel End Wt. (Lbs.)	Test Fuel Charge Wt. (Lbs.)	Test Fuel Moisture (Dry Basis)	Run Time (Min.)
	Pre	Post	Pre	Post	Start	End					
Run 1	73	74	45	45	419	324	30.17	1.3	5.82	21.32 %	160
Run 2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Run 3	73	73	46	47	387	415	30.02	1.5	5.8	23.7 %	100
Run 4	70	71	42	43	316	325	29.78	1.2	5.4	22.2 %	160
Run 5	70	72	43	43	486	643	29.99	1.2	5.3	23.2 %	30
Run 6	71	72	37	36	703	682	29.96	1.3	5.2	21.27 %	30

Table 2

Description:

Dimensions, firebox configuration, air supply locations, air introduction locations, and baffle locations of the wood heater are referenced below in Table 3 and Figures 1 through 9.

Table 3

Heater Dimensions				
Height	Width	Depth	Firebox Volume	Weight
25"	12.5"	21"	0.79 ft^3	180 lbs.

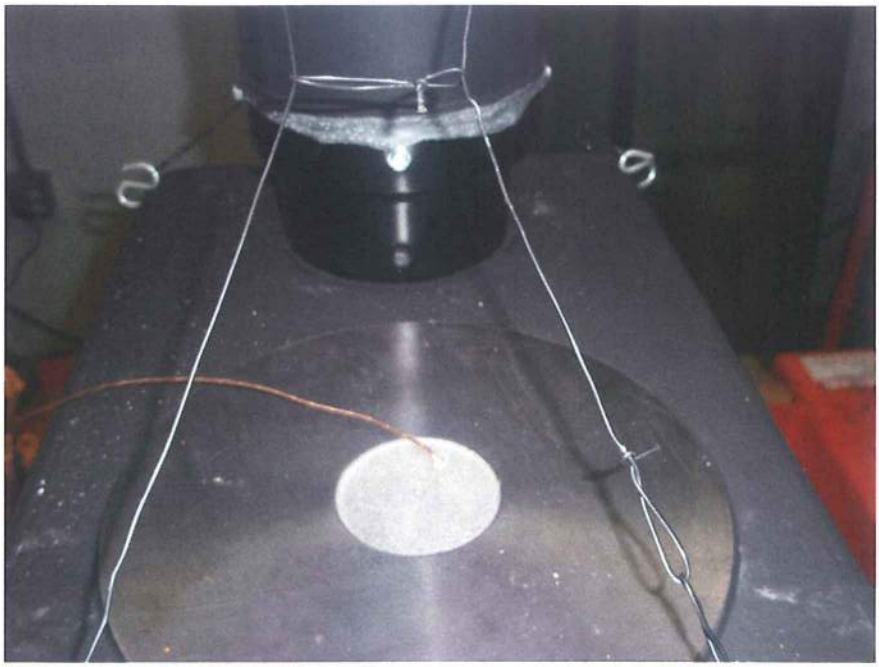


Figure 1: Top

Figure 2: Right Side

Figure 3: Left Side

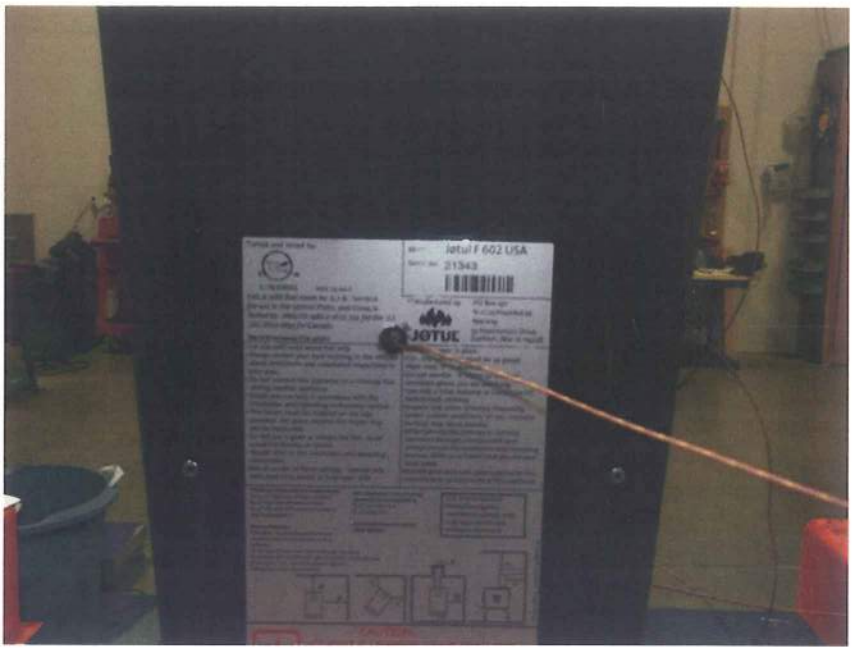


Figure 4: Rear

Figure 5: Interior

Figure 6: Bottom

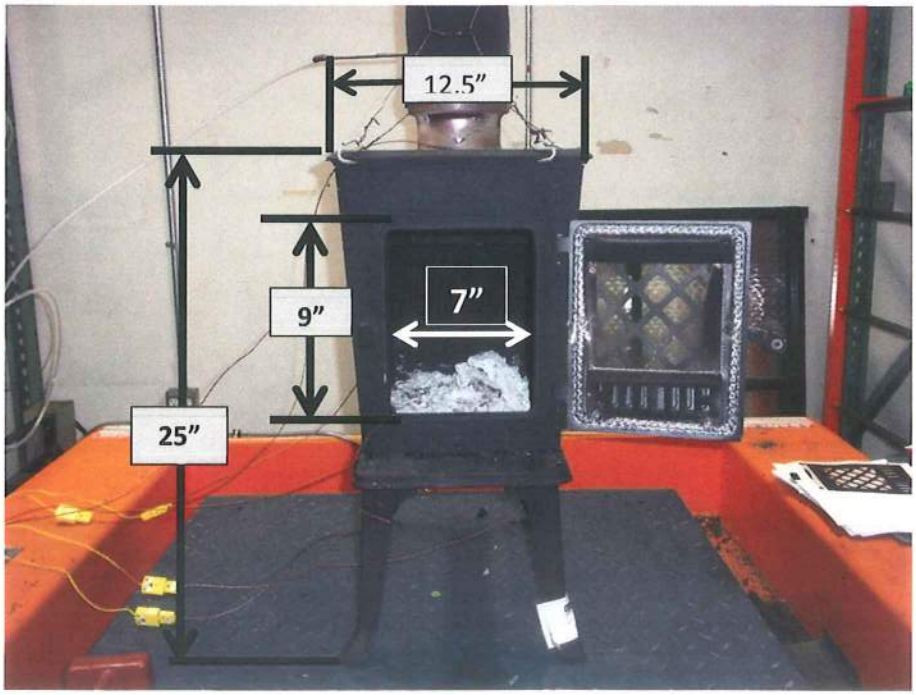


Figure 7: Dimensions-Front

Figure 8: Dimensions-Side

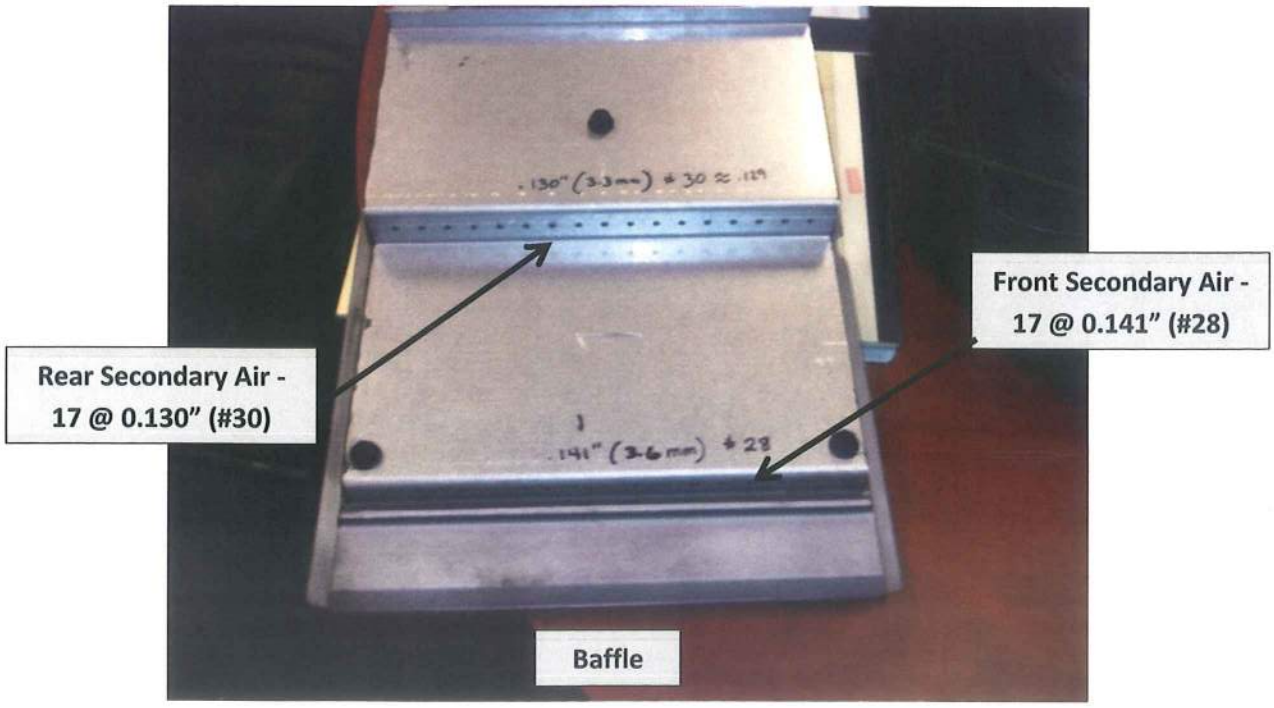


Figure 9: Secondary/Baffle

Process Operations:

The appliance was operated according to procedures as described in the Operations Manual – (see appendix H). Primary air supply settings, fuel bed adjustments, test fuel properties, test fuel configuration and loading density are as described below in Tables 4, and Figure 10. All draft measurements for all 8 runs were less than 1 ft^3 per minute. See Appendix E for detailed run information.

Table 4

	Burn Category	Primary Air Setting	Fuel Bed Adjustments	
			Pre-Burn	Test Run
Run 1	2	.270"	None	Door shut at 1.5 minutes. Primary air open full until 3'20" mark then set to .270" for duration.
Run 2	N/A	0.290"	Added 4.5 lbs wood @ 30 minute mark	Run Aborted due to equipment failure
Run 3	3	.20"	stirred coal bed at 65 Min.	Shut door at 2 Min mark. w/damper full open. @ 3'20 sec set damper to 0.274"
Run 4	1	0.270"	Busted coals at 35'. Added 6lbs at 51'. At 120' added 2lbs.	Shut door immediately and set primary air to full open.
Run 5	4	Full Open	Stirred coal bed at 35 Min added 2 lbs at 42 min	Door shut at 1.5 minute mark and primary set to full open. Run exceeded allowable Delta "T"
Run 6	4	Full Open	Added 4.4 lbs @ 34 min. Added 3.4 lbs @ 55 min.	Door shut at 1.5 minute mark and Primary set to full open.

Figure 10: Primary Air Measuring Points

Test Fuel Properties:

All test fuel charges consisted of 3 pieces of 2"x4"x13.5" douglas fir dimensional lumber and were assembled per Method 28 specifications. Figures 11 and 12 detail the fuel charges. All fuel crib moisture content and temperatures were within allowable limits.

Figure 91: Fuel Load

Figure 12: Fuel Loaded

Sampling Locations:

Sample ports are located 16.5 feet downstream from any disturbances and 1.5 feet upstream from any disturbances. Flow rate traverse data was collected 12 feet downstream from any disturbances and 5.5 feet upstream from any disturbances. (See figures 13 and 14).

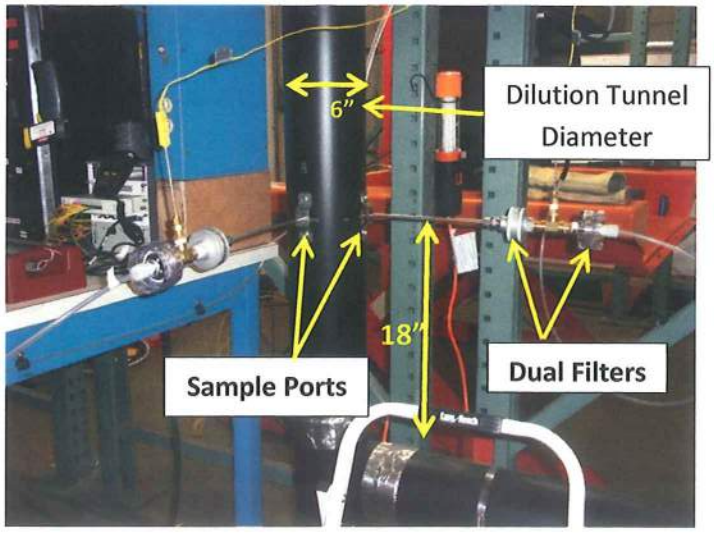


Figure 13: Sample Ports

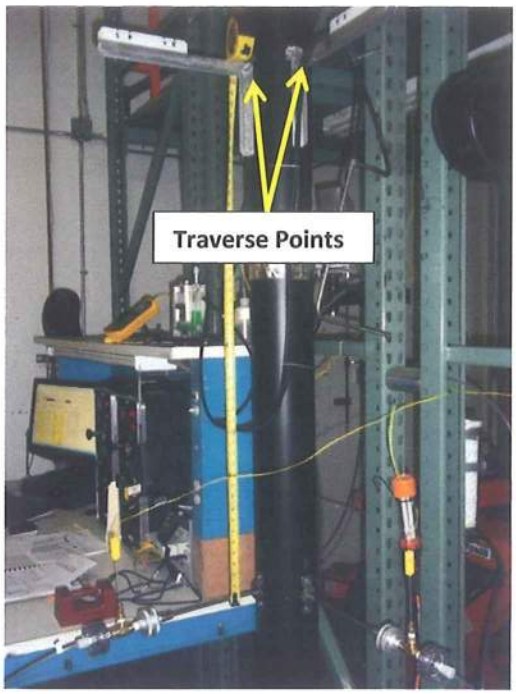


Figure 104 : Traverse Points

Sampling Methods:

A dual filter dry sampling train system (5G sample option 3) was used in collecting particulate samples. The dilution tunnel is 6 inches in diameter. All sampling conditions per method 5G option 3 were followed. No alternate procedures were used.

Sampling and Analytical Procedures:

All sampling and analytical procedures used followed EPA Methods 1, 2, 3, 4, 5 and 28. See Figures 13 and 14 for sample port locations.

Analytical Methods Description:

All sample recovery and analysis procedures followed EPA Method 5 procedures. At the end of each test run, filters were removed from their housings, dessicated for 24 hours, and then weighed to a constant weight per Method 5 section 11.0.

Quality Control and Assurance Procedures and Results:

Calibration procedures and results were conducted per EPA Method 1 through 5 and Method 28. Calibration certificates and results can be found in Appendix F.

Test method quality control procedures (leak checks, volume meter checks, stratification checks, proportionality results) followed the procedures outlined in Method 5.

Upon completion of testing, the unit was sealed with metal strapping and labeled with the following seal:

ATTENTION:

THIS SEAL IS NOT TO BE BROKEN WITHOUT PRIOR AUTHORIZATION FROM THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY.

THIS APPLIANCE HAS BEEN SEALED IN ACCORDANCE WITH REQUIREMENTS OF 40 CFR PART 60 SUBPART AAA §60.535(g)

REPORT #_____ **DATE SEALED**_____

MANUFACTURER_____ **MODEL #**_____

Appendices:

Appendix A: Sampling and Analytical Procedures

All Sampling and Analytical Procedures were performed by John Steinert and Gary Nelke. All procedures used were directly from EPA Methods 1, 2, 3, 4, 5 and 28. No alternative procedures were used for this test series. Efficiency testing was performed to CSA B-415.1-10

Appendix B: Participants

The following personnel were involved with the testing and producing of this report.

- John Steinert, President
- Gary Nelke CMfgE, Vice President
- Ryan Smith, Q/A

Appendix C: Updates

The following changes were made to Jotul Model F 602 USA:

- Front secondary air holes (See Figure 9) were increased from 0.130" diameter to 0.141"(3.6mm) diameter (#28). This resulted in a net increase in area of 9.5%. See Secondary Air worksheet in Appendix E and Figure 9 for more detailed information.

Appendix E: Run Information

Run 1:

PREBURN

APPLIANCE: 602
TECHNICIAN: Gary Nelke
DATE: 6/9/11
RUN #: 1
READING INTERVAL: 10

.

Run Time: 130

	Tunnel Traverse Information								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.034	0.032	0.034	0.030	0.032	0.032	0.036	0.030	0.033
Temperature	94	94	94	94	94	94	94	94	94.000

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
0	5.5	-0.25	496	457	462	405	502	464.4
10	4.3	-0.25	464	454	424	401	509	450.4
15	3.8	-0.25	458	454	407	397	503	443.8
20	3.5	-0.25	460	454	394	394	495	439.4
25	3.1	-0.25	464	455	384	394	487	436.8
30	2.9	-0.25	468	453	377	393	484	435
35	2.6	-0.25	475	450	373	394	482	434.8
45	2.1	-0.25	482	450	369	396	478	435
50	1.9	-0.25	480	453	370	397	476	435.2
55	1.7	-0.25	473	456	372	396	472	433.8
60	1.5	-0.25	467	455	379	393	469	432.6
65	1.4	-0.25	460	456	386	391	462	431
70	1.3	-0.25	449	447	389	389	446	424
75	1.3	-0.25	434	433	389	387	429	414.4
			466.4285714		391.07143			

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Tunnel Velocity:	12.3242 ft/sec.
Intial Tunnel Flow:	132.278 scfm
Average Tunnel Flow:	133.798 scfm

Notes:

Technician 7/4/11

Run #	1
Date:	6/9/11

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Dilution Tunnel Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.034	0.032	0.034	0.030	0.032	0.032	0.036	0.030	0.033
Temperature	94	94	94	94	94	94	94	94	94.000

Tunnel Velocity:	12.324	ft/sec.
Intial Tunnel Flow:	132.28	scfm
Average Tunnel Flow	133.8	scfm

BOX A

APPLIANCE:	Jotul 602
TECHNICIAN:	Gary Nelke
DATE:	6/9/2011
RUN #:	1
READING INTERVAL:	10
SAMPLE BOX :	a

METER Y FACTOR: 1

ROOM TEMP (F) 73.0

BAROMETRIC PRESSURE (In.Hg.)

BEG	MID	END	AVG
30.02	30.02	30.01	30.0167

PROBE MATERIAL: S.S.

FRONT FILTER #:	1082				REAR FILTER #:	1083			
FINAL LEAK RATE (CFM):	<0.001	@	13	IN-HG	FINAL LEAK RATE (CFM)	<0.001	@	13	IN-HG

Run Time: 160

TEST START TIME:

AMBIENT FILTER #:	n/a	VOLUME		LITERS	
FINAL LEAK RATE (CFM):		@		IN-HG	

FUEL MOISTURE DB 21.32 %

									1	2	3	4	5	6		
									TEMPERATURES							
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	TUNNEL DELTA P	ORIFICE DELTA H	FILTER VAC	Proportional Rate (%)	Scale Weight	Weight Chg	TUNNEL TEMP	FLUE TEMP	FILTER TEMP	FB REAR TEMP	FB INT	METER TEMP	AMBIENT TEMP	
0	0.000	0.000	0.033	0.06	0	NA	5.82	0	91	244	73	390	968	77	73	
10	1.379	0.138	0.033	1.99	0	102	4.6	1.22	96	347	77	353	1097	79	73	
20	2.777	0.140	0.033	1.98	0	102	3.9	0.7	95	332	78	324	1003	82	73	
30	4.176	0.140	0.033	1.98	0	102	3.1	0.8	95	333	78	308	922	86	73	
40	5.578	0.140	0.033	1.98	0	101	2.5	0.6	95	328	78	302	862	89	73	
50	6.985	0.141	0.033	1.98	0	101	2	0.5	94	302	78	302	898	92	74	
60	8.392	0.141	0.033	1.99	0	101	1.6	0.4	93	285	78	302	874	94	74	
70	9.803	0.141	0.033	1.98	0	101	1.2	0.4	92	275	78	302	785	95	74	
80	11.219	0.142	0.033	1.99	0	100	1	0.2	90	252	78	304	730	97	74	
90	12.632	0.141	0.033	1.98	0	100	0.8	0.2	89	232	78	305	658	98	74	
100	14.052	0.142	0.033	1.97	0	100	0.7	0.1	88	217	78	306	633	99	74	
110	15.467	0.142	0.033	1.99	0	100	0.5	0.2	87	202	77	306	600	100	75	
120	16.890	0.142	0.033	1.98	0	100	0.4	0.1	87	191	77	306	552	100	74	
130	18.307	0.142	0.033	1.99	0	99	0.3	0.1	86	186	77	306	544	101	74	
140	19.731	0.142	0.033	1.97	0	100	0.2	0.1	86	183	76	308	549	101	74	
150	21.150	0.142	0.033	1.97	0	100	0.2	0	85	182	77	312	546	101	74	
160	22.576	0.143	0.033	1.98	0	100	0	0.2	86	182	77	316	529	102	74	
	22.576		0.033	1.98		100.6			90	251				94	74	

Technician

APPLIANCE:	Jotul 602							
TECHNICIAN:	Gary Nelke							
DATE:	6/9/11							
RUN #:	1							
READING INTERVAL:	10							
SAMPLE BOX :	b	METER Y FACTOR:	1		PROBE MATERIAL:	SS		
FRONT FILTER #:	1084			REAR FILTER #:	1085			
FINAL LEAK RATE (CFM):	<0.001	@	15	FINAL LEAK RATE (CFM):	<0.001	@	15	

Run Time: 160

							1	2	3	4	5	6		
							TEMPERATURES							
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB REAR	FB BOT	METER	STOVE AVG T	Run Notes:
0	0	0	NA	0	0	0	425	424	76	471	386	78	419	
10	1.369	0.137	101	0	2.05	0	402	413	79	627	378	79	435	
20	2.768	0.140	102	0	2.05	0	395	411	79	663	369	83	432	
30	4.171	0.140	101	0	2.05	0	402	415	79	689	360	87	435	
40	5.578	0.141	101	0	2.05	0	409	424	80	706	350	89	438	
50	6.989	0.141	101	0	2.05	0	414	431	80	664	341	92	430	
60	8.407	0.142	101	0	2.05	0	412	434	79	620	335	94	421	
70	9.827	0.142	101	0	2.05	0	410	432	79	604	331	96	416	
80	11.250	0.142	100	0	2.02	0	406	424	79	553	328	98	403	
90	12.677	0.143	100	0	2.05	0	392	398	79	490	323	99	382	
100	14.105	0.143	100	0	2.05	0	380	379	79	446	316	100	365	
110	15.534	0.143	100	0	2.05	0	368	363	79	401	308	101	349	
120	16.967	0.143	100	0	2.06	0	356	351	78	371	300	102	337	
130	18.402	0.144	100	0	2.04	0	346	346	78	355	294	102	329	
140	19.833	0.143	100	0	2.05	0	339	345	78	346	287	102	325	
150	21.268	0.144	100	0	2.05	0	339	343	78	342	282	102	324	
160	22.707	0.144	100	0	2.05	0	342	339	78	343	278	103	324	
	22.707	0.142	100.577	0.000	2.048125	0	385	392	79	511	327	95		
	TOTAL	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG		

Technician

RESULTS

RUN # 1

DATE: 6/9/2011

BURN RATE 0.82 KG/HR DRY

FILTER A PARTICULATE 2.4 mg

FILTER B PARTICULATE 2.2 mg

	SAMPLE A INFORMATION		SAMPLE B INFORMATION	
Total Sample Volume - Vm	22.58		22.71	
Average Gas Velocity in Dilution Tunnel - vs	12.32	feet/second	12.32	feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8027.89	dscf/hour	8027.89	dscf/hour
Total Sample Volume (Standard Conditions) - Vmstd	21.70	dscf	21.80	dscf
Average Tunnel Temperature	90.3	F	90.3	F
Average Delta p	0.033		0.033	
Average Gas Meter Temperature	94	F	95	F
Average Delta H	1.98	in-h20	2.05	in-h20
Total Time of Test	160	min	160	min
Total Particulates	2.4	mg	2.2	mg
Particulate Concentration (dry-standard)	0.00011	grams/dscf	0.00010	grams/dscf
Particulate Emission Rate	0.89	grams/hour	0.81	grams/hour
Adjusted Emissions	1.65	grams/hour	1.53	grams/hour
AVERAGE ADJUSTED EMISSIONS		1.59	grams/hour	
% OF AVERAGE	103.8		96.2	

Technician

VERSION: 2.4 4/15/2010

Manufacturer: Jotul
Model: 602
Date: 6/9/2011
Run: 1
Control #: 1
Test Duration: 160
Output Category: 2

Appliance Type: non-cat (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
Weight Units lb (kg or lb)

Default Fuel Values

	D. Fir	Oak
HHV (kJ/kg)	19,810	19,887
%C	48.73	50
%H	6.87	6.6
%O	43.9	42.9
%Ash	0.5	0.5

Wood Moisture (% wet): 17.56
Load Weight (lb wet): 5.82
Burn Rate (dry kg/h): 0.82
Total Particulate Emissions: 2.25 g

Fuel Data

	D. Fir	
HHV	19,810	kJ/kg
%C	48.73	
%H	6.87	
%O	43.9	
%Ash	0.5	

Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Note 2: In cases where the "Fuel Weight Remaining" is the same for three or more readings in a row, a "divide by zero error" will occur in the calculation sheet. In such cases, adjust the weight values by interpolation between the first occurence and the next reading showing a decrease in weight.

	Averages	0.82	6.77	13.71	251.35	73.76
					Temp. (°F)	
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO_2	O_2	Flue Gas	Room Temp
0	5.82	0.75	5.46	15.11	244.0	73.0
10	4.60	0.58	8.51	11.87	347.0	73.0
20	3.90	0.42	9.11	11.24	332.0	73.0
30	3.10	0.31	9.26	11.08	333.0	73.0
40	2.50	0.29	8.94	11.42	328.0	73.0
50	2.00	0.19	8.47	11.91	302.0	74.0
60	1.60	0.08	8.27	12.13	285.0	74.0
70	1.20	0.13	8.03	12.38	275.0	74.0
80	1.00	0.56	6.53	13.97	252.0	74.0
90	0.80	0.87	5.69	14.86	232.0	74.0
100	0.70	1.02	5.50	15.06	217.0	74.0
110	0.50	1.79	5.32	15.26	202.0	75.0
120	0.40	1.26	4.92	15.68	191.0	74.0
130	0.30	1.44	5.17	15.41	186.0	74.0
140	0.20	1.67	5.39	15.18	183.0	74.0
150	0.20	1.31	5.35	15.22	182.0	74.0
160	0.00	1.34	5.22	15.36	182.0	74.0

7/6/11

Dirigo Laboratories, Inc.

Manufacturer:	Jotul
Model:	602
Date:	06/09/11
Run:	1
Control #:	1
Test Duration:	160
Output Category:	2

Technicians: SR 2/6/11

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	74.2%	80.2%
Combustion Efficiency	94.6%	94.6%
Heat Transfer Efficiency	78%	84.7%

Output Rate (kJ/h)	11,998	11,381	**(Btu/h)**
Burn Rate (kg/h)	0.82	1.80	**(lb/h)**
Input (kJ/h)	16,172	15,341	**(Btu/h)**

Test Load Weight (dry kg)	2.18	4.80	**dry lb**
MC wet (%)	17.56		
MC dry (%)	21.30		
Particulate (g)	2.25		
CO (g)	169		
Test Duration (h)	2.67		

Emissions	**Particulate**	**CO**
g/MJ Output	0.07	5.29
g/kg Dry Fuel	1.03	77.81
g/h	0.84	63.52
lb/MM Btu Output	0.16	12.30

Air/Fuel Ratio (A/F)	13.60

VERSION: 2.4 4/15/2010

Dirigo Laboratories, Inc.

Appliance: Jotul 602
Technician: Gary Nelke
Date: 6/9/2011
Run Number: 1
Analyzer Type: CAL ZRE Gas Analyzer
Equipement No.: # 057

Time	CO	CO2	O2
0	0.75	5.46	15.11
10	0.58	8.51	11.87
20	0.42	9.11	11.24
30	0.31	9.26	11.08
40	0.29	8.94	11.42
50	0.19	8.47	11.91
60	0.08	8.27	12.13
70	0.13	8.03	12.38
80	0.56	6.53	13.97
90	0.87	5.69	14.86
100	1.02	5.50	15.06
110	1.79	5.32	15.26
120	1.26	4.92	15.68
130	1.44	5.17	15.41
140	1.67	5.39	15.18
150	1.31	5.35	15.22
160	1.34	5.22	15.36

Run 3:

PREBURN

APPLIANCE:	602
TECHNICIAN:	Gary Nelke
DATE:	6/10/11
RUN #:	3
READING INTERVAL:	5
.	
Run Time:	90

	Tunnel Traverse Information								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.034	0.036	0.035	0.032	0.030	0.034	0.036	0.032	0.034
Temperature	94	94	94	96	96	96	96	96	95.250

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
0	5.8	-0.082	311	282	6024	246	1503	1502.5
5	5.5	-0.065	338	308	6024	254	1498	1497.83
10	5.1	-0.072	348	315	6024	261	1499	1499.17
15	4.6	-0.073	354	322	6024	267	1515	1515.17
20	4.3	-0.071	361	338	6024	272	1527	1527
25	4.1	-0.066	371	354	241	277	374	373.833
30	3.8	-0.062	382	365	249	282	373	372.5
35	3.6	-0.053	392	368	260	287	368	368
40	3.4	-0.056	398	368	267	292	369	368.667
45	3.2	-0.055	401	369	273	297	369	369.333
50	3	-0.055	402	369	277	301	365	365.333
55	2.9	-0.044	402	367	279	306	361	361.333
60	2.7	-0.049	400	364	279	312	359	359.167
65	2.5	-0.045	396	363	279	317	358	358.167
70	2.3	-0.074	386	361	279	321	353	353.167
75	2	-0.056	388	365	282	323	374	374.333
80	1.8	-0.062	395	378	291	322	392	391.667
85	1.6	-0.054	397	388	299	321	397	396.5
90	1.5	-0.054	394	391	309	322	391	391.333
			379.7894737		1788.6316			

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Tunnel Velocity:	12.5755 ft/sec.
Intial Tunnel Flow:	134.403 scfm
Average Tunnel Flow:	135.097 scfm

Notes:

1st 5 readings did not record temps on back and bottom of firebox. Still had well over an hours worth of complete readings.

Technician GJN 7/6/11

Run #	3
Date:	6/10/11

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Dilution Tunnel Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.034	0.036	0.035	0.032	0.030	0.034	0.036	0.032	0.034
Temperature	94	94	94	96	96	96	96	96	95.250

Tunnel Velocity:	12.576	ft/sec.
Intial Tunnel Flow:	134.4	scfm
Average Tunnel Flow	135.1	scfm

Technician

BOX A

APPLIANCE:	Jotul 602
TECHNICIAN:	Gary Nelke
DATE:	6/10/2011
RUN #:	3
READING INTERVAL:	10
SAMPLE BOX :	a

METER Y FACTOR: 1

ROOM TEMP (F) 65.0

BAROMETRIC PRESSURE (In.Hg.)

BEG	MID	END	AVG
30.02	30.02	30.02	30.02

PROBE MATERIAL: S.S.

FRONT FILTER #:	1091				REAR FILTER #:	1090			
FINAL LEAK RATE (CFM):	<0.001	@	10	IN-HG	FINAL LEAK RATE (CFM)	<0.001	@	10	IN-HG

Run Time: 100

TEST START TIME:

AMBIENT FILTER #:	n/a	VOLUME		LITERS
FINAL LEAK RATE (CFM):		@		IN-HG

FUEL MOISTURE DB 21.6 %

									1	2	3	4	5	6		
									TEMPERATURES							
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	TUNNEL DELTA P	ORIFICE DELTA H	FILTER VAC	Proportional Rate (%)	Scale Weight	Weight Chg	TUNNEL TEMP	FLUE TEMP	FILTER TEMP	FB REAR TEMP	FB INT	METER TEMP	AMBIENT TEMP	
0	0.000	0.000	0.034	2	-0.07	NA	5.8	0	107	339	73	318	552	80	73	
10	1.438	0.144	0.034	2.06	-0.7	104	4.8	1	100	338	78	309	866	80	74	
20	2.868	0.143	0.034	2.02	-0.77	102	3.9	0.9	97	325	78	291	712	83	74	
30	4.305	0.144	0.034	2.02	-0.02	102	3.3	0.6	95	310	78	279	636	87	73	
40	5.729	0.142	0.034	2	-1.65	101	2.5	0.8	98	351	79	276	616	90	74	
50	7.155	0.143	0.034	2.02	-1.34	100	1.6	0.9	98	350	79	295	622	93	74	
60	8.581	0.143	0.034	2.02	-2.1	100	1	0.6	97	337	79	329	581	95	73	
70	10.011	0.143	0.034	2	-1.41	100	0.6	0.4	96	302	79	365	839	96	73	
80	11.440	0.143	0.034	2.03	-2.01	99	0.2	0.4	92	260	77	390	738	98	73	
90	12.875	0.144	0.034	2.02	-2.12	99	0.1	0.1	90	237	77	418	613	99	73	
100	14.305	0.143	0.034	2.02	-1.49	98	0	0.1	88	220	77	417	753	100	73	
	14.305		0.034	2.02		100.5			96	306				91	73	

Technician

APPLIANCE:	Jotul 602
TECHNICIAN:	Gary Nelke
DATE:	6/10/11
RUN #:	3
READING INTERVAL:	10
SAMPLE BOX :	b

METER Y FACTOR: 1

PROBE MATERIAL: SS

FRONT FILTER #:	1093			REAR FILTER #:	1092		
FINAL LEAK RATE (CFM):	<0.001	@	10	FINAL LEAK RATE (CFM):	<0.001	@	10

Run Time: 100

							1	2	3	4	5	6		
							TEMPERATURES							
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB REAR	FB BOT	METER	STOVE AVG T	Run Notes:
0	0	0	NA	0	2.06	0	391	393	75	509	322	80	387	
10	1.415	0.142	102	0	2.06	0	382	390	80	598	324	81	401	
20	2.838	0.142	102	0	2.06	0	374	383	79	642	325	84	403	
30	4.265	0.143	101	0	2.06	0	374	382	79	620	323	87	396	
40	5.696	0.143	101	0	2.06	0	393	391	79	719	319	90	420	
50	7.127	0.143	101	0	2.06	0	434	415	79	766	316	93	445	
60	8.559	0.143	100	0	2.06	0	462	434	79	758	314	95	459	
70	9.998	0.144	100	0	2.06	0	467	446	79	694	317	97	458	
80	11.434	0.144	99	0	2.06	0	461	448	79	598	322	99	444	
90	12.873	0.144	99	0	2.06	0	450	437	78	515	328	100	430	
100	14.315	0.144	99	0	2.06	0	430	420	78	473	334	101	415	
	14.315	0.143	100.468	0.000	2.06	0	420	413	79	627	322	92		
	TOTAL	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG		

Technician

RESULTS

RUN #	3
DATE:	6/10/2011

BURN RATE	1.30	KG/HR DRY
FILTER A PARTICULATE	3.5	mg
FILTER B PARTICULATE	3.6	mg

	SAMPLE A INFORMATION		SAMPLE B INFORMATION	
Total Sample Volume - Vm	14.31		14.32	
Average Gas Velocity in Dilution Tunnel - vs	12.58	feet/second	12.58	feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8105.82	dscf/hour	8105.82	dscf/hour
Total Sample Volume (Standard Conditions) - Vmstd	13.82	dscf	13.82	dscf
Average Tunnel Temperature	96.2	F	96.2	F
Average Delta p	0.034		0.034	
Average Gas Meter Temperature	91	F	92	F
Average Delta H	2.02	in-h20	2.06	in-h20
Total Time of Test	100	min	100	min
Total Particulates	3.5	mg	3.6	mg
Particulate Concentration (dry-standard)	0.00025	grams/dscf	0.00026	grams/dscf
Particulate Emission Rate	2.05	grams/hour	2.11	grams/hour
Adjusted Emissions	3.31	grams/hour	3.38	grams/hour
AVERAGE ADJUSTED EMISSIONS		3.35	grams/hour	
% OF AVERAGE	98.8		101.2	

Technician

VERSION: 2.4 4/15/2010

Manufacturer: Jotul
Model: 602
Date: 6/10/2011
Run: 3
Control #: 1
Test Duration: 100
Output Category: 3

Appliance Type: non-cat (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
Weight Units lb (kg or lb)

Default Fuel Values

	D. Fir	Oak
HHV (kJ/kg)	19,810	19,887
%C	48.73	50
%H	6.87	6.6
%O	43.9	42.9
%Ash	0.5	0.5

Fuel Data

	D. Fir	
HHV	19,810	kJ/kg
%C	48.73	
%H	6.87	
%O	43.9	
%Ash	0.5	

Wood Moisture (% wet): 17.76
Load Weight (lb wet): 5.80
Burn Rate (dry kg/h): 1.30
Total Particulate Emissions: 3.15 g

Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Note 2: In cases where the "Fuel Weight Remaining" is the same for three or more readings in a row, a "divide by zero error" will occur in the calculation sheet. In such cases, adjust the weight values by interpolation between the first occurence and the next reading showing a decrease in weight.

Averages		0.34	5.98	14.56	306.27	73.36
					Temp. (°F)	
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO_2	O_2	Flue Gas	Room Temp
0	5.80	0.26	3.86	16.81	339.0	73.0
10	4.80	0.63	4.89	15.71	338.0	74.0
20	3.90	0.33	5.86	14.68	325.0	74.0
30	3.30	0.33	5.65	14.91	310.0	73.0
40	2.50	0.18	7.75	12.68	351.0	74.0
50	1.60	0.07	7.85	12.57	350.0	74.0
60	1.00	0.06	7.65	12.78	337.0	73.0
70	0.60	0.06	6.63	13.87	302.0	73.0
80	0.20	0.46	5.65	14.91	260.0	73.0
90	0.10	0.61	5.16	15.43	237.0	73.0
100	0.00	0.75	4.80	15.81	220.0	73.0

7/6/11

Dirigo Laboratories, Inc.

Manufacturer:	Jotul
Model:	602
Date:	06/10/11
Run:	3
Control #:	1
Test Duration:	100
Output Category:	3

Technicians: [signature] 7/6/11

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	71.2%	77.0%
Combustion Efficiency	96.0%	96.0%
Heat Transfer Efficiency	74%	80.2%

Output Rate (kJ/h)	18,322	17,381	**(Btu/h)**
Burn Rate (kg/h)	1.30	2.86	**(lb/h)**
Input (kJ/h)	25,724	24,402	**(Btu/h)**

Test Load Weight (dry kg)	2.16	4.77	**dry lb**
MC wet (%)	17.76		
MC dry (%)	21.60		
Particulate (g)	3.15		
CO (g)	135		
Test Duration (h)	1.67		

Emissions	**Particulate**	**CO**
g/MJ Output	0.10	4.42
g/kg Dry Fuel	1.46	62.30
g/h	1.89	80.90
lb/MM Btu Output	0.24	10.26

Air/Fuel Ratio (A/F)	15.93

VERSION: 2.4 4/15/2010

Dirigo Laboratories, Inc.

Appliance: Jotul 602
Technician: Gary Nelke
Date: 6/10/2011
Run Number: 3
Analyzer Type: CAL ZRE Gas Analyzer
Equipement No.: # 057

Time	CO	CO2	O2
0	0.26	3.86	16.81
10	0.63	4.89	15.71
20	0.33	5.86	14.68
30	0.33	5.65	14.91
40	0.18	7.75	12.68
50	0.07	7.85	12.57
60	0.06	7.65	12.78
70	0.06	6.63	13.87
80	0.46	5.65	14.91
90	0.61	5.16	15.43
100	0.75	4.80	15.81

7/6/11

Run 4:

PREBURN

APPLIANCE: 602
TECHNICIAN: GEN
DATE: 6/12/11
RUN #: 4
READING INTERVAL: 10

Run Time: 120

Tunnel Traverse Information									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.032	0.038	0.038	0.032	0.035	0.040	0.038	0.032	0.036
Temperature	94	94	94	94	94	94	94	94	94.000

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
0	4.6	-0.057	304	321	213	225	309	309.167
10	4.1	-0.049	297	331	224	248	309	308.5
20	3.7	-0.055	289	342	232	263	309	309
30	3.2	-0.059	304	337	238	268	330	330
40	2.8	-0.058	321	344	245	272	341	341
50	2.6	-0.037	324	347	253	275	332	331.833
60	2.4	-0.035	316	337	255	280	316	316.333
70	2.2	-0.04	306	326	253	285	307	306.667
80	2.2	-0.036	297	316	249	288	298	298.333
90	4.4	-0.032	289	308	246	288	293	292.667
100	1.6	-0.042	302	321	251	283	315	315.5
110	1.4	-0.046	310	337	258	276	322	322.333
120	1.2	-0.04	308	340	260	275	315	314.667
			305.1538462		244.38462			

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Tunnel Velocity:	12.6663	ft/sec.
Intial Tunnel Flow:	137.882	scfm
Average Tunnel Flow:	138.306	scfm

Technician SR 7/6/11

Run #	4
Date:	6/12/11

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Dilution Tunnel Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.032	0.038	0.038	0.032	0.035	0.040	0.038	0.032	0.036
Temperature	94	94	94	94	94	94	94	94	94.000

Tunnel Velocity:	12.666	ft/sec.
Intial Tunnel Flow:	137.88	scfm
Average Tunnel Flow	138.31	scfm

Technician _____

APPLIANCE:	602
TECHNICIAN:	gen
DATE:	6/12/2011
RUN #:	4
READING INTERVAL:	10
SAMPLE BOX :	A

METER Y FACTOR: 1

ROOM TEMP (F) 70.0

BAROMETRIC PRESSURE (In.Hg.)

BEG	MID	END	AVG
29.8	29.77	29.78	29.7833

PROBE MATERIAL: SS

FRONT FILTER #:	1096				REAR FILTER #:	1097			
FINAL LEAK RATE (CFM):	<0.001	@	10	IN-HG	FINAL LEAK RATE (CFM)	<0.001	@	10	IN-HG

Run Time: 160

TEST START TIME:

AMBIENT FILTER #:	N/A	VOLUME		LITERS
FINAL LEAK RATE (CFM):		@		IN-HG

FUEL MOISTURE DB 22.2 %

ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	TUNNEL DELTA P	ORIFICE DELTA H	FILTER VAC	Proportional Rate (%)	Scale Weight	Weight Chg	1 TUNNEL TEMP	2 FLUE TEMP	3 FILTER TEMP	4 FB REAR TEMP	5 FB INT	6 METER TEMP	AMBIENT TEMP
									TEMPERATURES						
0	0.000	0.000	0.036	2.06	0	NA	5.4	0	84	185	73	250	430	75	70
10	1.423	0.142	0.035	2.02	0	104	4.6	0.8	84	235	73	250	554	75	70
20	2.855	0.143	0.035	1.99	0	104	4	0.6	85	250	73	237	504	79	70
30	4.278	0.142	0.035	2	0	102	3.5	0.5	85	249	74	229	682	83	70
40	5.703	0.143	0.035	1.99	0	102	2.9	0.6	85	251	73	228	713	86	70
50	7.121	0.142	0.035	2	0	101	2.4	0.5	85	250	73	232	634	89	70
60	8.553	0.143	0.035	2.01	0	101	2	0.4	82	244	72	239	627	92	70
70	9.978	0.143	0.035	2.01	0	100	1.6	0.4	83	236	73	248	615	94	70
80	11.412	0.143	0.035	2.02	0	100	1.2	0.4	83	238	73	257	596	95	69
90	12.842	0.143	0.035	2	0	100	0.9	0.3	82	224	72	270	659	96	69
100	14.278	0.144	0.035	1.98	0	100	0.6	0.3	83	202	72	287	564	97	70
110	15.708	0.143	0.035	1.98	0	100	0.4	0.2	82	186	73	303	547	98	71
120	17.143	0.144	0.035	1.97	0	100	0.3	0.1	82	175	73	315	565	99	71
130	18.574	0.143	0.035	2	0	99	0.2	0.1	81	167	73	322	556	99	71
140	20.010	0.144	0.035	2	0	100	0.2	0	81	162	73	325	555	99	71
150	21.446	0.144	0.035	1.98	0	100	0.1	0.1	81	163	73	321	566	99	71
160	22.880	0.143	0.035	2.02	0	100	0	0.1	81	165	73	317	556	99	71
	22.880		0.035	2.00		100.7			83	211				91	70

Technician

APPLIANCE:	602						
TECHNICIAN:	gen						
DATE:	6/12/11						
RUN #:	4						
READING INTERVAL:	10						
SAMPLE BOX :	B	METER Y FACTOR:	1		PROBE MATERIAL:	SS	
FRONT FILTER #:	1098			REAR FILTER #:	1099		
FINAL LEAK RATE (CFM):	<0.001	@	10	FINAL LEAK RATE (CFM):	<0.001	@	10

Run Time: 160

							1	2	3	4	5	6		
							TEMPERATURES							
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB REAR	FB BOT	METER	STOVE AVG T	
0	0	0	NA	-0.05	2.05	0	300	330	74	420	278	76	316	Run Notes:
10	1.395	0.140	101	-0.057	2.06	0	305	336	74	426	279	76	319	
20	2.805	0.141	102	-0.049	2.07	0	300	329	74	499	280	79	329	
30	4.219	0.141	101	-0.055	2.07	0	311	326	74	532	278	83	335	
40	5.636	0.142	101	-0.059	2.05	0	324	331	74	547	276	86	341	
50	7.056	0.142	101	-0.058	2.05	0	337	346	74	572	275	89	352	
60	8.483	0.143	101	-0.037	2.04	0	347	365	74	584	272	91	361	
70	9.915	0.143	101	-0.035	2.07	0	351	377	73	566	270	93	362	
80	11.348	0.143	101	-0.04	2.06	0	355	385	74	558	270	94	365	
90	12.781	0.143	100	-0.036	2.05	0	362	389	73	539	272	95	366	
100	14.219	0.144	101	-0.032	2.03	0	366	388	73	488	275	96	361	
110	15.657	0.144	100	-0.042	2.07	0	374	376	74	436	280	97	354	
120	17.095	0.144	100	-0.046	2.07	0	370	363	74	401	286	98	347	
130	18.537	0.144	100	-0.04	2.05	0	365	352	74	379	290	98	342	
140	19.977	0.144	100	-0.04	2.05	0	358	341	74	361	293	99	336	
150	21.420	0.144	100	-0.03	2.05	0	349	332	74	349	295	99	329	
160	22.864	0.144	100	-0.032	2.05	0	343	327	74	343	295	99	325	
	22.864	0.143	100.679	-0.043	2.0552941	0	342	353	74	471	280	91		
	TOTAL	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG		

Technician

RESULTS

RUN #	4
DATE:	6/12/2011

BURN RATE	0.75	KG/HR DRY
FILTER A PARTICULATE	7.3	mg
FILTER B PARTICULATE	6.9	mg

	SAMPLE A INFORMATION		SAMPLE B INFORMATION	
Total Sample Volume - Vm	22.88		22.86	
Average Gas Velocity in Dilution Tunnel - vs	12.67	feet/second	12.67	feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8298.34	dscf/hour	8298.34	dscf/hour
Total Sample Volume (Standard Conditions) - Vmstd	21.92	dscf	21.92	dscf
Average Tunnel Temperature	82.9	F	82.9	F
Average Delta p	0.035		0.035	
Average Gas Meter Temperature	91	F	91	F
Average Delta H	2.00	in-h20	2.06	in-h20
Total Time of Test	160	min	160	min
Total Particulates	7.3	mg	6.9	mg
Particulate Concentration (dry-standard)	0.00033	grams/dscf	0.00031	grams/dscf
Particulate Emission Rate	2.76	grams/hour	2.61	grams/hour
Adjusted Emissions	4.23	grams/hour	4.04	grams/hour
AVERAGE ADJUSTED EMISSIONS		4.14	grams/hour	
% OF AVERAGE	102.3		97.7	

Technician

VERSION: 2.4 4/15/2010

Manufacturer: Jotul
Model: 602
Date: 6/12/2011
Run: 4
Control #: 1
Test Duration: 160
Output Category: 1

Appliance Type: non-cat (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
Weight Units lb (kg or lb)

Wood Moisture (% wet): 18.17
Load Weight (lb wet): 5.40
Burn Rate (dry kg/h): 0.75
Total Particulate Emissions: 3.65 g

Fuel Data

	D. Fir	
HHV	19,810	kJ/kg
%C	48.73	
%H	6.87	
%O	43.9	
%Ash	0.5	

Default Fuel Values

	D. Fir	Oak
HHV (kJ/kg)	19,810	19,887
%C	48.73	50
%H	6.87	6.6
%O	43.9	42.9
%Ash	0.5	0.5

Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Note 2: In cases where the "Fuel Weight Remaining" is the same for three or more readings in a row, a "divide by zero error" will occur in the calculation sheet. In such cases, adjust the weight values by interpolation between the first occurence and the next reading showing a decrease in weight.

Averages		0.58	5.03	15.57	210.71	70.24
					Temp. (°F)	
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO_2	O_2	Flue Gas	Room Temp
0	5.40	0.44	3.48	17.21	185.0	70.0
10	4.60	0.66	3.89	16.77	235.0	70.0
20	4.00	0.47	5.27	15.31	250.0	70.0
30	3.50	0.48	5.37	15.20	249.0	70.0
40	2.90	0.36	5.60	14.96	251.0	70.0
50	2.40	0.14	5.85	14.69	250.0	70.0
60	2.00	0.05	5.97	14.57	244.0	70.0
70	1.60	0.11	5.67	14.88	236.0	70.0
80	1.20	0.10	6.06	14.47	238.0	69.0
90	0.90	0.42	5.61	14.95	224.0	69.0
100	0.60	0.64	5.20	15.38	202.0	70.0
110	0.40	0.75	4.87	15.73	186.0	71.0
120	0.30	0.78	4.79	15.82	175.0	71.0
130	0.20	0.95	4.54	16.08	167.0	71.0
140	0.20	0.99	4.55	16.07	162.0	71.0
150	0.10	1.25	4.45	16.18	163.0	71.0
160	0.00	1.21	4.27	16.37	165.0	71.0

Jan 7/6/11

Dirigo Laboratories,Inc.

Manufacturer:	Jotul
Model:	602
Date:	06/12/11
Run:	4
Control #:	1
Test Duration:	160
Output Category:	1

Technicians: SEA

7/6/11

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	72.7%	78.6%
Combustion Efficiency	93.8%	93.8%
Heat Transfer Efficiency	78%	83.8%

Output Rate (kJ/h)	10,832	10,276	**(Btu/h)**
Burn Rate (kg/h)	0.75	1.66	**(lb/h)**
Input (kJ/h)	14,894	14,129	**(Btu/h)**

Test Load Weight (dry kg)	2.00	4.42	**dry lb**
MC wet (%)	18.17		
MC dry (%)	22.20		
Particulate (g)	3.65		
CO (g)	190		
Test Duration (h)	2.67		

Emissions	**Particulate**	**CO**
g/MJ Output	0.13	6.58
g/kg Dry Fuel	1.82	94.81
g/h	1.37	71.28
lb/MM Btu Output	0.29	15.29

Air/Fuel Ratio (A/F)	17.55

VERSION: 2.4 4/15/2010

Dirigo Laboratories, Inc.

Appliance: Jotul 602
Technician: Gary Nelke
Date: 6/12/2011
Run Number: 4
Analyzer Type: CAL ZRE Gas Analyzer
Equipement No.: # 057

Time	CO	CO2	O2
0	0.44	3.48	17.21
10	0.66	3.89	16.77
20	0.47	5.27	15.31
30	0.48	5.37	15.2
40	0.36	5.60	14.96
50	0.14	5.85	14.69
60	0.05	5.97	14.57
70	0.11	5.67	14.88
80	0.1	6.06	14.47
90	0.42	5.61	14.95
100	0.64	5.20	15.38
110	0.75	4.87	15.73
120	0.78	4.79	15.82
130	0.95	4.54	16.08
140	0.99	4.55	16.07
150	1.25	4.45	16.18
160	1.21	4.27	16.37

SN 7/6/11

Run 5:

PREBURN

APPLIANCE:	602
TECHNICIAN:	J. Steinert
DATE:	6/13/11
RUN #:	5
READING INTERVAL:	10
.	
Run Time:	70

Tunnel Traverse Information									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.032	0.038	0.038	0.030	0.035	0.038	0.037	0.030	0.035
Temperature	99	99	99	98	98	99	99	99	98.750

	1	2	3	4	5	
	TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
0	7.5	-0.047	114	119	103	81	123	123.167
10	6.1	-0.079	154	171	118	110	203	203.5
20	4.7	-0.094	237	269	146	177	290	290
30	3.3	-0.094	337	380	208	257	376	375.833
40	1.9	-0.088	443	489	305	341	465	464.833
50	2.8	-0.093	479	507	392	380	496	496.333
60	1.8	-0.089	500	505	442	401	507	507
70	1.2	-0.083	497	487	454	413	491	491.167
			345.125		271			

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Tunnel Velocity:	13.1256	ft/sec.
Intial Tunnel Flow:	136.035	scfm
Average Tunnel Flow:	133.243	scfm

Notes:

Technician 7/6/11

Run #	5
Date:	6/13/11

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Dilution Tunnel Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.032	0.038	0.038	0.030	0.035	0.038	0.037	0.030	0.035
Temperature	99	99	99	98	98	99	99	99	98.750

Tunnel Velocity:	13.126	ft/sec.
Intial Tunnel Flow:	136.04	scfm
Average Tunnel Flow	133.24	scfm

Technician 7/6/11

BOX A

APPLIANCE:	602
TECHNICIAN:	J. Steinert
DATE:	6/13/2011
RUN #:	5
READING INTERVAL:	10
SAMPLE BOX :	A

METER Y FACTOR: 1

ROOM TEMP (F) 70.0

BAROMETRIC PRESSURE (In.Hg.)

BEG	MID	END	AVG
29.97	30	30	29.99

PROBE MATERIAL: SS

FRONT FILTER #:	1100				REAR FILTER #:	1101			
FINAL LEAK RATE (CFM):	<0.001	@	10	IN-HG	FINAL LEAK RATE (CFM)	<0.001	@	10	IN-HG

Run Time: 30

TEST START TIME:

AMBIENT FILTER #:	N/A	VOLUME		LITERS
FINAL LEAK RATE (CFM):		@		IN-HG

FUEL MOISTURE DB 23.2 %

									1	2	3	4	5	6		
									TEMPERATURES							
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	TUNNEL DELTA P	ORIFICE DELTA H	FILTER VAC	Proportional Rate (%)	Scale Weight	Weight Chg	TUNNEL TEMP	FLUE TEMP	FILTER TEMP	FB REAR TEMP	FB INT	METER TEMP	AMBIENT TEMP	
0	0.000	0.000	0.035	1.95	-0.06	NA	5.3	0	113	453	71	460	583	75	70	
10	1.399	0.140	0.035	1.95	0	102	3.3	2	136	693	80	446	645	77	70	
20	2.803	0.140	0.035	1.95	0	102	1.3	2	140	723	82	494	1233	80	71	
30	4.206	0.140	0.035	1.93	0	99	0	1.3	123	590	82	558	1211	84	72	
	4.206		0.035	1.95		100.9			128	615				79	71	

Technician 7/6/11

APPLIANCE:	602								
TECHNICIAN:	J.Steinert								
DATE:	6/13/11								
RUN #:	5								
READING INTERVAL:	10								
SAMPLE BOX :	B	METER Y FACTOR:		1		PROBE MATERIAL:		SS	
FRONT FILTER #:	1102			REAR FILTER #:	1103				
FINAL LEAK RATE (CFM):	<0.001	@	13	FINAL LEAK RATE (CFM):	<0.001	@	13		

Run Time: 30

							1	2	3	4	5	6		
							TEMPERATURES							
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB REAR	FB BOT	METER	STOVE AVG T	Run Notes:
0	0	0	NA	0	2.05	-1	493	479	73	583	415	76	486	Blown Delta T- Invalid run
10	1.376	0.138	102	0	2.05	-3	480	485	81	878	404	77	539	
20	2.757	0.138	102	0	2.02	-1	543	572	84	1012	395	81	603	
30	4.130	0.137	99	0	2	-3	637	652	84	956	414	85	643	
	4.13	0.138	100.967	0.000	2.03	-2	538	547	81	857	407	80		
	TOTAL	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG		

Technician 6/6/11

RESULTS

RUN #	5
DATE:	6/13/2011

BURN RATE	3.90	KG/HR DRY
FILTER A PARTICULATE	2.4	mg
FILTER B PARTICULATE	2.5	mg

	SAMPLE A INFORMATION		SAMPLE B INFORMATION	
Total Sample Volume - Vm	4.21		4.13	
Average Gas Velocity in Dilution Tunnel - vs	13.13	feet/second	13.13	feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	7994.55	dscf/hour	7994.55	dscf/hour
Total Sample Volume (Standard Conditions) - Vmstd	4.15	dscf	4.07	dscf
Average Tunnel Temperature	128.0	F	128.0	F
Average Delta p	0.035		0.035	
Average Gas Meter Temperature	79	F	80	F
Average Delta H	1.95	in-h20	2.03	in-h20
Total Time of Test	30	min	30	min
Total Particulates	2.4	mg	2.5	mg
Particulate Concentration (dry-standard)	0.00058	grams/dscf	0.00061	grams/dscf
Particulate Emission Rate	4.62	grams/hour	4.91	grams/hour
Adjusted Emissions	6.49	grams/hour	6.82	grams/hour
AVERAGE ADJUSTED EMISSIONS		6.65	grams/hour	
% OF AVERAGE	97.5		102.5	

Technician 6/6/11

VERSION: 2.4 4/15/2010

Manufacturer: Jotul
Model: 602
Date: 6/13/2011
Run: 5
Control #: 1
Test Duration: 30
Output Category: 4

Appliance Type: non-cat (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
Weight Units lb (kg or lb)

Default Fuel Values

	D. Fir	Oak
HHV (kJ/kg)	19,810	19,887
%C	48.73	50
%H	6.87	6.6
%O	43.9	42.9
%Ash	0.5	0.5

Wood Moisture (% wet): 18.83
Load Weight (lb wet): 5.30
Burn Rate (dry kg/h): 3.90
Total Particulate Emissions: 6.65 g

Fuel Data

	D. Fir	
HHV	19,810	kJ/kg
%C	48.73	
%H	6.87	
%O	43.9	
%Ash	0.5	

Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Note 2: In cases where the "Fuel Weight Remaining" is the same for three or more readings in a row, a "divide by zero error" will occur in the calculation sheet. In such cases, adjust the weight values by interpolation between the first occurence and the next reading showing a decrease in weight.

					Temp. (°F)	
	Averages	0.12	9.28	11.06	614.75	70.75
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO_2	O_2	Flue Gas	Room Temp
0	5.30	0.12	4.85	15.75	453.0	70.0
10	3.30	0.10	9.99	10.30	693.0	70.0
20	1.30	0.19	13.40	6.68	723.0	71.0
30	0.00	0.05	8.85	11.51	590.0	72.0

7/6/11

Dirigo Laboratories, Inc.

Manufacturer:	Jotul
Model:	602
Date:	06/13/11
Run:	5
Control #:	1
Test Duration:	30
Output Category:	4

Technicians: 7/6/11

Test Results In Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	61.7%	66.7%
Combustion Efficiency	99.2%	99.2%
Heat Transfer Efficiency	62%	67.2%

Output Rate (kJ/h)	47,713	45,261	**(Btu/h)**
Burn Rate (kg/h)	3.90	8.60	**(lb/h)**
Input (kJ/h)	77,335	73,360	**(Btu/h)**

Test Load Weight (dry kg)	1.95	4.30	**dry lb**
MC wet (%)	18.83		
MC dry (%)	23.20		
Particulate (g)	6.65		
CO (g)	28		
Test Duration (h)	0.50		

Emissions	**Particulate**	**CO**
g/MJ Output	0.28	1.16
g/kg Dry Fuel	3.41	14.12
g/h	13.30	55.13
lb/MM Btu Output	0.65	2.69

Air/Fuel Ratio (A/F)	11.36

VERSION: 2.4 4/15/2010

Dirigo Laboratories, Inc.

Appliance: Jotul 602
Technician: J. Steinert
Date: 6/13/2011
Run Number: 5
Analyzer Type: CAL ZRE Gas Analyzer
Equipement No.: # 057

Time	CO	CO2	O2
0	0.12	4.85	15.75
10	0.1	9.99	10.3
20	0.19	13.40	6.68
30	0.05	8.85	11.51

[signature] 7/6/11

Run 6:

PREBURN

APPLIANCE:	602
TECHNICIAN	G.Nelke
DATE:	6/20/11
RUN #:	6
READING INTERVAL:	10
.	
Run Time:	70

Tunnel Traverse Information

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.034	0.038	0.039	0.034	0.032	0.038	0.038	0.034	0.036
Temperature	96	96	96	96	96	96	96	96	96.000

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
0	7.1	-0.065	329	343	291	174	322	322
10	6.1	-0.075	321	342	276	228	321	321
20	4.4	-0.1	344	401	277	282	404	403.833
30	2.4	-0.111	447	487	330	349	513	513.167
40	4.2	-0.116	533	552	443	426	594	594.333
50	1.9	-0.11	569	598	541	513	649	649.5
60	3.4	-0.116	605	645	591	571	688	688
70	1.3	-0.104	636	668	579	618	711	711
			473		416			

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Tunnel Velocity:	13.6346	ft/sec.
Intial Tunnel Flow:	138.573	scfm
Average Tunnel Flow:	131.933	scfm

Notes:

Technician 7/6/11

Run #	6
Date:	6/20/11

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Dilution Tunnel Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.034	0.038	0.039	0.034	0.032	0.038	0.038	0.034	0.036
Temperature	96	96	96	96	96	96	96	96	96.000

Tunnel Velocity:	13.635	ft/sec.
Intial Tunnel Flow:	138.57	scfm
Average Tunnel Flow	131.93	scfm

Technician 

BOX A

APPLIANCE:	Jotul 602
TECHNICIAN:	G. Nelke
DATE:	6/20/2011
RUN #:	6
READING INTERVAL:	10
SAMPLE BOX :	a

METER Y FACTOR: 1

ROOM TEMP (F) 71.0

BAROMETRIC PRESSURE (In.Hg.)

BEG	MID	END	AVG
29.92	29.99	29.97	29.96

PROBE MATERIAL: SS

FRONT FILTER #:	1109				REAR FILTER #:	1110			
FINAL LEAK RATE (CFM):	<0.001	@	12	IN-HG	FINAL LEAK RATE (CFM)	<0.001	@	12	IN-HG

Run Time: 30

TEST START TIME:

AMBIENT FILTER #:	N/A	VOLUME		LITERS
FINAL LEAK RATE (CFM):		@		IN-HG

FUEL MOISTURE DB 21.27 %

									1	2	3	4	5	6		
									TEMPERATURES							
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	TUNNEL DELTA P	ORIFICE DELTA H	FILTER VAC	Proportional Rate (%)	Scale Weight	Weight Chg	TUNNEL TEMP	FLUE TEMP	FILTER TEMP	FB REAR TEMP	FB INT	METER TEMP	AMBIENT TEMP	
0	0.000	0.000	0.036	0.05	-0.02	NA	5.2	0	158	586	72	603	834	74	71	
10	1.294	0.129	0.036	1.76	0	102	2.9	2.3	175	944	85	533	865	76	72	
20	2.594	0.130	0.036	1.71	-0.66	100	0.8	2.1	154	753	84	530	832	80	72	
30	3.912	0.132	0.036	1.8	-2.38	99	0	0.8	138	640	82	595	955	84	72	
	3.912		0.036	1.76		100.4			156	731				79	72	

Technician

APPLIANCE:	Jotul 602
TECHNICIAN:	G. Nelke
DATE:	6/20/11
RUN #:	6
READING INTERVAL:	10
SAMPLE BOX :	B
METER Y FACTOR:	1
PROBE MATERIAL:	SS
FRONT FILTER #:	1111
REAR FILTER #:	1112
FINAL LEAK RATE (CFM):	<0.001 @ 13
FINAL LEAK RATE (CFM):	<0.001 @ 13
Run Time:	30

							1	2	3	4	5	6		
							TEMPERATURES							
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB REAR	FB BOT	METER	STOVE AVG T	
0	0	0	NA	0	0	0	662	684	72	928	637	74	703	Run Notes:
10	1.288	0.129	101	0	2	-3	605	641	88	1032	615	76	685	
20	2.600	0.131	100	0	2	-3	635	683	85	1050	581	81	696	
30	3.927	0.133	100	0	2	0	662	694	85	901	557	85	682	
	3.927	0.131	100.391	0.000	2	-1.5	641	676	83	978	598	79		
	TOTAL	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG		

Technician

RESULTS

RUN # 6

DATE: 6/20/2011

BURN RATE 3.89 KG/HR DRY

FILTER A PARTICULATE 1.8 mg

FILTER B PARTICULATE 1.6 mg

	SAMPLE A INFORMATION		SAMPLE B INFORMATION	
Total Sample Volume - Vm	3.91		3.93	
Average Gas Velocity in Dilution Tunnel - vs	13.63	feet/second	13.63	feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	7915.97	dscf/hour	7915.97	dscf/hour
Total Sample Volume (Standard Conditions) - Vmstd	3.86	dscf	3.87	dscf
Average Tunnel Temperature	156.3	F	156.3	F
Average Delta p	0.036		0.036	
Average Gas Meter Temperature	79	F	79	F
Average Delta H	1.76	in-h20	2.00	in-h20
Total Time of Test	30	min	30	min
Total Particulates	1.8	mg	1.6	mg
Particulate Concentration (dry-standard)	0.00047	grams/dscf	0.00041	grams/dscf
Particulate Emission Rate	3.69	grams/hour	3.27	grams/hour
Adjusted Emissions	5.38	grams/hour	4.87	grams/hour
AVERAGE ADJUSTED EMISSIONS		5.13	grams/hour	
% OF AVERAGE	105.0		95.0	

Technician

VERSION: 2.4 4/15/2010

Manufacturer: Jotul
Model: 602
Date: 6/22/2011
Run: 6
Control #: 1
Test Duration: 30
Output Category: 4

Appliance Type: Non-Cat (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
Weight Units lb (kg or lb)

Wood Moisture (% wet): 21.27
Load Weight (lb wet): 5.20
Burn Rate (dry kg/h): 3.71
Total Particulate Emissions: 5.13 g

Fuel Data

	D. Fir	
HHV	19,810	kJ/kg
%C	48.73	
%H	6.87	
%O	43.9	
%Ash	0.5	

Default Fuel Values

	D. Fir	Oak
HHV (kJ/kg)	19,810	19,887
%C	48.73	50
%H	6.87	6.6
%O	43.9	42.9
%Ash	0.5	0.5

Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Note 2: In cases where the "Fuel Weight Remaining" is the same for three or more readings in a row, a "divide by zero error" will occur in the calculation sheet. In such cases, adjust the weight values by interpolation between the first occurence and the next reading showing a decrease in weight.

Averages		0.10	14.06	5.99	730.75	71.75
					Temp. (°F)	
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO_2	O_2	Flue Gas	Room Temp
0	5.20	0.13	13.37	6.72	586.0	71.0
10	2.90	0.08	16.24	3.67	944.0	72.0
20	0.80	0.16	16.22	3.69	753.0	72.0
30	0.00	0.04	10.41	9.86	640.0	72.0

SR 7/6/11

Dirigo Laboratories, Inc.

Manufacturer:	Jotul
Model:	602
Date:	06/22/11
Run:	6
Control #:	1
Test Duration:	30
Output Category:	4

Technicians: BSA

7/6/11

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	63.8%	68.9%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	64%	69.3%

Output Rate (kJ/h)	46,934	44,522	**(Btu/h)**
Burn Rate (kg/h)	3.72	8.19	**(lb/h)**
Input (kJ/h)	73,595	69,813	**(Btu/h)**

Test Load Weight (dry kg)	1.86	4.09	**dry lb**
MC wet (%)	21.27		
MC dry (%)	27.02		
Particulate (g)	5.13		
CO (g)	15		
Test Duration (h)	0.50		

Emissions	**Particulate**	**CO**
g/MJ Output	0.22	0.63
g/kg Dry Fuel	2.76	7.91
g/h	10.26	29.39
lb/MM Btu Output	0.51	1.46

Air/Fuel Ratio (A/F)	7.86

VERSION: 2.4 4/15/2010

Dirigo Laboratories, Inc.

Appliance: Jotul 602
Technician: Gary Nelke
Date: 6/20/2011
Run Number: 6
Analyzer Type: CAL ZRE Gas Analyzer
Equipement No.: # 057

Time	CO	CO2	O2
0	0.13	13.37	6.72
10	0.08	16.24	3.67
20	0.16	16.22	3.69
30	0.04	10.41	9.86

7/6/11

Supporting Data and Notes

EPA Method 28 - Weighted Average

DIRIGO LABORATORIES INC.

Weighted Average: 3.4 (g/hr)

Client: EPA
Model: Jotul
Tracking No.: 1
Project No.: 001-WS-002-3
Test Dates: 6/6/2011 - 6/16/2011

Signature/Date: 7/6/11

Burn Rate Category	1
Burn Rate (kg/hr-dry)	0.75
Emissions Rate (g/hr)	4.14
Emissions Rate Cap (g/hr)	15
Weighting Factor	12.91%
Run Number	4

Burn Rate Category	2
Burn Rate (kg/hr-dry)	0.82
Emissions Rate (g/hr)	1.59
Emissions Rate Cap (g/hr)	15
Weighting Factor	24.05%
Run Number	1

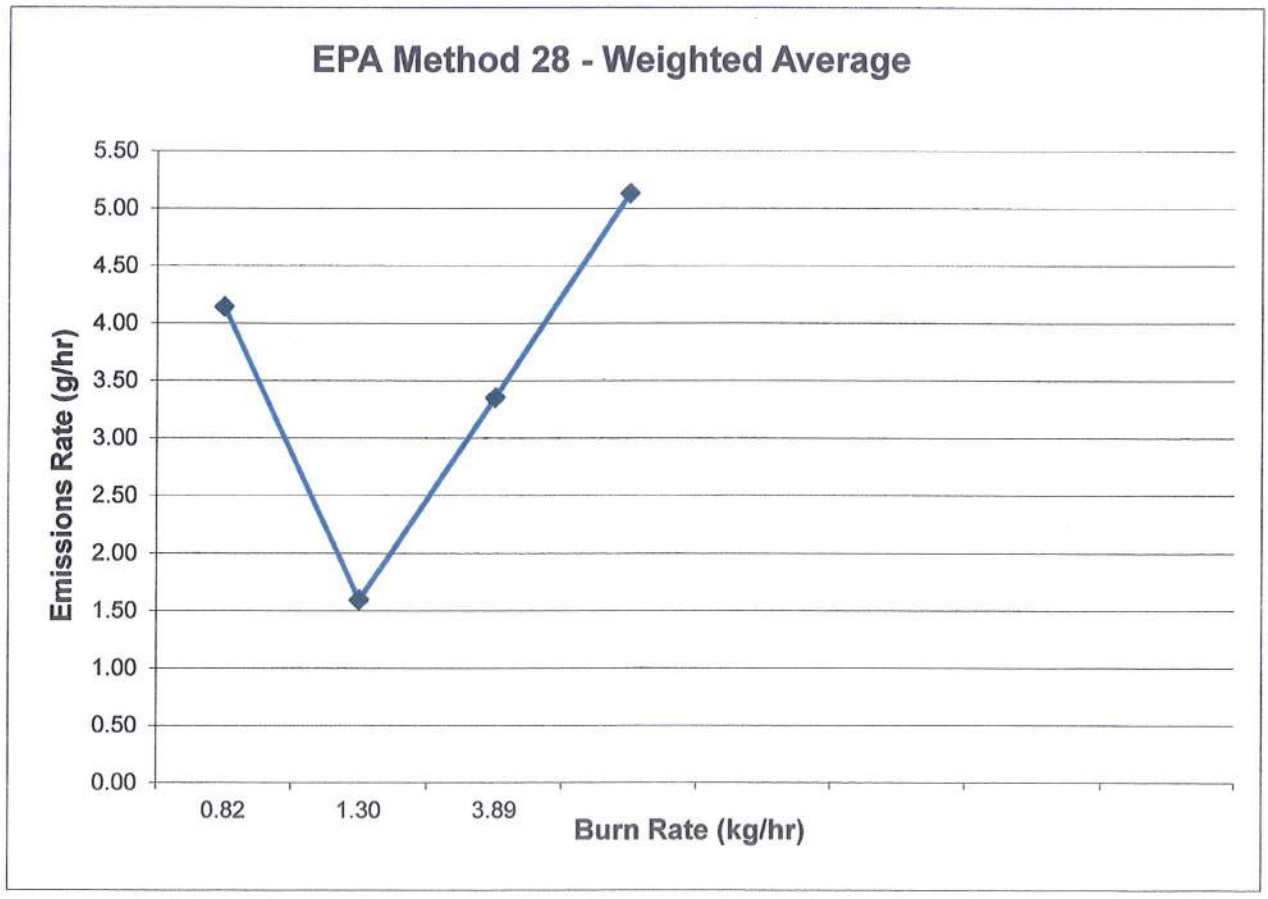
Burn Rate Category	3
Burn Rate (kg/hr-dry)	1.30
Emissions Rate (g/hr)	3.35
Emissions Rate Cap (g/hr)	15
Weighting Factor	42.03%
Run Number	3

Burn Rate Category	4
Burn Rate (kg/hr-dry)	3.89
Emissions Rate (g/hr)	5.13
Emissions Rate Cap (g/hr)	18
Weighting Factor	21.01%
Run Number	6

DIRIGO LABORATORIES INC.

Client: EPA
Model: Jotul
Tracking No.: 1
Project No.: 001-WS-002-3
Test Dates: 6/6/2011 - 6/16/2011

Signature/Date: _____ 7/6/11



Dirigo Laboratories, Inc.

Appliance: Jotul 602
Technician: J. Steinert, G. Nelke
Date: 6/9/11 - 6/20/11

Run Number	Weighting Factor	HHV Efficiency %	LHV Efficiency %
1	0.234	74.2	80.2
3	0.435	71.2	77.0
4	0.760	72.7	78.6
6	0.380	63.8	68.9
Total Ave. Efficiency % =		70.7	76.4

HHV Efficiency % Calculation:
= (((0.234x74.2)+(0.435x71.2)+(0.760x72.7)+(0.380x63.8))/(0.234+0.435+0.760+0.380)) = 70.7%

7/6/11

SECONDARY AIR WORKSHEET

Project #	001-WS-002-3
Client	Jotul North America
Model	602
Technician	J.Steinert
Date	6/7/2011
Signature	7/6/11

ORIGINAL CONFIGURATION

Position	Diameter (mm)	Area (mm^2)	# OF HOLES	Area (mm^2)
REAR	3.30	8.553	17	145.40
MIDDLE	0.00	0.000	0	0.00
FRONT	3.30	8.553	17	145.40
			Total	**290.80**

FINAL CONFIGURATION

Position	Diameter (mm)	Area (mm^2)	# OF HOLES	Total Area (mm^2)	% Change
REAR	3.30	8.553	17	145.40	0.00%
MIDDLE	0.00	0.000	0	0.00	#DIV/0!
FRONT	3.60	10.179	17	173.04	19.01%
			Total	**318.44**	**9.50%**

TOTAL % CHANGE	**9.50%**

Jotul Emissions work sheet

Run 1

Box A

Probes		Front Filter		Rear Filter		
Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	
115655.6	115655.9	123.0	125.1	120.8	120.8	Total mg
	0.3		2.1		0.0	2.4

Box B

Probes		Front Filter		Rear Filter		
Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	
115898.9	115899.0	121.2	123.2	122.0	122.1	Total mg
	0.1		2.0		0.1	2.2

Run 3

Box A

Probes		Front Filter		Rear Filter		
Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	
116310.7	116311.1	119.6	122.6	121.3	121.4	Total mg
	0.4		3.0		0.1	3.5

Box B

Probes		Front Filter		Rear Filter		
Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	
116216.5	116216.7	121.7	124.8	120.8	121.1	Total mg
	0.2		3.1		0.3	3.6

Run 4

Box A

Probes		Front Filter		Rear Filter		
Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	
116053.4	116053.7	119.9	126.5	122.7	123.1	Total mg
	0.3		6.6		0.4	7.3

Box B

Probes		Front Filter		Rear Filter		
Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	
116317.9	116318.0	121.6	128.0	122.0	122.4	Total mg
	0.1		6.4		0.4	6.9

Run 5

Box A

Probes		Front Filter		Rear Filter		
Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	
115655.8	115656.0	115.3	117.2	120.6	120.9	Total mg
	0.2		1.9		0.3	2.4

Box B

Probes		Front Filter		Rear Filter		
Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	
115899.0	115899.1	119.6	121.4	115.7	116.3	Total mg
	0.1		1.8		0.6	2.5

Run 6

Box A

Probes		Front Filter		Rear Filter		
Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	
115651.7	115652.3	115.6	116.6	119.2	119.4	Total mg
	0.6		1.0		0.2	1.8

Box B

Probes		Front Filter		Rear Filter		
Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	Tare (mg)	Post (mg)	
115894.6	115895.2	121.5	122.4	116.1	116.2	Total mg
	0.6		0.9		0.1	1.6

Dirigo Laboratories, Inc.

Technician : 7/6/11

Nozzle Pre-Test Weights

DATE	TIME	WEIGHT	DATE	TIME	WEIGHT	DATE	TIME	WEIGHT	Comments
6/7/11	11:00	115.6557	6/8/11	8:00	115.6557	6/9/11	07:00	115.6556	1A 602 R1
6/7/11	1:00	115.8989	6/8/11	8:00	115.8992	6/9/11	07:00	115.8989	1B 602 R1
6/8/11	4:00	116.3108	6/9/11	7:30	116.3108	6/10/11	07:00	116.3107	2A 602 R3
6/8/11	4:00	116.2165	6/9	7:50	116.2165	6/10/11	07:00	116.2165	2B 602 R3
6/10	7:00	116.0533	6/11	7:00	116.0534	6/12/11	09:00	116.0534	3A 602 R4
6/10	7:00	116.3181	6/11/11	7:00	116.3179	6/12/11	09:00	116.3179	3B 602 R4
6/11/11	7:00	115.6561	6/12/11	12:00	115.6559	6/13/11	07:00	115.6558	1A 602 R5
6/11/11	7:00	115.8990	6/12/11	12:00	115.8990	6/12/11	07:00	115.8990	1B 602 R5
6/15/11	4:30	116.0541							3A [redacted] #7
6/15/11	4:30	116.3177							3B [redacted] #1
6/15/11	07:30	116.6518	6/16/11	07:30	115.6516	6/17/11	07:00	115.6517	1A 602 #6
6/15/11	07:30	115.8948	6/16/11	07:30	115.8946	6/17/11	07:00	115.8946	1B 602 #6
6/22/11	10:00					6/22	10:00	115.2171	2A [redacted] #3
6/22/11	10:00					6/22	10:00	115.3118	2B [redacted] #3
						6/23/11	10:14	115.6518	1A [redacted] #4
						6/23/11	10:14	115.8941	1B [redacted] #4
6/29/11	1:30								

Nozzle Post-Test Weights

Tare Wt	DATE	TIME	WEIGHT	DATE	TIME	WEIGHT	DATE	TIME	WEIGHT	Comments
115.6557	6/10/11	11:30	115.6559	6/11	10:00	115.6559	6/12	1200	115.6559	1A R1
115.8989	6/10/11	11:30	115.8991	6/11	10:00	115.8991	6/12	1200	115.8990	1B R1
116.3107	6/12	8:00	116.3111	6/13	7:30	116.3111	6/14	7:30	116.3111	2A R3
116.2165	6/12	8:00	116.2168	6/13	7:30	116.2168	6/14	7:30	116.2167	2B R3
116.0534	6/18	7:30	116.0544	6/14/11	7:30	116.0540	6/15	9:00	116.0537	3A R4
114.3179	6/13	7:30	116.3184	6/14/11	7:30	116.3180	6/15	9:00	116.3180	3B R4
115.6558	6/14/11	7:30	115.6568	6/15/11	9:00	115.6561	6/16	7:30	115.6560	1A R5
115.8990	6/14/11	7:30	115.8993	6/15/11	9:00	115.8991	6/16	7:30	115.8991	1B R5
115.6517 ~~115.6501~~	6/20		115.6520	6/21/11	6:00pm	115.6525	6/22	9:15	115.6523	1A R6
~~115.8946~~	6/20		115.8950	6/21/11	6:00pm	115.8950	6/22	9:15	115.8952	1B R6
										1A [redacted] R4
										1B [redacted] R4

PRETEST INFORMATION

FILTER #	DATE	TIME	WEIGHT	DATE	TIME	WEIGHT	DATE	TIME	WEIGHT	Comments
1082			.1229			.1230			.1230	
1083			.1209			.1208			.1208	
1084			.1211			.1212			.1212	
1085			.1220			.1220			.1220	
1086			.1187			.1188			.1187	
1087			.1212			.1213			.1213	
1088			.1199			.1201			.1201	
1089			.1208			.1208			.1208	
1090			.1213			.1212			.1213	
1091			.1195			.1196			.1196	
1092			.1208			.1208			.1208	
1093			.1217			.1217			.1217	
1094			.1198			.1199			.1198	
1095			.1205			.1205			.1205	
1096			.1198			.1200			.1199	
1097			.1230			.1228			.1227	
1098			.1216			.1221			.1216	
1099			.1221			.1221			.1220	
1100			.1156			.1157			.1153	
1101			.1210			.1212			.1206	
1102			.1198			.1196			.1196	
1103			.1162			.1160			.1157	
1104			.1204			.1210			.1208	
1105			.1199			.1199			~~.1199~~ .1197	6/15 4.20
1106			.1161			.1212			~~.1162~~ .1158	
1107			.1212			.1196			.1212	
1108										

5/31/11 — 8:45 — 6/1/11 — 07:00 — 6/3/11 — 7:30

6/11/11 — 12:00 — 6/12/11 — 6:00 — 6/12/11 — 12:00

6/13/11 — 7:20

PRETEST INFORMATION

FILTER #	DATE	TIME	WEIGHT	DATE	TIME	WEIGHT	DATE	TIME	WEIGHT	Comments
1109	6/15	7:00	0.1154	6/16	07:00	0.1156	6/17	10:00	0.1156	
1110			0.1192			0.1193			0.1192	
1111			0.1215			0.1215			0.1215	
1112			0.1160			0.1160			0.1161	
1113			0.1199			0.1199			0.1198	
1114			0.1206			0.1207			0.1207	
1115			0.1154			0.1158			0.1155	
1116			0.1195			0.1194			0.1195	
1117			0.1205			0.1205			0.1206	
1118			0.1157			0.1157			0.1158	
1119			0.1197			0.1198			0.1198	
1120			0.1206			0.1207			0.1205	
1121			0.1161			0.1162			0.1162	
1122			0.1184			0.1183			0.1184	
1123	6/16	7:30	0.1208	6/25	12:00	0.1206	6/27	10:12	0.1207	
1124			0.1162	6/25	12:00	0.1160	6/27	10:12	0.1160	
1125			0.1186	6/27	10:12	0.1185	6/28	750	0.1183	[redacted]
1126			0.1212	6/27	10:12	0.1213	6/28	750	0.1213	[redacted]
1127			0.1156	6/27	10:15	0.1154	6/28	750	0.1155	
1128			0.1205	6/27	1015	0.1207	6/28	750	0.1207	
1129			0.1209	6/27	1015	0.1209	6/28	750	0.1207	
1130			0.1151	6/27	1015	0.1149	6/28	750	0.1147	
1131									0.1210	[redacted]
1132									0.1186	[redacted]
1133									0.1152	[redacted]
1134									0.1149	[redacted]
1135										

POST TEST INFORMATION

Tare Wt	FILTER #	DATE	TIME	WEIGHT	DATE	TIME	WEIGHT	DATE	TIME	WEIGHT	comment
.1230	1082	6/10/11	12:00	.1258	6/12/11	12:00	.1254	6/13/11	0700	.1251	AF R1
.1208	1083			.1210			.1208			.1208	AR R1
.1212	1084			.1250			.1246			.1232	BF R1
.1220	1085			.1221			.1221			.1224	BR R1
.1187	1086										
.1213	1087										
.1201	1088										
.1208	1089										
.1213	1090	6/12/11	8:00	.1221	6/13/11	0720	.1221	6/14/11	7:30	.1274	AR R2
.1196	1091			.1234			.1230			.1226	AF R2
.1208	1092			.1214			.1212			.1211	BR R3
.1217	1093			.1259			.1252			.1248	BF R3
.1198	1094										
.1205	1095										
.1199	1096	6/13/11	0730	.1269	6/14/11	0730	.1267	6/15/11	6:15	.1265	AF R4
.1227	1097			.1232			.1232			.1231	AR
.1216	1098			.1282			.1280			.1280	BF
.1220	1099			.1223			.1223			.1224	BR
.1153	1100	6/14/11	0730	.1174	6/15/11	6:20	.1171	6/16/11	7:00 AM	.1172	AF R5
.1206	1101			.1210			.1209			.1208 9	AR
.1196	1102			.1216			.1216			.1214	BF
.1157	1103			.1163			.1165			.1163	BR
.1208	1104										AF [redacted]
.1197	1105										AR
.1158 ~~.1162~~	1106										BF
.1212	1107										BR
	1108										

Total 602

Total 602

POST TEST INFORMATION

Tare Wt	FILTER #	DATE	TIME	WEIGHT	DATE	TIME	WEIGHT	DATE	TIME	WEIGHT	comment
.1156	1109	6/21	11:00	0.1167	6/21	6:00 pm	0.1165	6/22/4	9:10	0.1166	AF Total BG
.1192	1110			0.1195			0.1195			0.1194	AR
.1215	1111			0.1225			0.1224			0.1224	BF
.1161	1112			0.1165			0.1162			0.1162	BR
.1198	1113	6/24	0830	0.1310	6/29	12:00	.1309			.1309	AF [redacted] R3
.1207	1114			0.1217			.1217			.1218	AR R3
.1155	1115			0.1255			0.1257			.1256	BF R3
.1195	1116			0.1205			.1209			.1205	BR R3
.1206	1117	6/24	0830	0.2250	6/29	12:00	0.2256			.2223	AF [redacted] R4
.1158	1118			0.1183			.1181			.1183	AB R4
.1198	1119			.2230			.2236			.2209	BF R4
.1205	1120			.1231			.1235			.1230	BB R4
.1162	1121	6/29	12:30	.1501			.1503			.1504	AF [redacted] R5
.1184	1122			.1209			.1209			.1209	AR R5
.1207	1123			.1554			.1551			.1550	BF R5
.1160	1124			.1179			.1179			.1179	BR R5
.1183	1125	6/29	12:00	.1448			.1437			.1436	BF [redacted] R6
.1213	1126			.1229			.1230			.1229	BR [redacted] R6
.1155	1127										AF R7
.1207	1128										AR R7
.1207	1129										BF R7
.1147	1130										BB [redacted] R7
	1131										AF R8
	1132										AR R8
	1133										BF R8
	1134										BR R8
	1135										

6/9/11

GAS ANALYZER CAL

	BJT	DNR
CO	4.255	4.260
CO_2	17.42	17.43
O_2	16.90	16.88

PRE-TEST

JOTUL 602 EM run #1

FUEL LOAD = 5.82

FUEL MOISTURE ⇒ 21.32%

Preburn 9.04 lbs actual 8.2 lbs @ 12:00

Setting ⇒ 1.270

Startup Procedure DO 1.5 min

DC - DAMPER FULL OPEN

Setting @ 3'20 sec

FILTERS 1082/1083 A

1084/1085 B

Preburn burned to fast / checked air setting and reloaded 4.0 lbs @ 12:52

Stirred @ 45" and 2.2 lbs

Filter Pre-Leak Ck A- <.001 @ 18" Hg

B- <.001 @ 18" Hg

SR 7/6/11

6/10 8.6 lbs Preburn @ 11:00 OOTCL 6 oz

FUEL LOAD = 5.7 lbs

Closed Damper to .290 @ 11:20

	BOT	MET
GAS m	4.255	4.250
	17.42	17.41
	16.90	16.90

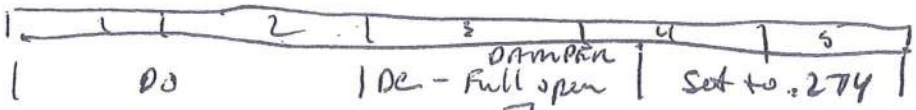
Stirred CB @ 60 min

Test Start @ :

Run aborted - Computer/HARDWARE MALFUNCTION

SGM 7/6/11

6/10/11 . JOULE Run #3
. 7.7 lbs Pre-burn
. FUEL LOAD 5.84 lbs
. PB ~~start~~ @ 4:40 DAMPER FULL OPEN
@ 5:05 set damper to *0.275 (5.7 lbs)
. START PB recorder.
Re-leak ch A <.001 @ 10 in Hg
B <.001 @ 10 in Hg
Stirred Coals @ 65 min



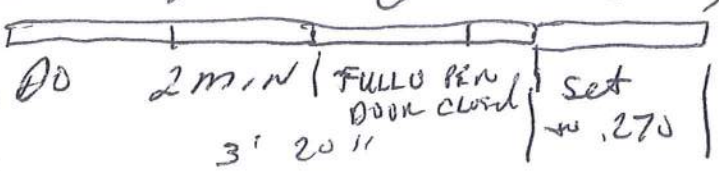
* [Actual Setting was .280]

@ 90' MARK - logged @ lbs but Scale was Still "Bouncing" 0.0 → 0.1

6/11/11 . 7.0 lbs Preburn FUEL

6/12 8 lbs Preburn
5.42 lb FUEL LOAD

Stirred Preburn @ 90 min (Reading 2.1 lbs)



29.8 29.77

AVG
.032 .038 .038 .032 .035 .040 .038 .032 .035
94 94

8/7/6/11

6/13 JUTUL Run # 5 HIGH BURN
FUEL 5.36 lbs DAMPER FULL OPEN

Gas ZERO ✓

	BOT	Meter
O_2	17.42	17.92
CO	4.255	4.255
O_2	16.90	16.90

A Lk Ck ✓ OK
B Lk Ck ✓ OK

Started CB @ 35 MIN

added fuel @ 42 minutes (2 lbs)

Door Open 1.5 MINUTES / closed
DAMPER @ FULL OPEN

.132	.038	.038	.030	.035	.038	.037	.030	.035
99	99	99	99	98	99	99	99	

BP → 29.97 30.00 30.00

SB 7/6/14

6/24/11 Re-Run of 602 High Burn due to (602 model)
blown ΔT
Run #6
FUEL LOAD 5.2 lbs
FUEL MOISTURE = 21.27

PB started @ 9:30
Tunnel
Traverse

.034	.038	.039	.034	.032	.038	1038	.034
96	96	96	96	96	96	96	96

				BUT	MTR
GAS MON	Ø GAS	CO	Ø	SPAN	4.255	4.254
		CO_2	Ø		17.42	17.42
		O_2	-.01%		16.9	16.90

Added 4.4 lbs to PB @ 34'
Added 3.4 lbs @ 55'

Rel Lk Ck A → < .001 @ 10"
Ck B → < .001 @ 12"

SR 7/6/11

Appendix F: Calibration and Q/A

Certificate of Calibration

Certificate Number: 469735

JJ Calibrations, Inc.
7007 SE Lake Rd
Portland, OR 97267-2105
Phone 503.786.3005
FAX 503.786.3994

Dirigo Laboratories, Inc.
11785 SE Hwy. 212
Suite 305
Clackamas, OR 97015

PO: 7
Order Date: 02/04/2011
Authorized By: N/A

Property #: 051
User: N/A
Department: N/A
Make: Unknown
Model: 10 LBS.
Serial #: 051
Description: Mass
Procedure: DCN 500901
Accuracy: NIST HB 105-1 (F CLASS)

Calibrated on: 02/08/2011
*Recommended Due: 02/08/2016
Environment: 18 °C 36 % RH
As Received: Within Tolerance
As Returned: Within Tolerance
Action Taken: Calibrated
Technician: 92

Remarks: * Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
432A	Sartorius	C-44	Microbalance 5.1g	11/08/2011	461791
503A	Rice Lake	1mg-200g (Class O)	Mass Set	11/08/2011	460936
550A	And (A&D) Co.	HP-30K	Balance 30 Kg	02/02/2012	467177

Measurement Data

Parameter / Measurement Description	Range Unit	Reference	UUT	Variance	Min	Max
Before/After						
Mass						
Class F - 10 lb	mg	4535924.0	4536081	-157.0	4535474.0	4536374.0

JJ Calibrations, Inc. certifies that this instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual with the stated procedure using standards that are traceable to the National Institute of Standards and Technology (NIST), or other National Measurement Institutes (NMI's), or by using natural physical constants, intrinsic standards or ratio calibration techniques. The quality system and this certificate are in compliance with ANSI/NCSL Z540-1-1994, ISO/IEC 17025-2005, ISO 10012-1, the ISO 9000 family and QS 9000. The expanded uncertainties of measurements for this calibration are based upon 95% (2 sigma) confidence limits. Unless otherwise stated, a test accuracy ratio (TAR) of 4:1, if achievable, is maintained. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without prior written consent of JJ Calibrations, Inc.
JJ Calibrations, Inc. quality system has been assessed and accredited to ISO/IEC 17025:2005.

Reviewer

Issued 02/08/2011 Rev # 14

Inspector

Certificate of Calibration

Certificate Number: **469894**

JJ Calibrations, Inc.
7007 SE Lake Rd
Portland, OR 97267-2105
Phone 503.786.3005
FAX 503.786.2994

OnSite

A2LA ACCREDITED 0723.01

Dirigo Laboratories, Inc.
11785 SE Hwy. 212
Suite 305
Clackamas, OR 97015

Property #: ~~5248~~ 48
User: N/A
Department: N/A
Make: Scientech
Model: ZSA 210
Serial #: 28095
Description: Analytical Scale, 200g
Procedure: DCN 500877
Accuracy: ±.0005g

PO: 7
Order Date: 02/08/2011
Authorized By: N/A
Calibrated on: 02/08/2011
*Recommended Due: 08/08/2011
Environment: 21 °C 39 % RH
As Received: Within Tolerance
As Returned: Within Tolerance
Action Taken: Calibrated
Technician: 111

Remarks: * Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
503A	Rice Lake	1mg-200g (Class O)	Mass Set	11/08/2011	460936

Measurement Data

Parameter / Measurement Description	Range Unit	Reference	UUT	Variance	Min	Max	Uncertainty	Accredited = ✓
Before/After								
Force								
	g	5.00000	4.9998	0.00020	4.99950	5.00050	5.8E-5	✓
	g	50.00000	49.9998	0.00020	49.99950	50.00050	5.8E-5	✓
	g	100.00000	99.9997	0.00030	99.99950	100.00050	5.8E-5	✓
	g	150.00000	150.0000	0.00000	149.99950	150.00050	5.8E-5	✓
	g	200.00000	199.9998	0.00020	199.99950	200.00050	5.8E-5	✓

JJ Calibrations, Inc. certifies that this instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual with the stated procedure using standards that are traceable to the National Institute of Standards and Technology (NIST), or other National Measurement Institutes (NMI's), or by using natural physical constants, intrinsic standards or ratio calibration techniques. The quality system and this certificate are in compliance with ANSI/NCSL Z540-1-1994, ISO/IEC 17025-2005, ISO 10012-1, the ISO 9000 family and QS 9000. The expanded uncertainties of measurements for this calibration are based upon 95% (2 sigma) confidence limits. Unless otherwise stated, a test accuracy ratio (TAR) of 4:1, if achievable, is maintained. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without prior written consent of JJ Calibrations, Inc.
JJ Calibrations, Inc. quality system has been assessed and accredited to ISO/IEC 17025:2005.

Reviewer

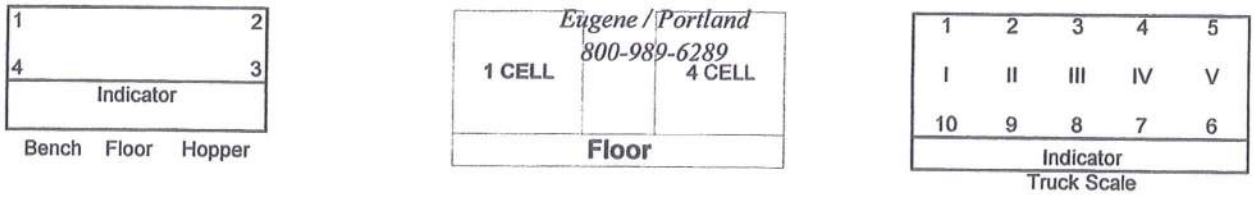
5 Issued 02/09/2011 Rev # 14

Inspector

American Scale Co

Eugene / Portland

800-989-6289



Certificate of Inspection and Calibration

Name:	Dirigo Labs	**Date:**	2/22/2011		
Address:	11785 SE Hwy 212 Suite 305 Clackamas Or 97015				
Make:	Rice Lake	**Capacity:**	1,000lbs	**Type:**	Floor
Model:	IQ 355	**Platform:**	FSP#2610000126	**ID**	3
Serial #:	167102	**# Sections:**	4	**Grad Size:**	.1lb
Previous Test:	12/27/10				

Initial Test *(Final if no adjustments necessary)*

Load Position	Test Weights	Scale Indication	Error
	0	0.0	
1	100lb	100.0	0.0
2	100lb	99.9	-0.1
3	100lb	100.1	0.1
4	100lb	100.0	0.0
1	250lbs	250.0	0.0
2	250lbs	249.8	-0.2
3	250lbs	250.3	0.3
4	250lbs	250.0	0.0
1	500lbs	500.0	0.0
2	500lbs	499.8	-0.2
3	500lbs	500.6	0.6
4	500lbs	500.0	0.0

Final Calibration *(If Initial Check exceeds Tolerance Limits)*

Load Position	Test Weights	Scale Indication	Error
	0		
1	100lb	100.0	0.0
2	100lb	100.0	0.0
3	100lb	100.0	0.0
4	100lb	100.0	0.0
1	250lbs	250.0	0.0
2	250lbs	250.0	0.0
3	250lbs	250.0	0.0
4	250lbs	250.0	0.0
1	500lbs	500.0	0.0
2	500lbs	500.0	0.0
3	500lbs	500.0	0.0
4	500lbs	500.0	0.0

Next Scheduled Calibration Test: 02/22/12

The Scale listed above was tested and calibrated using test weights calibrated and traceable to the National Institute of Standards & Technology (NIST).

Remarks:

Technician: Nathan Dalton

ID	Make	Model	Serial#	Capacity	Type	Grad Size	Load Position	Applied Load	# cells	Last Test	note
3	Rice Lake	IQ 355	167102	1,000lbs	Floor	.1lb		500lbs	4	12/27/10	

XC-60A-ED-DIR-1101004 Dirigo AIO0048989.xls

Box A

APEX INSTRUMENTS SOURCE TESTING EQUIPMENT

APEX INSTRUMENTS METER CONSOLE CALIBRATION

Meter Console Information					
Console Model	XC-60A-ED-DIR	Console Serial Number	1101004	Encoder Model	HEDS-9100-F00
Gas Meter Model	AP25	Totalizer Scale Factor (Initial)	7.5000	Totalizer Model	DURANT
Gas Meter Serial#	1902130	Totalizer Scale Factor (Final)	7.6517	Temp Display Model	JENCO

~~3785~~ (Ft³) 2722

Calibration Conditions							
WTM ID	539784	Calibration Technician		EW		Calibration Date	2-Feb-11
WTM Cal Factor	1.0024	Barometric Pressure	(Pb)	750	mm Hg		

	Calibration Data									Results				
	Run Time	Dry Gas Meter			Wet Test Meter		Standardized Volumes			Totalizer Gamma		Corrected Flowrate	ΔH @	
	Elapsed	Gas Pressure	Gas Temp	Meter Volume	Gas Volume	Gas Temp	Totalizer Initial SF	Totalizer Final SF	Wet Test Meter	Final	Variation		$5L_{std}$/min	Variation
	(Θ)	(P_m)	(t_m)		(V_w)	(t_w)	($V_{m(std)}$)	($V_{m(std)}$)	($V_{w(std)}$)	(Y)	(ΔY)	(Q_m)	(ΔH@)	(ΔΔH@)
	min	mm H_2O	°C	liters	liters	°C	std liters	std liters	std liters			slm	mm H_2O	
Run 1 - Initial	0.00	82.55	23.00	0.000	121.144	23.0								
Final	5.00	82.55	23.00	24.622	146.614	23.0								
Total/Avg	5.00	82.55	23.00	24.622	25.470	23.0	24.264	24.754	24.811	1.0023	0.002	4.94	85.8	-1.3
Run 2 - Initial	0.00	69.85	23.00	24.622	146.614	23.0								
Final	5.00	69.85	23.00	47.175	169.939	23.0								
Total/Avg	5.00	69.85	23.00	22.553	23.325	23.0	22.197	22.646	22.721	1.0033	0.003	4.53	86.6	-0.5
Run 3 - Initial	0.00	50.80	23.00	47.175	169.939	23.0								
Final	5.00	50.80	23.00	66.525	189.918	23.0								
Total/Avg	5.00	50.80	23.00	19.350	19.979	23.0	19.009	19.394	19.462	1.0035	0.004	3.88	85.8	-1.3
Run 4 - Initial	0.00	25.40	23.00	66.525	189.918	23.0								
Final	5.00	25.40	23.00	80.227	203.962	23.0								
Total/Avg	5.00	25.40	23.00	13.702	14.044	23.0	13.428	13.699	13.680	0.9986	-0.001	2.73	86.8	-0.2
Run 5 - Initial	0.00	12.70	23.00	80.227	203.962	23.0								
Final	6.00	12.70	23.00	91.710	215.642	23.0								
Total/Avg	6.00	12.70	23.00	11.483	11.680	23.0	11.239	11.466	11.378	0.9923	-0.008	1.89	90.4	3.3

Average Meter Calibration Factor Y	1.0000	87.1

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, using the Precision Wet Test Meter # 11AE6, which in turn was calibrated using the American Bell Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

Signature Eric Wilke Date 2/2/11

Pressure Audit for XC-60A-ED-DIR-1101004 AIO0048909.xls Box A

XC-60A-ED-DIR Transducer Pressure Audit

Date	3-Feb-11
Console #	1101004
Model #	M-DP-B2/5

Calibration Technician	EW
Reference Meter	Love
ID Number	09DWY00-0680

Transducer ΔH		Range	0-127	
	Transducer Pressure	Reference Pressure	Difference	% Difference
	in Hg	in Hg		< 2.5%
	0.28	0.281	0.001	0.36%
	1.55	1.534	-0.016	1.04%
	2.83	2.816	-0.014	0.50%
	3.56	3.553	-0.007	0.20%

Transducer ΔP		Range	-63 to + 63	
	Transducer Pressure	Reference Pressure	Difference	% Difference
	in Hg	in Hg		< 2.5%
	-1.19	-1.198	-0.008	0.67%
	-0.61	-0.607	0.003	0.49%
	1.81	1.806	-0.004	0.22%
	3.9	3.89	-0.01	0.26%

Signature Eric Love Date 2/3/11

Temperature Sensor Calibration Data Sheet

Box A

Unit	XC-60A-ED-DIR	Serial #	1101004
Date	2/2/2011	ThermoCouple No	Model Altek Series 22 Type K
Personnel	EW	Reference	105795

Reference Point Number	Reference Thermometer Temperature C	Thermocouple Display Temperature C	Absolute Temperature Difference %
1	38	36	0.6
2	93	92	0.3
3	149	148	0.2
4	260	258	0.4
5	371	371	0.0
6	482	481	0.1
7	593	593	0.0
8	816	815	0.1
9	1038	1038	0.0
10			
11			
12			
			0.195

<1.5

NIST Reference TC ID	**90728323**
Ice Water	**Meter TC**
32° F / 0° C	**Reading**
0.00	0.000

Checked By Eric Water 2/2/11
(Personnel (Sign/Date)

XC-60A-ED-DIR-1101005 Dirigo AIO0048989.xls

Box B

APEX SOURCE TESTING EQUIPMENT INSTRUMENTS

APEX INSTRUMENTS METER CONSOLE CALIBRATION

Meter Console Information					
Console Model	XC-60A-ED-OMNI	Console Serial Number	1101005	Encoder Model	HEDS-9100-F00
Gas Meter Model	SK25	Totalizer Scale Factor (Initial)	7.5000	Totalizer Model	DURANT
Gas Meter Serial#	1902133	Totalizer Scale Factor (Final)	7.6841	Temp Display Model	JENCO

Calibration Conditions							
WTM ID	539784	Calibration Technician		EW		Calibration Date	3-Feb-11
WTM Cal Factor	1.0024	Barometric Pressure	(Pb)	761	mm Hg		

	Calibration Data									Results				
	Run Time	Dry Gas Meter			Wet Test Meter		Standardized Volumes			Totalizer Gamma		Corrected Flowrate	ΔH @	
	Elapsed	Gas Pressure	Gas Temp	Meter Volume	Gas Volume	Gas Temp	Totalizer Initial SF	Totalizer Final SF	Wet Test Meter	Final	Variation		$5L_{std}$/min	Variation
	(Θ)	(P_m)	(t_m)		(V_w)	(t_w)	($V_{m(std)}$)	($V_{m(std)}$)	($V_{w(std)}$)	(Y)	(ΔY)	(Q_m)	(ΔH@)	(ΔΔH@)
	min	mm H_2O	°C	liters	liters	°C	std liters	std liters	std liters			slm	mm H_2O	
Run 1 - Initial	0.00	82.55	21.00	0.000	437.899	21.0								
Final	5.00	82.55	21.00	23.227	461.911	21.0								
Total/Avg	5.00	82.55	21.00	23.227	24.012	21.0	23.380	23.954	23.895	0.9975	-0.002	4.76	90.6	0.8
Run 2 - Initial	0.00	69.85	21.00	23.227	461.911	21.0								
Final	5.00	69.85	21.00	44.490	483.939	21.0								
Total/Avg	5.00	69.85	21.00	21.263	22.028	21.0	21.377	21.902	21.921	1.0009	0.001	4.37	91.0	1.3
Run 3 - Initial	0.00	50.80	21.00	44.490	483.939	21.0								
Final	5.00	50.80	21.00	62.835	502.913	21.0								
Total/Avg	5.00	50.80	21.00	18.345	18.974	21.0	18.410	18.861	18.881	1.0011	0.001	3.76	89.2	-0.5
Run 4 - Initial	0.00	25.40	21.00	62.835	502.913	21.0								
Final	5.00	25.40	21.00	75.900	516.406	21.0								
Total/Avg	5.00	25.40	21.00	13.065	13.493	21.0	13.079	13.400	13.427	1.0020	0.002	2.68	88.2	-1.6
Run 5 - Initial	0.00	12.70	21.00	75.900	516.406	21.0								
Final	7.00	12.70	21.00	88.777	529.653	21.5								
Total/Avg	7.00	12.70	21.00	12.877	13.247	21.3	12.875	13.191	13.171	0.9985	-0.002	1.88	89.9	0.1

Average Meter Calibration Factor Y	1.0000	89.8

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, using the Precision Wet Test Meter # 11AE6, which in turn was calibrated using the American Bell Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

Signature Eric Wilk Date 2/3/11

Pressure Audit for XC-60A-ED-DIR-1101005 AIO0048909.xls Box B

XC-60A-ED-DIR Transducer Pressure Audit

Date	3-Feb-11
Console #	1101005
Model #	M-DP-B2/5

Calibration Technician	EW
Reference Meter	Love
ID Number	09DWY00-0680

Transducer		Range	0-4	
ΔH	Transducer	Reference		
	Pressure	Pressure	Difference	% Difference
	in Hg	in Hg		< 2.5%
	0.73	0.736	0.006	0.82%
	1.25	1.269	0.019	1.50%
	2.05	2.057	0.007	0.34%
	3.15	3.144	-0.006	0.19%

Transducer		Range	-2.5 to +2.5	
ΔP	Transducer	Reference		
	Pressure	Pressure	Difference	% Difference
	in Hg	in Hg		< 2.5%
	-1.67	-1.679	-0.009	0.54%
	-0.26	-0.261	-0.001	0.38%
	0.82	0.817	-0.003	0.37%
	2.15	2.153	0.003	0.14%

Signature Eric Wick Date 2/3/11

Box B

Temperature Sensor Calibration Data Sheet

Unit	XC-60A-ED-DIR	Serial #	1101005
Date	2/2/2011	ThermoCouple No	Model Altek Series 22 Type K
Personnel	EW	Reference	105795

Reference Point Number	Reference Thermometer Temperature C	Thermocouple Display Temperature C	Absolute Temperature Difference %
1	38	35	1.0
2	93	91	0.5
3	149	147	0.5
4	260	257	0.6
5	371	370	0.2
6	482	481	0.1
7	593	593	0.0
8	816	816	0.0
9	1038	1038	0.0
10			
11			
12			
			0.315
			<1.5

NIST Reference TC ID	**90728323**
Ice Water	**Meter TC**
32° F / 0° C	**Reading**
0.00	-0.002

Checked By Eric Witt 2/3/11
(Personnel (Sign/Date)

DGM-1101001 Dirigo Laboratories Inc. AIO0049101.xls

Standard DGM

APEX INSTRUMENTS REFERENCE METER CALIBRATION
USING WET-TEST METER #536610
15-POINT METRIC UNITS

Calibration Meter Information	
WTM Model	W-NK-1A
WTM Serial #	539784
WTM Gamma	1.0024
DGM Serial #	1101001

Calibration Conditions	
Date Start	6-Jan-11
Date End	6-Jan-11
Calibration Technician	EW
Initial Scale Factor	3.9000
Final Scale Factor	3.8897

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K_1	0.386	°K / mm Hg

		Calibration Data													Results		
		Run Time	Dry Gas Meter						Calibration Meter						Dry Gas Meter Totalizer		
Date	Barometric Pressure	Elapsed	Meter Pressure	Volume Initial	Volume Final	Sample Volume	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Sample Volume	Outlet Temp Initial	Outlet Temp Final		Calibration Factor		Flowrate
															Value	Variation	Std & Corr
		(Θ)	(P_m)	(V_{mi})	(V_{mf})	V	(t_{mi})	(t_{mf})	(V_{wi})	(V_{wf})	V	(t_{wi})	(t_{wf})		Y	(ΔY)	($Q_{m(std)(corr)}$)
	mm Hg	min	mm H_2O	L	L	L	°C	°C	L	L	L	°C	°C		Final		Lpm
6-Jan-11	747	5	-51	0.000	21.945	21.945	19.0	19.0	54.326	75.944	21.618	18.0	18.0		0.9985	-0.00052	4.287
6-Jan-11	747	5	-51	21.945	44.054	22.109	19.0	19.0	75.944	97.709	21.765	18.0	18.0		0.9978	-0.00118	4.316
6-Jan-11	747	5	-51	44.054	66.082	22.028	19.0	19.0	97.709	119.457	21.748	18.0	18.0		1.0007	0.00170	4.313
										Passed Calibration Factor Variation Requirement					0.9990	Averages	4.305
6-Jan-11	747	5	-31	0.000	11.080	11.080	18.0	18.0	21.361	32.335	10.974	18.0	18.0		0.9985	-0.00056	2.176
6-Jan-11	747	5	-31	11.080	22.191	11.111	18.0	19.0	32.335	43.328	10.993	18.0	18.0		0.9991	0.00009	2.180
6-Jan-11	747	5	-31	22.191	33.322	11.131	19.0	19.0	43.328	54.326	10.998	18.0	18.0		0.9995	0.00046	2.181
										Passed Calibration Factor Variation Requirement					0.9990	Averages	2.179
6-Jan-11	747	12	-22	0.000	14.508	14.508	19.0	20.0	119.457	133.743	14.286	18.0	19.0		0.9952	-0.00284	1.178
6-Jan-11	747	12	-22	14.508	28.860	14.352	20.0	20.0	133.743	147.960	14.217	19.0	19.0		1.0012	0.00311	1.171
6-Jan-11	747	12	-22	28.860	43.208	14.348	20.0	20.0	147.960	162.125	14.165	19.0	19.0		0.9978	-0.00027	1.166
										Passed Calibration Factor Variation Requirement					0.9981	Averages	1.172
6-Jan-11	747	18	-19	0.000	14.032	14.032	20.0	20.0	162.125	175.985	13.860	19.0	19.0		0.9980	-0.00030	0.761
6-Jan-11	747	18	-19	14.032	28.158	14.126	20.0	21.0	175.985	189.930	13.945	19.0	19.5		0.9983	-0.00002	0.765
6-Jan-11	747	18	-19	28.158	42.272	14.114	21.0	21.0	189.930	203.868	13.938	19.5	20.0		0.9986	0.00032	0.763
										Passed Calibration Factor Variation Requirement					0.9983	Averages	0.763
6-Jan-11	747	50	-17	0.000	10.382	10.382	21.0	21.0	203.868	214.133	10.265	20.0	20.0		0.9988	-0.00677	0.202
6-Jan-11	747	50	-17	10.382	20.709	10.327	21.0	22.0	214.133	224.481	10.348	20.0	21.0		1.0122	0.00666	0.203
6-Jan-11	747	50	-17	20.709	31.161	10.452	22.0	23.0	224.481	234.869	10.388	21.0	21.0		1.0057	0.00011	0.204
										Passed Calibration Factor Variation Requirement					1.0056	Averages	0.203
														Overall Average Y	1.0000		

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, using a Precision Wet Test Meter, which in turn was calibrated using the American Bell Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.)

Signature Eric Wilt Date 1/6/11

DIRIGO LABORATORIES INC.

EPA Method 5 Dry Gas Meter Calibration for γ and ΔH@

Average DGM γ factor = **1.000**

Average Meter Orifice ΔH@ = **58.966**

Manufacturer:	Apex
Model/Box No.:	Box B - SK25
Serial Number	1902133
Equipment No.:	Dirigo 054
Calibration Date:	7/6/2011
Next Calibration Due:	1/6/2012
Barometric Pressure:	30.04 inHg
Signature/Date:	7/6/11

	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	42.849	41.978	33.938
Standard Ave. Meter Temperature (°F), (Tstd)	75.0	75.0	76.0
DGM Initial Volume (cuft)	0.000	0.000	0.000
DGM Final Volume (cuft)	1.561	1.528	1.249
DGM Average Temperature (°F), (T_{DGM})	97.0	94.0	99.0
Time (min)	10.0	11.0	10.0
Orifice ΔH ("H2O)	2.45	1.93	1.54
Vacuum ("H2O)	0.00	0.00	0.00
Total Volume for Standard DGM (Vstd) (cuft)	1.513	1.482	1.199
Total Volume for DGM (V_{DGM}) (cuft)	1.561	1.528	1.249

Dry Gas Meter γ Factor	1.003	1.000	0.997
γ Factor Deviation From Average	0.003	0.000	0.003
Meter Orifice ΔH@	59.090	58.853	58.954
Orifice ΔH@ Deviation From Average	0.124	0.112	0.012

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. γ = (Vstd x (Std γ factor) x (P_{bar}) x (T_{DGM} + 460) / (V_{DGM} x (Tstd + 460) x (Pbar + (dH / 13.6)))
3. ΔH@ = 0.0319 x ΔH ((((T_{DGM}+ 460) x (Time^2)) / (P_{bar} x (γ factor^2) x (V_{DGM}^2)))

Measurement of uncertainty = +/- 0.14 cfm

Standard Meter Data

Date	1/6/2011
γ Factor	1.0000
Model	W-NK-1A
Serial Number	539784

Pre-Calibration Data

Date	2/3/2011
γ Factor	1.0000
ΔH@	3.535
Tolerance (5%)	0.050
Deviation	0.000

Pass

DGM Calibration Data

γ Deviation Tolerance	0.020
Maximum γ Deviation	0.003
ΔH@ Deviation Tolerance	0.200
Maximum dH@ Deviation	0.124

Pass

DIRIGO LABORATORIES INC.

EPA Method 5 Dry Gas Meter Calibration for γ and ΔH@

Average DGM γ factor = **1.003**

Average Meter Orifice ΔH@ = **57.180**

Manufacturer:	Apex
Model/Box No.:	Box A
Serial Number	1902130
Equipment No.:	Dirigo 053
Calibration Date:	7/6/2011
Next Calibration Due:	1/6/2012
Barometric Pressure:	30.04 inHg
Signature/Date:	7/6/11

	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	44.479	40.994	35.739
Standard Ave. Meter Temperature (°F), (Tstd)	75.0	75.0	75.0
DGM Initial Volume (cuft)	0.000	0.000	0.000
DGM Final Volume (cuft)	1.562	1.446	1.269
DGM Average Temperature (°F), (T_{DGM})	77.0	79.0	81.0
Time (min)	10.0	10.5	10.0
Orifice ΔH ("H2O)	2.46	1.91	1.61
Vacuum ("H2O)	0.00	0.00	0.00
Total Volume for Standard DGM (Vstd) (cuft)	1.571	1.448	1.262
Total Volume for DGM (V_{DGM}) (cuft)	1.562	1.446	1.269

Dry Gas Meter γ Factor	1.003	1.004	1.002
γ Factor Deviation From Average	0.000	0.001	0.001
Meter Orifice ΔH@	57.115	57.190	57.233
Orifice ΔH@ Deviation From Average	0.064	0.011	0.054

Standard Meter Data

Date	1/6/2011
γ Factor	1.0000
Model	W-NK-1A
Serial Number	539784

Pre-Calibration Data

Date	2/2/2011
γ Factor	1.0000
ΔH@	3.429
Tolerance (5%)	0.050
Deviation	0.003

Pass

DGM Calibration Data

γ Deviation Tolerance	0.020
Maximum γ Deviation	0.001
ΔH@ Deviation Tolerance	0.200
Maximum dH@ Deviation	0.064

Pass

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. γ = (Vstd x (Std γ factor) x (P_{bar}) x (T_{DGM} + 460) / (V_{DGM} x (Tstd + 460) x (Pbar + (dH / 13.6)))
3. ΔH@ = 0.0319 x ΔH ((((T_{DGM}+ 460) x (Time^2)) / (P_{bar} x (γ factor^2) x (V_{DGM}^2)))

Measurement of uncertainty = +/- 0.14 cfm

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
11711 S. Alameda Street
Los Angeles, CA 90059-2130
(323) 357-6891 Fax: (323) 567-3686
http://www.airgas.com

Part Number:	E04NI77E15A0575	Reference Number:	48-124265336-1
Cylinder Number:	CC280566	Cylinder Volume:	151 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32011	Valve Outlet:	590
Analysis Date:	May 25, 2011		

Expiration Date: May 25, 2014

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON MONOXIDE	2.500 %	2.494 %	G1	+/- 1% NIST Traceable
CARBON DIOXIDE	10.00 %	10.47 %	G1	+/- 1% NIST Traceable
OXYGEN	10.50 %	10.11 %	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	060608	CC206095	22.51% OXYGEN/NITROGEN	May 01, 2016
NTRM	080614	CC267714	1.959% CARBON MONOXIDE/NITROGEN	Oct 15, 2012
NTRM	040604	XC034266B	19.84% CARBON DIOXIDE/NITROGEN	May 15, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS % CO2	NDIR	May 21, 2011
HORIBA % CO	NDIR	May 03, 2011
Siemens %O2	PARAMAGNETIC	May 20, 2011

Triad Data Available Upon Request

Notes:

Approved for Release

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
11711 S. Alameda Street
Los Angeles, CA 90059-2130
(323) 357-6891 Fax: (323) 567-3686
http://www.airgas.com

Part Number:	E04NI61E15A0574	Reference Number:	48-124265918-1
Cylinder Number:	CC114718	Cylinder Volume:	101 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	1310 PSIG
PGVP Number:	B32011	Valve Outlet:	590
Analysis Date:	May 25, 2011		

Expiration Date: May 25, 2014

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON MONOXIDE	4.250 %	4.255 %	G1	+/- 1% NIST Traceable
CARBON DIOXIDE	17.00 %	17.42 %	G1	+/- 1% NIST Traceable
OXYGEN	17.00 %	16.90 %	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	060608	CC206095	22.51% OXYGEN/NITROGEN	May 01, 2016
NTRM	080614	CC267714	1.959% CARBON MONOXIDE/NITROGEN	Oct 15, 2012
NTRM	040604	XC034335B	19.84% CARBON DIOXIDE/NITROGEN	May 15, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS % CO2	NDIR	Apr 22, 2011
HORIBA % CO	NDIR	May 03, 2011
Siemens %O2	PARAMAGNETIC	Apr 22, 2011

Triad Data Available Upon Request

Notes:

Approved for Release

AIRGAS

NITROGEN - ULTRA HIGH PURITY-PURE

www.airgas.com

Part Number:	NI UHP200BA	Reference Number:	16-101518687-3
Cylinder Analyzed:	6564&	Cylinder Volume:	230 Cubic Feet
Laboratory:	NOR - Portland - OR	Cylinder Pressure:	2200 PSIG
Analysis Date:	May 10, 2011	Valve Outlet:	580
Lot #:	16-101518687-3		

ANALYTICAL RESULTS

Component	Requested Purity	Certified Concentration
NitrogenUltraHighPurity	99.999%	99.999%
CO + CO2	< 1 PPM	< 1 PPM
Moisture	< 1 PPM	< 1 PPM
Oxygen	< 1 PPM	< 1 PPM
THC	< 0.5 PPM	< 0.5 PPM

Cylinders in Batch:

CAI2175778Y, CG969822, N-459011

Notes:

Impurities verified against analytical standards traceable to NIST by weight and/or analysis.

Approved for Release

Calibration Worksheet

Pre-Test

Date: 6/9/4 Technician: GN
Time: _____ Project #: 001-WS-1-10

R1	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0	0.0	2.494	2.54	4.25	4.26
CO_2	0	0.0	10.47	10.51	17.42	17.43
O_2	0	0.0	10.11	10.05	16.9	16.88

Date: 6/10/11 Technician: GN
Time: _____ Project #: 001-WS-10

R2	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0	0.0	2.494	2.55	4.25	4.25
CO_2	0	0.0	10.47	10.50	17.42	17.41
O_2	0	0.0	10.11	10.02	16.9	16.90

Date: 6/10/4 Technician: GN
Time: _____ Project #: 001-WS-1-10

R3	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0	0.0	2.494	2.55	4.25	4.25
CO_2	0	0.0	10.47	10.50	17.42	17.41
O_2	0	0.0	10.11	10.02	16.9	16.90

Date: 6/12/11 Technician: GN
Time: _____ Project #: 001-WS-1-10

R4	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0	0.0	2.494	2.47	4.25	4.25
CO_2	0	0.0	10.47	10.45	17.42	17.40
O_2	0	0.0	10.11	10.07	16.9	16.91

Post Test

Date: _____ Technician: _____
Time: _____ Project #: _____

	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0	0.0	2.494	2.56	4.25	4.28
CO_2	0	0.0	10.47	10.55	17.42	17.50
O_2	0	0.0	10.11	10.10	16.9	16.89

Date: _____ Technician: _____
Time: _____ Project #: _____

N/A	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0		2.494		4.25	
CO_2	0		10.47		17.42	
O_2	0		10.11		16.9	

Date: 6/10/11 Technician: G.N
Time: _____ Project #: 001-WS-1-10

	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0	0.0	2.494	2.57	4.25	4.29
CO_2	0	0.0	10.47	10.52	17.42	17.58
O_2	0	0.0	10.11	10.07	16.9	16.72

Date: 6/12/11 Technician: G.N
Time: _____ Project #: 001-WS-1-10

	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0	0.1	2.494	2.50	4.25	4.27
CO_2	0	0.0	10.47	10.49	17.42	17.42
O_2	0	0.1	10.11	10.09	16.9	17.11

ZERO Part # NI UHP200BA
LOT # 16-101518687-3

MID Part # E04NI77E15A0575
Cylinder # CC280566

SPAN Part # E04N161E5Z0574
Cylinder # CC114718

Calibration Worksheet

Pre-Test

Date: 6/13/11 Time: _____ Technician: J. Steinert Project #: 001-WS-1-10

RS

	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0	0.0	2.494	2.50	4.25	4.255
CO_2	0	0.0	10.47	10.48	17.42	17.42
O_2	0	0.0	10.11	10.12	16.9	16.9

Date: 6/20 Time: _____ Technician: G.N. Project #: 001-WS-1-10

RL2

	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0	0.0	2.494	2.490	4.25	4.254
CO_2	0	0.0	10.47	10.45	17.42	17.42
O_2	0	0.0	10.11	10.05	16.9	16.90

Date: _____ Time: _____ Technician: _____ Project #: _____

	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0		2.494		4.25	
CO_2	0		10.47		17.42	
O_2	0		10.11		16.9	

Date: _____ Time: _____ Technician: _____ Project #: _____

	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0		2.494		4.25	
CO_2	0		10.47		17.42	
O_2	0		10.11		16.9	

Post Test

Date: 6/13/11 Time: _____ Technician: J. Steinert Project #: 001-WS-1-10

	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0	0.0	2.494	2.52	4.25	4.3
CO_2	0	0.1	10.47	10.48	17.42	17.43
O_2	0	0.1	10.11	10.14	16.9	17.1

Date: 6/20/11 Time: _____ Technician: G.N. Project #: 001-WS-1-10

	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0	0.0	2.494	2.51	4.25	4.27
CO_2	0	0.0	10.47	10.49	17.42	17.44
O_2	0	0.0	10.11	10.08	16.9	16.99

Date: _____ Time: _____ Technician: _____ Project #: _____

	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0		2.494		4.25	
CO_2	0		10.47		17.42	
O_2	0		10.11		16.9	

Date: _____ Time: _____ Technician: _____ Project #: _____

	Zero Gas		Mid Gas		Span Gas	
	Value	Reading	Value	Reading	Value	Reading
CO	0		2.494		4.25	
CO_2	0		10.47		17.42	
O_2	0		10.11		16.9	

ZERO Part # NI UHP200BA LOT # 16-101518687-3

MID Part # E04NI77E15A0575 Cylinder # CC280566

SPAN Part # E04N161E5Z0574 Cylinder # CC114718

History for Portland, OR

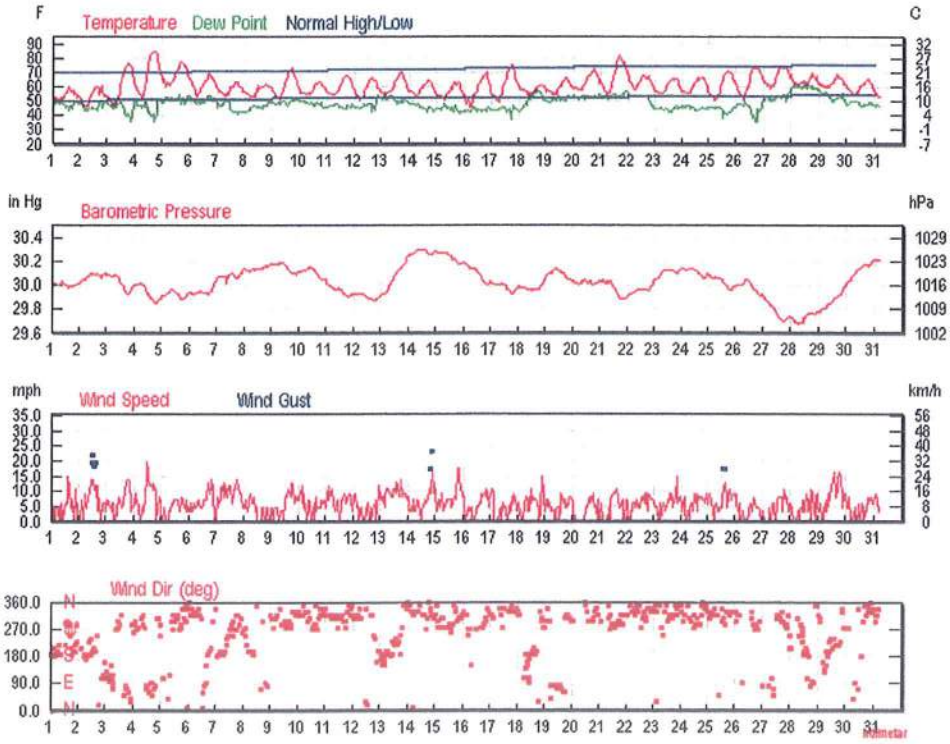
Month of June, 2011 — View Current Conditions

Month of June, 2011

« Previous Month June 9 2011 View Next Month »

Daily Weekly **Monthly** Custom

	Max	Avg	Min	Sum
Temperature				
Max Temperature	86 °F	70 °F	61 °F	
Mean Temperature	69 °F	62 °F	54 °F	
Min Temperature	62 °F	53 °F	45 °F	
Degree Days				
Heating Degree Days (base 65)	11	4	0	107
Cooling Degree Days (base 65)	4	1	0	16
Growing Degree Days (base 50)	19	11	4	337
Dew Point				
Dew Point	61 °F	49 °F	36 °F	
Precipitation				
Precipitation	0.31 in	0.03 in	0.00 in	0.63 in
Snowdepth	0.0 in	0.0 in	0.0 in	-
Wind				
Wind	22 mph	6 mph	0 mph	
Gust Wind	26 mph	20 mph	16 mph	
Sea Level Pressure				
Sea Level Pressure	30.30 in	30.02 in	29.67 in	



Certify This Report

Monthly Calendar Overview

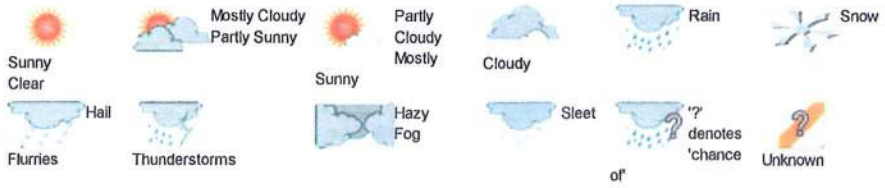
Precipitation: Actual month total **0.63** Normal month total **1.59**

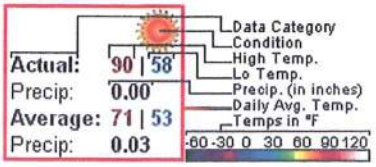
Print This Calendar

« Previous Month « 2010 **June 2011** 2012 » Next Month »

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1 Actual: 63 | 51 Precip: 0.31 Average: 70 | 50 Precip: 0.07	2 Actual: 61 | 46 Precip: 0.04 Average: 70 | 50 Precip: 0.07	3 Actual: 77 | 47 Precip: 0.00 Average: 70 | 51 Precip: 0.07	4 Actual: 86 | 51 Precip: 0.00 Average: 70 | 51 Precip: 0.06
5 Actual: 78 | 59 Precip: 0.00 Average: 70 | 51 Precip: 0.06	6 Actual: 69 | 54 Precip: 0.00 Average: 71 | 51 Precip: 0.06	7 Actual: 65 | 54 Precip: 0.01 Average: 71 | 51 Precip: 0.06	8 Actual: 62 | 53 Precip: T Average: 71 | 51 Precip: 0.06	9 Actual: 73 | 50 Precip: 0.00 Average: 71 | 52 Precip: 0.06	10 Actual: 65 | 55 Precip: T Average: 71 | 52 Precip: 0.06	11 Actual: 70 | 55 Precip: 0.00 Average: 72 | 52 Precip: 0.06
12 Actual: 67 | 51 Precip: T Average: 72 | 52 Precip: 0.06	13 Actual: 71 | 55 Precip: 0.01 Average: 72 | 52 Precip: 0.06	14 Actual: 67 | 54 Precip: 0.00 Average: 72 | 52 Precip: 0.06	15 Actual: 65 | 50 Precip: 0.02 Average: 72 | 53 Precip: 0.05	16 Actual: 69 | 45 Precip: 0.00 Average: 73 | 53 Precip: 0.05	17 Actual: 76 | 48 Precip: 0.00 Average: 73 | 53 Precip: 0.05	18 Actual: 61 | 54 Precip: 0.17 Average: 73 | 53 Precip: 0.05
19 Actual: 67 | 54 Precip: 0.02 Average: 73 | 53 Precip: 0.05	20 Actual: 73 | 57 Precip: T Average: 74 | 53 Precip: 0.05	21 Actual: 83 | 54 Precip: 0.00 Average: 74 | 53 Precip: 0.05	22 Actual: 69 | 58 Precip: 0.00 Average: 74 | 54 Precip: 0.05	23 Actual: 67 | 55 Precip: 0.00 Average: 74 | 54 Precip: 0.04	24 Actual: 68 | 55 Precip: 0.00 Average: 75 | 54 Precip: 0.04	25 Actual: 72 | 50 Precip: 0.00 Average: 75 | 54 Precip: 0.04
26 Actual: 75 | 51 Precip: 0.00 Average: 75 | 54 Precip: 0.04	27 Actual: 77 | 59 Precip: 0.00 Average: 75 | 54 Precip: 0.04	28 Actual: 70 | 62 Precip: 0.05 Average: 76 | 55 Precip: 0.04	29 Actual: 69 | 59 Precip: T Average: 76 | 55 Precip: 0.04	30 Actual: 67 | 55 Precip: T Average: 76 | 55 Precip: 0.04		

Calendar Legend





Daily Observations

2011	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mph>)			Wind (mph)			Precip. (in)	Events
Jun	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	high	sum	
1	63	57	51	50	48	44	96	76	55	30.03	30.01	29.98	10	9	5	16	6	21	0.31	Rain
2	61	54	46	51	47	44	100	78	55	30.09	30.07	30.03	10	10	4	21	7	26	0.04	Rain
3	77	62	47	50	45	36	100	63	26	30.08	30.03	29.93	10	8	0	16	7	21	0.00	

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2011	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mph>)			Wind (mph)			Precip. (in)	Events
4	86	69	51	51	45	36	83	50	17	30.02	29.93	29.84	10	10	9	22	8	26	0.00	
5	78	69	59	55	51	48	72	54	35	29.96	29.92	29.88	10	10	10	12	4	14	0.00	Rain
6	69	62	54	53	50	46	83	70	56	30.06	29.96	29.92	10	10	10	14	6	-	0.00	
7	65	60	54	52	46	41	89	68	46	30.13	30.08	30.02	10	9	4	20	10	23	0.01	Rain
8	62	58	53	49	46	43	77	66	55	30.17	30.14	30.11	10	10	10	10	5	13	T	Rain
9	73	62	50	52	49	47	89	67	44	30.19	30.14	30.08	10	10	10	14	6	17	0.00	
10	65	60	55	50	48	46	83	70	56	30.15	30.10	30.02	10	10	10	12	5	21	T	
11	70	63	55	48	47	45	77	60	42	30.01	29.95	29.90	10	10	10	12	7	15	0.00	
12	67	59	51	53	48	42	83	66	48	29.93	29.90	29.87	10	10	10	10	4	14	T	Rain
13	71	63	55	54	51	48	93	70	47	30.24	30.05	29.92	10	10	4	17	9	21	0.01	Rain
14	67	61	54	48	46	43	77	61	44	30.30	30.28	30.25	10	10	10	14	5	18	0.00	
15	65	58	50	48	45	41	89	69	48	30.27	30.23	30.18	10	10	8	17	7	21	0.02	Rain
16	69	57	45	46	44	42	86	62	37	30.17	30.09	30.00	10	10	10	12	4	15	0.00	
17	76	62	48	47	44	37	86	56	25	30.02	29.98	29.93	10	10	10	12	4	14	0.00	
18	61	58	54	57	52	42	93	73	53	30.06	29.98	29.95	10	7	2	12	3	14	0.17	Rain
19	67	61	54	53	51	49	86	71	56	30.13	30.09	30.03	10	10	9	10	5	13	0.02	
20	73	65	57	55	53	51	80	65	49	30.04	30.02	30.01	10	10	10	10	4	13	T	
21	83	69	54	57	54	52	93	65	36	30.04	29.97	29.88	10	9	3	12	5	25	0.00	
22	69	64	58	54	52	45	86	72	58	30.05	29.96	29.91	10	10	10	12	5	16	0.00	
23	67	61	55	47	45	42	72	57	42	30.14	30.10	30.05	10	10	10	13	5	15	0.00	
24	68	62	55	47	46	44	72	59	45	30.14	30.11	30.06	10	10	10	13	6	18	0.00	
25	72	61	50	47	44	38	83	59	34	30.08	30.03	29.97	10	10	10	14	6	17	0.00	
26	75	63	51	51	45	36	83	54	25	30.04	29.99	29.91	10	10	10	8	3	10	0.00	
27	77	68	59	59	53	50	78	61	43	29.90	29.77	29.70	10	10	10	12	4	14	0.00	Rain
28	70	66	62	61	60	58	93	83	73	29.78	29.73	29.67	10	10	6	12	6	13	0.05	Rain
29	69	64	59	57	53	48	90	72	53	30.01	29.87	29.78	10	10	10	18	9	23	T	Rain
30	67	61	55	50	49	47	83	68	52	30.22	30.14	30.03	10	10	9	9	4	13	T	Rain

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Appendix G: Example Calculations

Example Calculations for Run 1 - Box A:

1. Sample Rate (ft^3/min) = $\frac{(\text{Interval}_2 \text{ gas meter volume} - \text{Interval}_1 \text{ gas meter volume})}{\text{Interval range (min)}} = (2.777\ ft^3 - 1.379\ ft^3) / 10\ min = 0.140\ ft^3/min$

2. Proportional Rate % = $\frac{(\text{Run time})(\text{Gas meter Volume})(\text{Initial Tunnel velocity})(\text{Average meter temp} + 460)(\text{Tunnel temp} + 460)}{(\text{Interval time})(\text{Total meter volume})(\text{Tunnel velocity})(\text{Average tunnel temp} + 460)(\text{Average meter temp} + 460)} \times (100) =$

   $= \frac{(160\ min)(2.777\ ft^3)(12.324\ ft/sec)(94\ °F + 460)(95\ °F + 460)}{(10\ min)(22.576\ ft^3)(12.282\ ft/sec)(90\ °F + 460)(94\ °F + 460)} \times (100) = 102\%$

3. Initial Tunnel Flow (scfm) = $\left((5129.4) \times (\text{Pitot tube Cp}) \times (((\Delta P_1)^{0.5}(\Delta P_2)^{0.5}(\Delta P_3)^{0.5}(\Delta P_4)^{0.5}(\Delta P_5)^{0.5}(\Delta P_6)^{0.5}(\Delta P_7)^{0.5}(\Delta P_8)^{0.5})/8) \times ((\text{Ave tunnel temp} + 460)/((\text{Ave } P_{bar} + (\text{static}/13.6))(MW_{wet})))^{0.5} \times (528/(\text{Ave tunnel temp} + 460)) \times ((\text{Ave } P_{bar} + (\text{static}/13.6))/29.92) \times (\text{Tunnel area})\right) \times (1-(\%H2O/100)) =$

   $= \left((5129.4) \times (0.99) \times (((0.034)^{0.5}(0.032)^{0.5}(0.034)^{0.5}(0.030)^{0.5}(0.032)^{0.5}(0.032)^{0.5}(0.036)^{0.5}(0.030)^{0.5})/8) \times ((94 + 460)/(30.02 + (-0.4/13.6))(28.56)))^{0.5} \times (528/(94 + 460)) \times ((30.02 + (-0.4/13.6))/29.92) \times (0.196)\right) \times (1-(4.00/100)) = 132.28\ scfm$

4. Tunnel Velocity (Vs) =

Vs (ft/sec) = (85.49)(Pitot Tube Cp)(Ave. Tunnel ΔP)$^{0.5}$ ((Ave. tunnel temp + 460)/(Ave. P_{bar} + Tunnel static/13.6)(Dilution tunnel MW))$^{0.5}$ =

= (85.49)(0.99)(0.033 inH_2O)$^{0.5}$ ((94 °F + 460)/(30.02 inHg +(-0.400 inH2O/13.6))(28.56 lb/lb-mole))$^{0.5}$ = 12.324 ft/sec

5. Average Gas Flow Rate in Dilution Tunnel – Qsd

Qsd (dscf/hr) = (3600)(1-(Dilution tunnel %H2O/100))(Tunnel area)(Vs)(528/29.92)((Ave.P_{bar} + (Dilution tunnel static/13.6))/(Ave. tunnel temp + 460))

= (3600)(1-(4.00 % / 100))(0.196 ft^2)(12.324 ft/sec)(528/29.92 inHg)((30.02 inHg + (-0.400 inH_2O/13.6))/(90 °F + 460)) = 8027.89 dscf/hr

6. Total Sample Volume (Standard Condition) – Vmstd

Vm = Total sample volume

$$\text{Vmstd (dscf)} = \left(\frac{((Vm)(\text{Meter y factor})(528 / 29.92\ \text{inHg}))(\text{Average } P_{bar}+(\text{Orifice } \Delta H/13.6))}{(\text{Average meter temp} + 460)}\right) =$$

$$= \left(\frac{((22.58\ \text{cf})(1)(528 / 29.92\ \text{inHg}))\ ((30.02\ \text{inHg})+(1.98/13.6))}{(94\ °\text{F} + 460)}\right) = 21.70\ \text{dscf}$$

7. Particulate Concentration (dry standard) – (grams/dscf) =

= (Total particulate / 1000) / (vmstd) = (3.2 mg / 1000) / (21.70 dscf) = 0.00015 g/dscf

8. Particulate Emission Rate (grams / hour) =

= (Particulate concentration)(Qsd) = (0.00015 g/dscf)(8027.89 dscf/hr) = 1.18 g/hr

9. Adjusted Emissions (grams/hour) =

= (1.82)(Particulate emissions rate)$^{0.83}$ = (1.82)(1.18 g/hr)$^{0.83}$ = 2.09 g/hr

10. Dry Wood Burn Rate (kg/hr) =

= $\left((1-(\text{Average Fuel moisture} / (100 + \text{Average fuel moisture}))\right)(60 \text{ min/hr})(\text{Fuel weight} / \text{Run time})(0.453593 \text{ kg/lb})\right)$ =

= $\left((1-(21.32 \% / (100 + 21.32 \%))(60 \text{ min/hr})(5.82 \text{ lb} / 160 \text{ min})(0.453593 \text{ kg/lb})\right)$ = 0.82 kg/hr

Example Calculations for Weighted Average:

11. Test run weighting factor:

P_i = Probability for burn rate during test run

K_i = Test run weighting factor

$K_1 = P_2 - P_0$, $K_2 = P_3 - P_1$, $K_3 = P_4 - P_2$, $K_4 = P_5 - P_3$, $K_5 = P_6 - P_4$, $K_6 = P_7 - P_5$, $K_7 = P_8 - P_6$, $K_8 = P_9 - P_7$

K_2 = (0620 - 0.185) = 0.435

12. Emissions rate weighted average:

E_i = Emissions rate for test run

K_2E_2 = (0.435)(1.6) = 0.68 g/hr

Weighted average (E_w)

E_w (g/hr) = (Summation of K_iE_i) / (Summation of K_i) = (6.08 g/hr) / (1.809) = 3.4 g/hr

13. HHV Eficiency %:

= (((0.234x74.2)+(0.435x71.2)+(0.760x72.7)+(0.380x63.8)) / (0.234+0.435+0.760+0.380)) = 70.7%

Appendix H: Installation and Operations Manual

Jøtul F 602 USA
Manual Version P09

Jøtul F 602 USA

JØTUL

Kindly save these instructions for future reference.
Ce document doit être conservé pendant toute la vie de l'appareil.

USA

Table of contents

Accepted For Use
City of New York
Department of Buildings
MEA 313-00-E
Jøtul North America, Inc.

General Information

The Owner's Manual describes the installation and operation of the Jøtul F 602 USA non-catalytic wood heater. This heater meets the U.S. Environmental Protection Agency's emission limits for wood heaters sold after July 1, 1990. Under specific test conditions, this heater has shown heat output at rates ranging from 9,600 to 42,000 BTU's per hour.

When installing, operating, and maintaining your Jøtul F 602 USA, follow the guidelines given in these instructions. Save these instructions, and make them available to anyone using the stove.

A number of areas of the U.S. and Canada require a building permit to install a solid-fuel burning appliance. NFPA 211 (National Fire Protection Association, Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances) or CAN/CSA B-365 (Installation Code for Solid-Fuel Burning Appliances and Equipment) may apply to the installation of solid fuel burning appliances in your area. Your Jøtul dealer has knowledge of your local codes and can provide assistance in making sure your installation is safe and legal. Also contact your insurance representative, building inspector, or fire officials to determine what regulations apply in your area.

The Jøtul F 602 USA has been tested and listed to ANSI-UL 1482, UL 737, and ULC S627 by Intertek Testing Services-Warnock Hersey of Middelton, Wisconsin.

NATIONAL FIREPLACE INSTITUTE 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

Possible Hazards to Avoid When Using the Jøtul F 602 USA

Any use of fire in a house represents a certain danger. With intense overfiring, temperatures on the surface of the Jøtul F 602 USA can exceed 1 000 °F (536 °C).

Comply with the following guidelines:

- Never overfire the stove. If any part of the stove or chimney glows, you are overfiring, and a house fire or serious damage to the stove or chimney could result. Immediately close down the air control if you notice this condition.
- Teach children that the stove is hot and must not be touched.
- Never use gasoline, gasoline-type lantern fuel,
- Never use kerosene, charcoal lighter fluid or similar liquids to start or "freshen up" a fire in this heater. They can ignite with explosive force, causing bodily injury or death. Keep all such liquids far away from the heater while it is in use.
- Never use the stove if there are combustible gases in the house. The fumes from certain cleaning fluids, adhesives, and paints are a few examples of combustible gases. Remember, the operating woodstove is a source of "open flame".
- Avoid creating a "low pressure" condition in the room where the stove is operating, such as by operating an exhaust fan or a clothes dryer. A low-pressure condition could cause poisonous gases to be drawn out of the stove into the room. Some fuel will during combustion separate carbon monoxide and generate it in the burnchamber. Carbon monoxide is toxic, so please follow the guidelines in this manual to avoid smoke "roll out" from the burnchamber. You can prevent a low-pressure condition by providing adequate outside combustion air within 24" of the stove.
- Never operate the Jøtul F 602 USA if it has cracked or broken glass. Replace damaged glass only with the proper glass panel available from your Jøtul dealer.
- Never burn trash of any kind in the stove.
- Keep combustible materials far away from the stove.
- Never modify the stove in any way.
- Do not dry clothes over the stove, since they could fall and ignite.
- Use only seasoned wood in your stove. Never use fireplace coal or synthetic logs that have not been approved for the stove.
- Always wear protective gloves when adding fuel to the fire.
- If you for some reason experience smoke "roll out" from the fireplace, it might activate smoke detectors (if installed).
- Do not connect this heater to any air distribution duct.

Note! This stove is not approved for use in mobile homes.

1.0 Installation

Safety Notice

If this solid fuel room heater is not properly installed a house fire may result. For your safety, follow the installation directions. Contact local building or fire officials about restrictions and installation inspection requirements in your area.

Please read this entire manual before you install and use your new stove. Failure to follow instructions may result in property damage, bodily injury, or even death.

We recommend that you have your Jøtul F 602 USA installed by a professional installer of solid fuel room heaters.

1.1 Top Exit or Rear Exit

The Jøtul F 602 USA has two flue outlet positions. If you wish to top-exit the stove, place the cover plate in the rear position and secure it with the screws and nuts, then secure the flue collar to the top with the two remaining screws.

To rear -exit the stove, secure the cover plate in the top position with the two screws, then secure the flue collar to the rear with the two remaining screws and two nuts.

When fastening the plate or flue collar to the rear, it may be necessary to reach in through the top opening and hold the nuts with a wrench.

1.2 Attaching the Legs

The Jøtul F 602 USA has four tapped leg bolt holes in the bottom plate. Fasten each leg to the bottom with a bolt and with a washer between the bolt head and the leg.

USA

2.0 Plan Ahead

A safe stove installation involves several elements, including: **(2.1)** the chimney connector, **(2.2)** the chimney itself, **(3.0)** the connection between the chimney connector and chimney, and **(4.0)** protection of combustible materials in the vicinity of the stove. Each of these elements is equally important for a safe stove installation.

2.1 Chimney Connector (Stove Pipe)

Chimney connector is also sometimes called stove pipe or flue pipe, and it is used to connect the stove to the chimney. The chimney connector should be 6" diameter black steel, with a minimum thickness of 24 gauge.
Do not use aluminium or galvanized steel pipe as a chimney connector. These materials cannot withstand the extreme temperatures of a wood fire and can give off toxic fumes when heated.

Matching enamel pipe is available for your Jøtul F 602 USA. Contact your Authorised Jøtul dealer for more information.

Do not use chimney connector pipe as a chimney.
The factory-supplied adapter must be used for fitting the stove's flue collar to the chimney connector.

Chimney connector sections must be attached to the stove's flue collar adapter and to each other with the crimped end toward the stove **(fig. 2, page 23)**.
The space between the flue collar adapter and the chimney connector should be sealed with stove cement or an appropriately size piece of gasket. This allows any small amounts of condensed creosote to run into the stove rather then onto the outside of the pipe or the stove top. All joints, including the adapter to the flue collar, should be secured with three sheet metal screws to ensure that the sections will not separate.

For proper operation the chimney connector should be as short as possible. Horizontal lengths should have an upward slope from the stove of 1/4" per foot. Avoid using more than two 90 degree elbows or total runs of pipe greater than 1 0'.

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. Whenever possible, avoid passing the chimney connector through a combustible wall.

Wall Pass-Through

When your installation unavoidably requires that the chimney connector pass through a combustible wall to reach the chimney, extreme care must be taken. In the U.S., the National Fire Protection Association's publication NFPA 21 1, Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances, permits four methods for passing through a combustible wall. In Canada, refer to CAN/CGA B356.

Before beginning the installation, contact local building officials to make sure the proposed pass-through method meets local building code requirements.

A commonly used method to pass through a wall directly to a masonry chimney requires removal of all combustible material from at least 12" around the entire chimney connector. The space is then filled with at least 12" of brick around a fireclay liner. Be sure to locate it so that the top of the chimney connector will be at least 18" below the ceiling.

To construct the brick pass-through, you will need an opening of 30" x 30" minimum. It will be necessary to cut wall studs, install headers, and construct a sill frame to maintain proper dimensions and to hold the weight of the brick. Minimum 3-1/2" (4" nominal) thick solid bricks are to be used.

The fireclay liner (ASTM C35 or equivalent), minimum 5/8" wall thickness, must not penetrate into the chimney beyond the inner surface of the chimney flue liner and must be firmly cemented in place. If it is necessary to cut a hole in the chimney liner, use extreme care to keep it from shattering. Refractory mortar must be used at the junction to the chimney liner. **(See figure 3, page 23)**

An approved installation that uses a section of listed solid fuel insulated factory-built chimney as a pass- through for the chimney connector, must have an inside diameter which is 2" larger than the chimney connector- a minimum length of 12" -and at least 1" of insulation thickness. The chimney section is installed with at least 2" of air space between the outer chimney wall and adjacent combustible materials.

Sheet steel support plates are used on both ends of the chimney section to keep the connector centred. The opening around the chimney section is closed on both sides of the wall with sheet steel plates and the chimney section is securely fastened to the plates. Fasteners used to support the chimney section should never penetrate the inner flue liner.

See NFPA-211 for other approved wall passthrough methods.

2.2 Chimneys

There are two types of chimneys suitable for the Jøtul F 602 USA. An approved masonry chimney, or a listed residential-type building heating appliance chimney.

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 masonry chimney on the exterior of the house will give the poorest performance. This is because it can be very difficult to warm up, and in extremely cold northern areas it may not work at all.

A tall masonry chimney inside the house is easier to keep warm and will work best.

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 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, wether masonry or prefabricated metal, must be the required height above the roof or other obstruction for safety and for proper draft operation. The requirement is that the chimney must at least 3' higher than the highest point where it passes through the roof and at least 2' higher than the be at least and highest part of the roof or structure that is within 10' of the chimney, measured horizontally **(fig. 4, page 23.**

Chimneys shorter than 14' may not provide adequate draft. This could result in smoke spilling the room from the door or joints in the stove or pipe. In addition, inadequate draft can cause puffing. A too-strong draft, on the other hand, cause excessive temperatures and can shorten burn times. Excessive drafts can be corrected by having your dealer install a barometric damper at 0.1" of water column. If you suspect you have draft problem, consult your dealer.

Listed Metal Prefabricated Chimneys

The heater must be connected to a listed Type HT per UL 103 or ULC S629 prefabricated 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 the proper clearance 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.

There are basically two methods of metal chimney installation. One method is to install the chimney inside the residence through the ceiling and the roof **(fig. 5, page 24)**.

The other method is to install an exterior chimney that runs up the outside of the residence.

USA

3.0 Connection to the Chimney

Masonry Chimneys

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 23.**

Prefabricated Chimneys

Always follow the chimney manufacturer's instructions and use all the components required by the manufacturer. Do not take shortcuts or use make shift methods for securing the chimney connector to the chimney.

Note: The clearances expressed in inches are those approved for installations in the United States. The clearances in parentheses that are expressed in centimeters are those approved for installations in Canada. Different test standards for the respective countries may result in differences in the clearance requirements.

4.0 Clearances to Combustibles

4.1 Floor Protection

A bottom heat shield is required in all installations. In addition, your 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 23)**.

The floor protection must have a minimum R value of .47. 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).

The easiest means of determining if a proposed alternate floor material meets requirements listed in the appliance manual is to follow the procedure: **See page 27.**

4.3 Clearance to Adjacent Combustible Materials

The diagrams in **figures 8-9-10 - page 23,** give the required clearances you must maintain from unprotected combustible materials or objects.

A combustible is anything that can burn, and in the case of stove installations, these combustibles 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 off icials. 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 unseen combustibles 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 in Alcove Installations

The Jøtul F 602 USA optional rear heat shield, PN HS50,may be used only in top-exiting parallel installations to reduce clearance as shown in **figures 11,12,13, page 24.**

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 16, 17, and 18 on pages 24 and 24** for approved sizing specifications.

4.6 Alcove installation

When installed with a listed double wall pipe and with wall protection, the Jøtul F 602 USA 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". The clearances for this installation are shown in **figure 14-15, page 24.**

When installed with a listed double wall pipe and with a stove heat shield, the Jøtul F 602 USA 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. 12-13, page 24.**

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 23).** Both side walls and the rear wall must be protected by the wall protector **(fig. 14, page 24).**

([1]*See NFPA 211 for ceiling clearance reductions with protection.*)

For a fireplace installation, refer to the clearance specifications as shown in fig. 20, page 26.

5.0 Operation

Before building a fire in your new stove, please read the following section carefully.

5.1 Use Solid Wood Fuel Only

The stove is designed to burn natural wood only. Higher efficiencies and lower emissions generally result when burning air-dried seasoned hardwoods, as compared to softwoods or to green or freshly-cut hardwoods.

Do not burn:

- Coal
- Garbage
- Cardboard
- Treated or painted Wood Solvents
- Treated or painted Wood
- Chemical Chimney Cleaners
- Colored Paper
- Any synthetic fuel or logs that have not been approved for wood stoves.

Burning treated wood, garbage, solvents, colored paper, chemical chimney cleaners, or trash may result in release of toxic fumes.

Never use gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fluid, or similar liquids to start or "freshen up" a fire in this heater. Keep all such liquids far away from the heater while it is in use.

5.2 Wood Storage

When storing wood outside, it should be covered and stored off the ground to protect it from the elements. Make certain that the woodpile has good air circulation through it in order to promote drying to aid in the seasoning process.

To obtain the best performance from your stove, we recommend using seasoned hardwood that has been dried and stored under cover for at least one year. Burning unseasoned or wet wood causes the rapid development of creosote and reduces the heat value of the wood.

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, but it is important to inspect the flue after every two weeks of use. An accumulation of 1/4" or more on the sides of the flue or connector is considered hazardous and should be removed.

USA

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 draft regulator 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 oxygen through the door, which then supports 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 been sustained.

5.3 Controls

Front Door Latch

The latch for the front door is conveniently located to the left of the door's center. To open the door, simply raise the latch and pull the door toward you. To shut the door, raise the latch, push the door tightly against the stove front, and lower the latch. See **fig. 19 A, page 26**.

Air Control

The sliding air control (See **fig. 19 B, page 26**) is located in the bottom center of the front door.

Sliding the control to the right opens the air control and increases the heat output; sliding it to the left closes the control and decreases the heat output.
Slide the control fully to the right when first starting or reviving a fire, or when maximum heat is required. Position the control in the middle or left of the middle when less heat is needed and when longer burn times are desired. You will determine the best settings for your particular needs as you gain experience with your stove.

Hot while in operation. Keep children, clothing and furniture away. Do not store fuel within the clearances listed previously.

5.4 Breaking in Your Stove

A cast iron stove should be "broken in" gradually. Five consecutive small fires must be built in the stove prior to operating the stove continuously. Each fire should be a little larger than the previous one, and the last fire should be a full-sized load. Allow the stove to cool completely between fires.

It is normal for new painted stoves to emit a smell or even some smoke during the first few fires. This is caused by the seasoning of the high temperature paint, and the odor will diminish with each fire and eventually disappear. Opening a window or door near the stove will help provide additional ventilation and reduce the odor.

5.5 Building a Fire

A good fire will efficiently utilize your fuel, keep the glass in the door clean, keep emissions and creosote to an absolute minimum, require less work, and be very predictable.

A Good Foundation

- Make sure the air control handle is fully to the right. Open the front door and cover the bottom of the stove with tightly crupled newspaper. Criss-cross a generous double handful of dry kindling, such as split pieces of scrap lumber, on top of the paper. If you don't have scrap lumber, split some of your best dry wood down to finger-sized pieces and use that. Place three or four 1" -2" split pieces of dry wood on top of the kindling.
- Light the paper evenly across the front and close the door.
- Continue to add 1" - 2" pieces of split dry wood until a healthy bed of glowing coals has formed.
- You can now add three or four small-to-medium pieces of wood. Allow this wood to burn for several minutes. Once you are sure the wood is burning well, adjust the air control to your desired heat output level. Moving it to the right increases the heat; moving it to the left decreases the heat. Avoid operating the stove with the air control closed completely.
- In order for secondary combustion to occur, the fire must be well established with temperatures above 1.000°F (600°C) in the firebox.
- If the fire dies out, this cause is most likely either an insufficient bed of coals, reducing the air supply too soon, or using wood that is either too large or not dry enough.

5.6 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).
- 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.

5.7 Open Door Fire-viewing

Warning: This stove should be operated with the door either fully open with the optional Spark Screen in place, or with the door fully closed.
If the door is left partly open, there is risk of overfiring. Also, gas and flame may be drawn out of the fireplace stove opening, creating risks from both fire and smoke. Be aware that when operating with the door open, there exists the possibility of generating carbon monoxide by some fuels (e.g. charcoal), and the hazards of carbon monoxide. Be sure adequate fresh air and ventilation is available to the stove.

5.8 Ash Removal

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 or rake any hot coals first to one side. Shovel out the exposed ash, and push or rake the hot coal to the other side. Remove the ash from the second side as well, and then spread the hot coals evenly across the firebox. Wood may now be added to start a new fire.

When removing ash from a stove that is in operation, close and latch the door before taking the ashes outside for safe disposal. It is always a good idea to wear heavy protective gloves while removing and disposing of the ashes from your stove.
Ashes should be placed in a metal container used exclusively for ashes, with a tight fitting lid. The closed container of ashes should be placed outdoors, well away from all combustible materials, pending final disposal. If ashes are disposed of by burisl in soil or otherwise dispersed, they should be retained 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 creosote which might deposit on the glass will burn off during the next hot fire.

Never clean the glass while it is hot and never use any 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 Replacement

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

If the stove's glass is cracked or broken, you must replace it before operating your stove. Carefully remove any broken pieces. Replace the panel only with the correct Jøtul replacement glass, and 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 steps are the same:
Clean off any residual gasket material from the door using a wire brush if necessary.

The replacement 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". Please note that the top of the glass is not gasketed. A small amount of air is allowed to enter through the 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 hits 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.

USA

It is extremely important that the retainers be tightened a small amount at a time and following a pattern similar to tightening the lug bolts on an automobile wheel. They should end up equally tightened and not over-tightened. It may be necessary to retighten once again after the stove has been burned and the new gasket has been seated.

6.3 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. You should clean the chimney and connector whenever accumulations of soot and creosote reach 1/4" thick, which may be several times a year, depending on how the stove is operated.

Thoroughly clean the entire stove. Brush all ash and soot out of the stove. It is better to brush out the ash and soot than to vacuum it out because soot particles are small enough to pass through most vacuum bags.

In a dark 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 stove furnace cement.

- **Enamel Care:**
  DO NOT ATTEMPT TO CLEAN HOT ENAMEL SURFACES. Clean only cold enamel surfaces with a soft damp cloth and polish with a clean dry cloth.
  DO NOT USE SOAPY OR ABRASIVE SOLUTIONS. These can cause stains. Coffee, tea, and fruit jucies will also cause stains.
- Avoid contact with metal objects. Trivets, kettles, or pots, can damage the enamel.

6.4 Gaskets

Check the door and window gaskets for tightness. 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.

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 gasket.

6.5 Chimney System

The Jøtul F 602 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, twice a 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 serious chimney fire.

7.0 Jøtul N. A. wood-burning product limited warranty

Effective February 1, 2010

This warranty policy applies to wood-burning products identified by Jøtul and Scan trade names, as set forth below.

A. Cast Iron, Enamel, and Steel Components:

Jøtul North America Inc. (JØTUL) warrants, to the original retail purchaser, that those components of the Jøtul or Scan Stove or Fireplace 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 in the following text.

B. Electrical Components (blowers, thermostatic switches):

JØTUL warrants, to the original retail purchaser, that those components of the Jøtul or Scan Stove or Fireplace 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 in the following text

JØTUL will repair or replace (including parts & labor), 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. This paragraph sets forth the sole remedy available under this warranty in the event of any defect in the Jøtul or Scan Stove or Fireplace.

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, baffles, air manifolds, firebricks, fire grates, or glass (glass is only warranted against thermal breakage).
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 due to service performed by an installer or service agency, unless otherwise agreed to in writing by JØTUL.
5. Damage caused by unauthorized modification, use or repair.
6. Costs incurred by travel time and/or loss of service.
7. Labor or other costs associated with the repair of components beyond the warranty period.
8. 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.

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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 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 or Scan 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.

If you believe your Jøtul or Scan Stove or Fireplace is defective, you should contact your nearest authorized Jøtul or Scan 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

Table des matières

Information d'ordre général

Le manuel du propriétaire décrit l'installation et le fonctionnement du poêle à bois, non catalytique, Jøtul F 602 USA. Ce poêle est conforme aux limites imposées par l'agence américaine pour la protection contre les émissions des poêles à bois vendus après le 1er juillet 1990. Ce poêle a en outre démontré, sous conditions de test spécifiques, que sa puissance calorifique pouvait s'étendre entre 9 600 et 42 000 Btu/h.

Pendant l'installation, le fonctionnement ou l'entretien du poêle Jøtul F 602 USA, veillez à suivre les directives du présent manuel. Conservez-les et tenez-les à la disposition de toute personne susceptible de se servir de ce poêle.

Plusieurs régions des États-Unis et du Canada requièrent un permis de construction pour l'installation d'un appareil de chauffage à combustible solide. La norme canadienne CAN/CSA(ACNOR) B-365 (Code d'installation pour appareils et équipement à combustible solide) ou codes similaires pourront s'appliquer à l'installation d'appareils de chauffage à combustible solide dans votre région. Votre concessionnaire Jøtul est au courant de ces codes locaux et pourra vous renseigner sur la sûreté et la légalité de votre installation. Communiquez, en outre, avec votre agent d'assurance, votre inspecteur de la construction ou les responsables officiels de la prévention des incendies afin de déterminer quels règlements s'appliquent dans votre région.

Le Jøtul F 602 USA a été testé et homologué conformément à la norme CAN-ULC S627 de Scarborough, Ontario.

Dangers possibles à éviter lorsque vous employez un poêle à bois Jøtul F 602 USA

Un feu allumé dans une maison représente toujours certains dangers. Les surfaces d'un poêle Jøtul F 602 USA soumises à une surchauffe intense pourront en pousser la température au-delà de 1 000°F (536°C).

Conformez-vous aux directives suivantes :

- Ne surchauffez jamais le poêle. L'incandescence de l'une quelconque des parties du poêle signifie surchauffe et risque éventuel d'un incendie ou de graves dommages au poêle ou à la cheminée. En l'occurrence, fermez immédiatement le distributeur d'air.
- Faites comprendre aux enfants qu'un poêle chauffe et qu'ils risquent de se brûler en y touchant.
- N'employez jamais de l'essence, du carburant pour lanternes genre essence, kérosène, allumeur liquide de charbon de bois ou autre liquide similaire dans ce poêle pour commencer un feu ni pour le raviver. Ceux-ci risquent de s'enflammer avec une vigueur explosive pouvant causer des blessures graves et parfois mortelles. Conservez tous ces liquides éloignés du poêle en fonctionnement.

CANADA

- N'employez jamais ce poêle dans une résidence où sont conservées des sources de gaz de combustion tels que certains liquides nettoyants d'usage domestique, adhésifs et peintures pour n'en nommer que quelques-uns. Souvenez-vous qu'un poêle à bois est, lui-même, une «source de flammes nues».
- Évitez de créer une pression basse dans la pièce chauffée généralement causée par l'utilisation d'un appareil tel qu'un ventilateur d'échappement, une sécheuse à linge etc., ceci pouvant libérer les vapeurs toxiques du poêle dans la pièce chauffée. Pour parer à cette condition, prévoyez suffisamment d'air de combustion extérieur dans un rayon de 24 po. (61 cm) autour du poêle.
- N'employez jamais un poêle Jøtul F 602 USA si une vitre est fêlée ou brisée. Ne remplacez le verre endommagé que par un panneau Jøtul F 602 USA approprié acheté chez votre concessionnaire Jøtul.
- Ne brûlez jamais aucun déchet quel qu'il soit dans ce poêle.
- Éloignez tous matériaux combustibles à une distance considérable du poêle.
- Ne modifiez jamais le poêle de quelque manière que ce soit.
- Ne suspendez jamais du linge au-dessus du poêle; il risquerait en effet de s'enflammer en tombant.
- N'employez que du bois sec dans votre poêle.
- N'utilisez jamais de charbon de bois pour cheminées ni des bûches synthétiques non approuvés pour poêles à bois.
- Portez toujours des gants protecteurs pour ajouter du carburant au feu.
- Si des fumées s'échappent du foyer, cela peut activer les détecteurs de fumées (s'ils sont installés).
- Ne reliez pas ce poêle à un conduit de distribution d'air.
- Ce poêle n'a pas été approuvé pour usage dans les maisons mobiles.

1.0 Installation

Avis de sécurité

L'installation non appropriée de ce poêle à combustible solide risque de causer un incendie. Assurez votre sécurité en respectant les directives d'installation et consultez les autorités locales de la construction et de la prévention des incendies au sujet des limitations et des exigences relatives aux inspections particulières à votre région.

Veuillez lire ce manuel tout entier avant d'installer et d'utiliser votre nouveau poêle. Tout manquement à observer ces directives risque de causer dommages matériels, blessures graves ou même la mort de personnes présentes.

Nous vous recommandons de faire installer votre poêle Jøtul F 602 USA par un installateur professionnel de poêles à combustible solide.

1.1 Sortie des fumées par le dessus ou par l'arrière

Votre poêle Jøtul F 602 USA vous offre deux positions de sortie de fumée.

Si vous choisissez la position supérieure, posez la plaquette appropriée en position arrière, maintenez-la avec vis et écrous puis fixez la virole du conduit de fumée à la partie supérieure au moyen des deux vis restantes.

Si vous préférez la position arrière, posez la plaquette appropriée en position par le dessus, maintenez-la avec les deux vis, puis fixez la virole du conduit de fumée à l'arrière au moyen des deux vis restantes et des deux écrous.

Lorsque vous attachez la plaquette ou la virole du conduit de fumée à l'arrière, il sera peut-être nécessaire d'introduire votre main dans l'orifice supérieur et de maintenir les écrous avec une clé anglaise.

1.2 Fixation des pieds

Le Jøtul F 602 USA est fourni avec quatre orifices prépercés dans la plaque du fond. Attachez chaque pied à cette plaque de fond avec un boulon et une rondelle entre la tête de boulon et le pied.

2.0 Organisez-vous d'avance

Plusieurs éléments, d'importance égale, contribuent à l'installation sûre de votre poêle : **(2.1** le raccord de cheminée; **(2.2)** la cheminée-même; **(3.0)** la connexion entre le raccord et la cheminée et **(4.0)** la protection des matériaux combustibles dans la proximité immédiate du poêle.

2.1 Raccord de cheminée (Tuyau de poêle)

Le raccord de cheminée, également appelé tuyau de poêle ou conduit de fumée est employé pour relier le poêle à la cheminée. Il se composera d'acier noir, son diamètre sera de 15-1/4 cm et son calibre d'épaisseur #24.

Ne vous servez jamais d'un raccord composé de tuyau d'aluminium ou d'acier galvanisé, ces matériaux chauffés ne pouvant soutenir les températures extrêmes d'un feu de bois et risquant de dégager des vapeurs toxiques.

Un tuyau d'émail assorti est disponible pour votre poêle Jøtul F 602 USA. Veuillez demander de plus amples renseignements à votre concessionnaire Jøtul.
N'employez jamais un tuyau de raccord en guise de cheminée.

L'adaptateur fourni en usine servira à ajuster l'orifice d'échappement de fumée de votre poêle au raccord de cheminée.

Les sections de raccord de cheminée doivent être attachées à l'adaptateur de sortie de fumée du poêle puis l'une à l'autre - l'extrémité plissée dirigée vers le poêle. **(Illustr. 2, page 21)**.

L'espace entre l'adaptateur de sortie des fumées du poêle et le raccord de cheminée doit être scellé avec un ciment à poêle ou un joint de mastic de poêle à bois, approximativement dimensionné. Ceci permettra à toute petite quantité de créosote condensée de passer dans le poêle plutôt que de s'accumuler à l'extérieur du tuyau ou à l'orifice du dessus de poêle. Tous les joints, y compris l'adaptateur de sortie des fumées seront fermement maintenus par trois vis à tôle, pour empêcher les sections de se séparer.

Pour un fonctionnement approprié, le raccord de cheminée sera aussi court que possible. Les tuyaux horizontaux auront une pente ascendante, depuis le poêle, d' 0.6 cm. Évitez d'utiliser plus de deux coudes à 90° ou une longueur totale de tuyau supérieure à 305 cm.
Aucune partie du raccord de cheminée ne passera à travers combles ou vides sous toits, armoires ou autres espaces dissimulés, planchers ni plafonds. Évitez autant que possible de faire passer un raccord de cheminée à travers un mur combustible.

Traverses murales

Lorsque votre installation requiert inévitablement de faire passer le raccord de cheminée de votre poêle à travers un mur combustible, d'extrêmes précautions devront être prises. La norme CAN/CSA(ACNOR) B-365 *(Code d'installation pour appareils et équipement à combustible solide)* prévoit quatre méthodes à cet effet.
Avant de commencer votre installation, renseignez-vous auprès de vos autorités locales de la construction sur la méthode de traverse proposée, pour votre poêle, compatible avec les codes locaux de la construction.

La méthode la plus commune de traverser un mur pour atteindre une cheminée de maçonnerie exige le retrait de tous matériaux combustibles dans un rayon d'au moins 30.5 cm autour du raccord tout entier pour être remplacés par une épaisseur de briques de 30.5 cm (35.5 cm) cm au moins autour d'une chemise argileuse. Veillez à placer celle-ci de sorte que le dessus du raccord de cheminée soit au moins 45-314 cm plus bas que le plafond.

Pour construire le «passe muraille» de brique, une ouverture d'au moins 76 cm x 76 cm est nécessaire. Des poteaux muraux seront en outre coupés, des boutisses installées et un encadrement construit conformément aux dimensions appropriées pour soutenir le poids des briques. Des briques solides de 9 cm (format nominal 10 cm seront employées. La chemise argileuse (ASTM C35 ou équivalent) d'une épaisseur murale de 1 -1 /2 cm ne pénétrera pas la cheminée au-delà de la surface intérieure de la chemise de celle-ci et sera fermement cimentée en position.

S'il s'avère nécessaire de découper un cercle dans la chemise de la cheminée, prenez toutes précautions possibles pour l'empêcher de se briser. Un mortier réfractaire sera employé au point de jonction de la chemise de cheminée.**(Illustr. 3, page 21)**

Une installation approuvée utilisant une section de cheminée isolée homologuée pour combustible solide, construite en usine en guise de traverse murale (passe-muraille) pour le raccord de cheminée.
Le diamètre intérieur de la section de cheminée sera 5 cm plus large que celui du raccord de cheminée; il mesurera 30.5 cm au moins et sera isolé sur une épaisseur d'au moins 2-1/2 cm.
Cette section installée présentera un espace d'air d'au moins 5 cm entre la paroi extérieure de la cheminée proprement dite et les matériaux combustibles adjacents.
Des plaques d'appui en feuille d'acier sont utilisées à chaque extrémité de la section de cheminée afin que le raccord demeure bien centré. L'orifice autour de la section de cheminée est bouché de chaque côté de la paroi murale avec des plaques en feuille d'acier auxquelles la section de cheminée est alors fermement attachée. Les attaches utilisées pour soutenir la section de cheminée ne pourront, en aucune circonstance, pénétrer la chemise intérieure du conduit de fumée.
Voyez la norme ; La norme CAN/CSA(ACNOR) B-365 pour toute autre méthode passe-muraille, approuvée.

CANADA

2.2 Cheminées

Deux types de cheminée conviennent pour votre poêle Jøtul F 602 USA : une cheminée de maçonnerie approuvée ou une cheminée d'appareil de chauffage de type résidentiel, homologuée pour sa sûreté.

Rappelez-vous, lorsque vous choisissez un type de cheminée et son emplacement dans la maison que c'est grâce à elle que le poêle peut fonctionner et non pas grâce au poêle que la cheminée fonctionne. Cela est dû au fait que la cheminée crée une aspiration appelée tirage qui attire l'air à travers le poêle.

Le tirage réagit à plusieurs facteurs : hauteur, superficie en coupe et température de la cheminée, ainsi que la proximité d'arbres ou de constructions environnants.

Une courte cheminée de maçonnerie à l'extérieur de la maison donne, généralement la performance la moins satisfaisante du fait qu'elle s'avère exceptionnellement difficile à chauffer et même impossible dans certaines régions extrêmement froides du Grand Nord.

Une haute cheminée de maçonnerie à l'intérieur de la maison facilite le chauffage et fonctionne le mieux.

Les présentes directives vous indiquent les exigences spéciales requises d'après le code national canadien, la norme CAN/CSA(ACNOR) B-365. Néanmoins, de nombreux codes locaux diffèrent du code national afin de tenir compte de facteurs tels que climat et altitude etc. Il est important que vous vérifiiez, auprès des autorités locales de la construction quels codes s'appliquent dans votre région avant de procéder à la construction d'une cheminée.

Cheminées de maçonnerie

Les exigences minimales pour construction appropriée d'une cheminée de maçonnerie comprennent ce qui suit :

La fondation doit être suffisamment large pour soutenir la cheminée envisagée sans affaissement.
Le mur de maçonnerie de la cheminée, soit en briques, soit en blocs modulaires, sera d'une épaisseur nominale d'au moins 10 cm. Un mur de blocaille ou de moellons bruts aura au moins 30.5 cm d'épaisseur.

La cheminée doit être doublée d'une chemise argileuse (ou équivalente) d'au moins 1 -1 /2 cm et doit être installée au moyen de mortier réfractaire. Un espace minimal d'1-1/4doit séparer la chemise du conduit de fumée du mur de la cheminée.

Le diamètre nominal préférable de la chemise argileuse de cheminée est de 20-1/4 x 20-1/4 cm; il ne pourra, en aucun cas, dépasser un diamètre maximal 20-1/4 x 30.5 cm. Une chemise circulaire requiert un diamètre intérieur de 15-1/4 cm - jamais plus de 20-1/4 cm. Si une cheminée à tuiles de plus grande dimension est employée, elle sera redoublée avec une chemise appropriée.

Aucun autre appareil ne sera aéré par le même conduit.

Une trappe de nettoyage hermétique sera située à la base de la cheminée.

Le dégagement d'une cheminée à l'intérieur de la maison doit être d'au moins 5 cm jusqu'à la structure combustible. Celui d'une cheminée extérieure sera d'au moins 2.5 cm jusqu'à la structure combustible. Des coupe-feu doivent être installés aux endroits où la cheminée traverse le plancher et (ou) le plafond .

Souvenez-vous que la cheminée doit être entourée d'un vide d'air suffisant et que le matériau isolant doit être éloigné de 5 cm ou plus de la cheminée.

Une cheminée, de maçonnerie ou métallique préfabriquée, sera de la hauteur requise, au-dessus du toit, ou de toute autre obstruction, pour en assurer la sécurité et le tirage approprié. Il est par conséquent nécessaire qu'elle soit d'au moins 3 pieds (91-1/2 cm) plus haut que le point le plus élevé auquel elle traverse le toit et d'au moins 2 pieds (61 cm) plus haut que la partie du toit ou de la structure la plus élevée dans une limite de 10 pieds (305 cm) de distance de la cheminée, mesurés horizontalement. **(Illustr. 4, page 21)**.

Aucune cheminée de moins de 14 pieds ne peut assurer un tirage adéquat ; elle permettra, au contraire, à la fumée de s'échapper dans la pièce par la porte ou les joints du poêle ou du conduit de fumée. En outre, un tirage inadéquat pourra causer des retours de flammes dans la boîte à feu. D'autre part, un tirage trop vigoureux, en causant des températures excessives, risque de raccourcir les durées de combustion. Vous pourrez remédier à des tirages excessifs en faisant installer, par votre concessionnaire, un registre barométrique réglé pour une colonne d'eau de 0-1/4 cm. Si vous soupçonnez un problème de tirage, consultez donc votre concessionnaire.

Cheminées métalliques préfabriquées, homologuées.

Lorsque vous employez une cheminée métallique préfabriquée, suivez à la lettre les directives d'installation du fabricant. Vous devrez en outre acheter et installer l'ensemble de support de plafond, ou de «passe-muraille», l'ensemble de section en Té, les coupe-feu éventuellement requis, l'écran isolant, le chaperon de toiture, chapiteau de cheminée etc., tous provenant du même fabricant. Respectez le dégagement approprié jusqu'à la structure, tel que recommandé par le fabricant. De règle générale, ce dégagement doit être d'au moins 5 cm bien qu'il puisse varier selon le fabricant ou le type de certaines composantes. **(Illustr. 5 page 22)**

3.0 Connexion à la cheminée

Cheminées de maçonnerie

Lorsque vous raccordez votre poêle à une cheminée de maçonnerie, le raccord doit glisser complètement à l'intérieur de la rosace (ou «trouée») jusqu'à la surface intérieure de la chemise argileuse. Assurez-vous que le raccord ne fasse pas saillie au-delà de l'intérieur de la chemise, ce qui risquerait de diminuer la section de passage de fumée et de causer, en conséquence, des problèmes pour votre système de cheminée. Le raccord de cheminée sera scellé dans la rosace au moyen d'un ciment réfractaire et sera, en outre, attaché mécaniquement à la cheminée. **(Illustr. 6, page 22)**.

Cheminés préfabriquées

Suivez toujours les directives du fabricant de cheminée et n'employez que les composantes recommandées par lui. Ne vous laissez pas tenter par des «raccourcis» ou des solutions de facilité lorsque vous fixez le raccord à la cheminée.

4.0 Dégagements jusqu'aux combustibles

4.1 Protection de plancher

Un écran de fond thermique est inclus aux éléments standard du poêle Jøtul F 602 USA et doit être présent dans toutes installations. De plus, le poêle sera placé sur une protection de plancher non combustible s'étalant sur 20-1/4 cm au moins au-delà des côtés et de l'arrière du poêle et de 40-1/2 cm par-devant ce qui vous donnera une protection de plancher de 84 cm de long par 115-1/2 cm de côté. Cette protection doit aussi recouvrir la surface par-dessous toutes sections horizontales de raccord de cheminée (tuyau de poêle) et doit s'étaler sur au moins 5 cm au-delà de chaque côté du tuyau. **(Illustr. 7, page 22).**

4.2 Alternante Protection de plancher

Le poêle sera posé sur un protège-plancher non combustible, homologué, comprendra de 0.9 cm d'épaisseur de carton à l'enrouleuse, d'une conductivité thermique de K-0.84 Btu-po. par pi.²/hre -°F. Veillez à ce qu'il n'y ait aucun espace entre les briques ou les tuiles éventuellement utilisées afin d'éviter que des étincelles ou des braises n'enflamment le plancher.

Une bonne méthode à suivre pour la fabrication de votre protection de plancher est de couvrir la couche de protection avec une plaque décorative non combustible ou d'un renfort de carrelage tel que Wonderboard (MD) ou Durock (MD)

Ne posez jamais aucun genre de protection de plancher par-dessus tapis ou moquette.

4.2 Dégagements jusqu'aux matériaux combustibles adjacents

Le diagramme de l'illustr **8-9-10-page 22**, stipule les dégagements requis à respecter jusqu'aux matériaux ou objets combustibles, non protégés.

Un combustible signifie tout ce qui est susceptible de brûler et peut parfois être invisible, en ce qui concerne les installations de poêle. Si vous n'êtes pas rassuré sur la combustibilité des matériaux environnant la surface d'installation prévue pour votre poêle, vérifiez auprès des responsables locaux de la prévention des incendies. Souvenez-vous que les matériaux soi-disant «résistants au feu» bien que longs à s'allumer, brûleront éventuellement. Ils sont, par conséquent, considérés comme combustibles.

Si vous avez récemment acheté une maison avec un âtre que vous prévoyez d'utiliser, il s'avère essentiel que la sécurité du système soit vérifiée auparavant. De nombreuses

maisons anciennes ont des cheminées défectueuses ou les murs et poteaux combustibles peuvent avoir été recouverts d'un placage de briques par les propriétaires précédents. La brique étant un excellent conducteur de chaleur risque d'enflammer les combustibles qu'elle dissimule.

Communiquez avec vos autorités locales de la construction et de la prévention des incendies au sujet des limitations et exigences d'installation imposées dans votre région.

4.4 Utilisation d'écrans thermiques pour diminuer les dégagements

L'écran thermique arrière facultatif du poêle Jøtul F 602 USA peut être employé pour sortie des fumées par le dessus pour diminuer le dégagement d'installations parallèles, **(Illustr. 11,12,13, page 23)**.

4.5 Utilisation de protège-murs pour diminuer les dégagements d'installations en alcôve

Le protège-mur d'une installation en alcôve sera non combustible - en acier galvanisé, par exemple, de calibre minimal #24 ou équivalent. Il sera élevé d'2.5 cm d'espace d'air au-dessus du plancher et sera monté de manière à ménager également 2.5 cm d'espace d'air au moins entre l'écran et le combustible. La hauteur du protège-mur, y compris celle de l'espace d'air au bas du mur doit être d'au moins 102-1/2 cm (Illustr. 15, page 21). Les deux murs latéraux ainsi que le mur arrière seront protégés par ce matériau. **(Illustr. 14, page 23)**.

4.6 Installation en alcôve

Lorsque vous installez votre poêle Jøtul F 602 USA avec un tuyau homologué à double paroi et une protection murale, vous pourrez le poser dans une alcôve dont la hauteur minimale est de 244 cm et la largeur maximale 122 cm et la longueur minimale 103 cm.
Les dégagements pour une installation de ce genre sont indiqués dans l'illustration **14-15, page 23**.

Lorsque vous installez votre poêle Jøtul F 602 USA avec un tuyau homologué à double paroi et un écran thermique pour poêle, vous pourrez le poser dans une alcôve dont la hauteur minimale est de 244 cm[1]. I et la largeur maximale 61 cm[2] et la longueur minimale 139-3/4 cm. Les dégagements pour une installation de ce genre sont indiqués dans l'illustr. **12-13, page 23**.

Notes :
[1] *Renseignez-vous auprès de votre concessionnaire sur les diminutions de dégagement de plafond avec protection.*
[2] *Si la largeur de l'un des deux murs latéraux est supérieure à 61 cm, (le dégagement du mur latéral le plus large sera de 63-1/2 cm.*

5.0 Fonctionnement

Avant de préparer un feu dans votre nouveau poêle, veuillez lire attentivement le chapitre suivant.

5.1 Ce poêle a été conçu uniquement pour le brûlage de bois naturel

Le brûlage de bois séché à l'air a pour résultat des rendements plus efficaces et des émissions moins élevées comparativement au brûlage de bois tendre, vert ou bois dur fraîchement coupé.

Ne brûlez jamais :
*ni charbon
*ni ordures ménagères
* ni carton
* ni solvants
* ni bois sec peint
* ni nettoyants chimiques de cheminée
* ni papier peint
*- ni déchets
* ni aucun carburant ou bûche synthétique quel qu'il soit, non approuvé pour poêles à bois.

Le brûlage de bois traité, ordures ménagères, solvants, papier peint, nettoyants chimiques de cheminée et déchets risque de libérer des vapeurs toxiques.

N'employez jamais de l'essence, du carburant pour lanternes genre essence, kérosène, allumeur liquide de charbon de bois ou autre liquide similaire dans ce poêle pour commencer un feu ni pour le raviver. Conservez tous ces liquides éloignés du poêle en fonctionnement. Entreposage/Rangement du bois.

5.2 Entreposage/Rangement du bois

Tout bois entreposé à l'extérieur sera couvert et le tas sera surélevé au-dessus du sol pour le protéger des intempéries. Veillez à l'entasser de manière à laisser suffisamment d'espace pour la circulation d'air afin de faciliter le processus de séchage.

Pour que votre poêle vous offre le meilleur rendement possible, nous vous recommandons d'utiliser du bois dur, séché et entreposé couvert pendant au moins un an. Le brûlage de bois non séché ou encore humide en diminuera la capacité calorifique en causant l'accumulation rapide de créosote et diminuera la puissance calorifique du bois employé.

Formation de créosote et de suie et nécessité de les éliminer

Lorsque le bois brûle lentement, il produit du goudron et d'autres vapeurs organiques qui, combinés à l'humidité expulsée, forment de la créosote, dont les vapeurs se condensent dans le conduit de fumée relativement froid

du tuyau de cheminée. Cette créosote accumulée est extrêmement inflammable ; elle est à l'origine de la plupart des feux de cheminée. Pour éviter un feu de cheminée, il vous faudra donc l'éliminer en ramonant la cheminée et le raccord du tuyau de fumée. La fréquence de ramonage dépendra du fonctionnement de votre poêle; néanmoins, il sera prudent de vérifier le tuyau de cheminée toutes les deux semaines d'utilisation du poêle. Une accumulation d'1/4 po. (0.6 cm) ou plus sur les parois de tuyau ou de raccord est considérée dangereuse et doit être nettoyée.

Au cas où la créosote accumulée dans le tuyau de cheminée ou le raccord s'enflammerait, le feu de cheminée est généralement signalé par un ronflement bruyant et des crépitements au fur et à mesure que la créosote se détache. Si vous soupçonnez un feu de cheminée, fermez immédiatement le régulateur de tirage et assurez-vous que la porte du poêle est close. Appelez les pompiers et faites sortir toutes les personnes présentes pour les mettre à l'abri.

Vous ne pouvez essayer d'éteindre le feu depuis l'intérieur du poêle; en fait, vous risqueriez d'empirer la situation en permettant la pénétration d'oxygène par la porte qui à son tour, continuerait d'alimenter le feu de cheminée. Lorsque le ronflement et les crépitements cessent, résistez à la tentation d'ouvrir la porte du poêle pour examiner le feu. Même si vous êtes parvenu à le suffoquer, il risque de se raviver lorsque vous ouvrez la porte. Après un feu de cheminée, n'employez votre poêle que lorsque la cheminée et le raccord auront été nettoyés et inspectés afin de vous assurer de l'absence de tout dommage.

5.3 Commandes

Loquet - Porte de devant

Le loquet de la porte avant est situé de manière pratique à gauche du centre de la porte. Pour ouvrir celle-ci, soulevez simplement le loquet et tirez la porte vers vous. Pour fermer, soulevez le loquet, pressez la porte fermement contre l'avant du poêle et abaissez le loquet. **(Voyez illustr. 19 A, page 24)**

Commande d'air

La commande d'air coulissante **(Illustr. 19 B, page 24)** est située sur le panneau avant, au-dessus de la porte de chargement de combustible.

Le glissement de la commande vers la droite augmente l'admission d'air et la sortie de chaleur ; son glissement vers la gauche diminue l'admission d'air et la sortie de chaleur.

Glissez intégralement la commande vers la droite pour mettre un feu en marche, pour le raviver ou lorsqu'un chauffage maximal est désiré. Positionnez la commande au milieu ou à gauche du milieu pour une chaleur moins forte et lorsque des durées prolongées de brûlage sont requises. Vous déterminerez les meilleurs réglages pour votre usage personnel au fur et à mesure que vous vous -familiariserez avec votre poêle.

Le poêle est chaud pendant son fonctionnement. Eloignez les enfants et ne gardez pas de vêtements ou de meubles à proximité. Ne stockez pas de combustible à l'intérieur des dégagements énumérés précédemment.

5.4 Rodage du poêle

Un poêle de fonte doit être «rodé» graduellement. Cinq petits feux seront allumés consécutivement avant d'utiliser le poêle en continu. Chaque feu sera un peu plus conséquent que le précédent et le dernier sera d'importance normale. Laissez le poêle refroidir complètement entre les feux.

Une certaine odeur et même de la fumée sont normales pendant les quelques premiers feux. Ceci est dû au traitement de la peinture soumise à une température élevée ; l'odeur devrait diminuer avec chaque feu et éventuellement disparaître. Une fenêtre ou porte ouverte à proximité du poêle produira un supplément d'aération et aidera à diminuer l'odeur.

5.5 Préparation d'un feu

Un feu bien préparé utilisera efficacement votre combustible, conservera la vitre propre, les émissions et la créosote au minimum, demandera moins de travail et ses réactions seront extrêmement faciles à prévoir.

Bonne fondation

Assurez-vous que la poignée de commande d'air primaire est bien poussée intégralement vers la droite et que le tisonnier de la commande de mise en marche est en position ouverte (tiré intégralement vers l'extérieur). Ouvrez la porte du devant et couvrez le fond du poêle de papier journal chiffonné serré. Entrecroisez une généreuse double poignée de bûchettes sèches - des morceaux de bois de retaille fendu par exemple, par-dessus le papier. Si vous ne disposez pas de bois de retaille, fendez-en vous-même dans du bois sec, en bâtonnets d'un doigt d'épaisseur environ et servez-vous en comme de bûchettes. Placez alors quatre morceaux de 2-1/2 à 5 cm de bois sec fendu sur le dessus des bûchettes.

Allumez uniformément le papier tout au long de l'avant du poêle et fermez la porte.

Continuez à ajouter des morceaux de 2-1/2 à 5 cm de bois sec fendu jusqu' à ce qu'un lit de braises incandescentes ait bien pris.
Vous pouvez maintenant ajouter trois ou quatre morceaux de bois - petite à moyenne dimension, que vous laisserez brûler plusieurs minutes. Dès que vous êtes convaincu que ce bois brûle bien, fermez l'admission d'air de mise en marche (tisonnier intégralement enfoncé) et réglez la commande d'air primaire au niveau de sortie de chaleur désiré et pour maintenir des températures de fonctionnement sûres et sans danger. Un déplacement vers la droite augmente la chaleur ; vers la gauche, il la diminue. Évitez d'employer le poêle si la commande d'air est complètement fermée.

Lorsqu'un feu meurt, cela est probablement dû à un lit de braises insuffisant, lequel diminue l'admission d'air trop rapidement ou à l'usage d'un bois trop épais ou insuffisamment séché.

5.6 Rechargement

Rechargez le poêle encore chaud et dont les braises restantes suffisent à enflammer la nouvelle charge de combustible. Il sera bon d'insérer un morceau ou deux de bois plus petits à la base de la nouvelle charge pour aider le poêle à récupérer plus rapidement sa température de fonctionnement.

Méthode de rechargement

- Portez toujours des gants lorsque vous prenez soin de votre poêle.
- Poussez la commande d'air à droite, en position ouverte intégrale.
- Attendez quelques secondes avant d'ouvrir la porte.
- Employez une pelle à poêle ou un outil similaire pour briser les restes de charbon de bois et pour attirer quelques braises vers l'avant du poêle par lequel entre l'air de combustion.
- Chargez le combustible (morceaux plus petits d'abord).
- Fermez la porte.
- Attendez 5 à 10 minutes puis réglez la commande d'air au niveau désiré.

Avis : Si le lit de charbon de bois présent au moment de recharger est relativement profond (5 à 7 1/2 cm) et si votre bois est bien sec, le moment est venu d'ajouter une nouvelle charge de combustible, de fermer la porte, de régler à nouveau la commande d'air au taux désiré de sortie de chaleur - tout cela en 5 minutes seulement.

5.7 Vue sur le feu porte ouverte

Attention : Ce poêle doit fonctionner soit porte ouverte avec un pare-étincelles soit porte complètement fermée. Si la porte reste partiellement ouverte, il y a un risque de surchauffe.

Il y a également un risque d'échappement des gaz et des flammes hors de l'appareil, pouvant entraîner un incendie ou l'asphyxie. N'oubliez pas que le fonctionnement porte ouverte risque d'entraîner l'émanation de monoxyde de carbone suivant les carburants (par exemple le charbon) le monoxyde de carbone est extrêmement dangereux. Assurez-vous que le poêle et la pièce bénéficient d'une bonne ventilation.

5.8 Retrait des cendres

Le retrait des cendres est requis chaque jour ou deux pendant une saison de fonctionnement normal ; il est bien plus facile à effectuer lorsque le bois brûlé est calciné en charbons.

Avec une pelle, poussez tout d'abord les braises chaudes d'un côté ou de l'autre. Ramassez à la pelle les cendres exposées et repoussez les braises chaudes de l'autre côté. Enlevez également les cendres de ce côté puis étalez uniformément les braises chaudes à travers la boîte à feu. Vous pouvez maintenant ajouter du nouveau bois pour commencer un nouveau feu.

Lorsque vous enlevez les cendres d'un poêle en fonctionnement, fermez et loquetez la porte avant de sortir les cendres à l'extérieur pour en disposer sans danger. Le port de gants protecteurs épais est toujours une bonne idée tandis que vous enlevez et disposez des cendres de votre poêle.

Les cendres devraient être placées dans un contenant de métal avec couvercle bien serré, uniquement réservé à cet effet et que vous conserverez à l'extérieur, bien éloigné de tous les matériaux combustibles, jusqu'à ce que vous puissiez en disposer définitivement. Si votre intention est d'enfouir les cendres dans le sol ou de les dispenser, conservez-les dans le contenant bien fermé jusqu'à ce que toutes les escarbilles soient éteintes et aient eu le temps de refroidir.

Une porte de poêle restant ouverte pourra causer de dangereuses conditions de surchauffe qui risqueraient d'endommager l'appareil, de rendre la garantie nulle et non avenue ou de causer un incendie.

Mise en garde : N'employez votre poêle Jøtul F 602 USA que lorsoue la porte est absolument fermée et n'ouvrez celle-ci que pour recharger le poêle ou enlever les cendres. Une porte partiellement ouverte risque de causer une surchauffe.

6.0 Entretien

6.1 Nettoyage du panneau de verre

Nettoyez, de temps à autre, la cendre fine accumulée sur la surface intérieure du panneau de verre étant donné qu'elle risquerait, en demeurant attachée trop longtemps sur le panneau de verre, de le rayer sans remède au point de le brouiller. La créosote éventuellement déposée sur le panneau de verre sera éliminée en brûlant pendant le prochain grand feu.

Ne nettoyez jamais le verre encore chaud et n'utilisez jamais de nettoyant abrasif. De l'eau fraîche et un chiffon doux ou une serviette de papier suffisent habituellement. Rincez à fond à l'eau fraîche après le lavage et séchez complètement avant de vous servir à nouveau de votre poêle.

6.2 Remplacement du verre

Si une vitre de poêle se fêle ou se brise, vous devez la remplacer avant de pouvoir utiliser le poêle de nouveau. Enlevez soigneusement tout morceau de verre brisé. Ne remplacez le panneau qu'avec un panneau de verre Jøtul identique sans possibilité de substitut.

Le verre peut être remplacé sans démonter la porte du poêle ou vous pouvez démonter celle-ci et la poser sur une surface plate.

- Nettoyez la porte de tout résidu de joint au moyen d'une brosse métallique, si nécessaire.
- Le joint sera auto-adhésif. Mesurez une longueur de joint suffisante pour entourer la vitre - depuis le coin supérieur de droite, au long du côté droit et du bord inférieur puis en remontant vers le coin supérieur de gauche plus 5 cm environ. Vous remarquerez que le côté supérieur de la vitre ne requiert pas de joint. La petite quantité d'air qui pénétrera par cet endroit aidera à conserver la vitre propre.
- Pelez environ 25 cm de revêtement protecteur du collant auto-adhésif. Prévoyez environ 3 cm de joint pour chevauchement puis insérez le joint dans la rainure de la porte en vous assurant que le côté adhésif est dirigé vers la porte. Pressez le joint fermement en position; continuez à peler l'adhésif et à appliquer le joint jusqu'à ce qu'il vous reste un court morceau lorsque vous atteindrez le coin supérieur de gauche. Pressez alors le joint fermement en position.
- Centrez le panneau de verre de remplacement en le déplaçant de gauche à droite sur le joint. Glissez la vitre vers le bas de la porte jusqu'à ce qu'elle se bloque, maintenez le verre en position d'une main tandis que vous passez les morceaux de chevauchement par dessus le côté supérieur du verre et au long des bords extérieurs. Il vous faudra tordre le joint de sorte que l'adhésif soit dirigé vers le verre. Pressez ces morceaux fermement en position sur le verre.
- Replacez la glissière de la commande d'air, les pattes de fixation supérieures et les vis.

Il est extrêmement important que les pattes soient serrées un peu à la fois et qu'elles imitent le serrage des goujons d'une roue d'automobile. Elles seront toutes aussi serrées les unes que les autres, sans forcer. Veillez à ce que le panneau de verre demeure centré dans l'ouverture et qu'il ne glisse pas vers le bas. Il pourra s'avérer nécessaire de serrer à nouveau lorsque le poêle aura fonctionné et lorsque le joint se sera placé définitivement en position.

6.3 Généralités

Une fois par an, au moins, soumettez votre système à un entretien de routine. Le meilleur moment pour cela est lorsque vous nettoyez la cheminée et le raccord. Ce nettoyage devrait être effectué chaque fois que l'accumulation de créosote et de suie atteint 0.6 cm d'épaisseur, ceci pouvant se produire plusieurs fois par an selon le fonctionnement de l'appareil.

1. Nettoyez à fond le poêle tout entier. Brossez toutes les cendres et la suie du poêle pour les éliminer. Il est préférable de brosser les cendres et la suie plutôt que de les nettoyer à l'aspirateur à cause de particules de suie si fines qu'elles peuvent passer à travers la plupart des sacs d'aspirateur.

2. Servez-vous d'une forte lampe dans une pièce sombre pour inspecter l'intérieur et l'extérieur du poêle afin de déceler les fêlures et fuites possibles des coins et des joints. Les parties fêlées seront remplacées ; les fuites de joints pourront être bouchées avec du ciment pour poêle.

6.4 Les joints

Vérifiez si la porte et les joints de fenêtre sont parfaitement étanches. Pour vérifier le joint de porte avant, introduisez à demi un dollar dans le poêle, fermez la porte, loquetez-la puis tentez de retirer le dollar sans le déchirer. S'il s'enlève facilement, le joint n'est pas assez serré. Vérifiez plusieurs endroits autour de la porte. Pour remplacer l'ancien joint défectueux, grattez toute trace du matériau de joint et de ciment. Etalez un cordon de ciment pour poêle d'1/8 po.(0.3 cm) au fond de la rainure et pressez le nouveau joint pardessus.

La porte requiert environ 91-1/2 cm de joint pour poêle, en fibre de verre d' 0.6 cm, haute densité. Ce joint s'use très peu entre le panneau de verre et la porte. La meilleure preuve de la nécessité d'un remplacement est l'apparition de stries sur le verre, causées par les fuites d'air autour du joint.

CANADA

7.0 Garantie limitée de Jøtul sur les appareils de chauffage au bois

En vigueur depuis le 1er février 2010

Cette garantie s'applique aux poêles et foyers à bois identifiés par les marques de commerce Jøtul et Scan, tel qu'établi ci-dessous.

A. Composants en fonte, en émail et en acier :

Jøtul North America Inc. (JØTUL) garantit à l'acheteur initial que les composants susmentionnés pour poêles ou foyers Jøtul ou Scan sont exempts de défauts de matériaux et de fabrication pour une période de cinq (5) ans à compter de la date d'achat. Cette garantie est assujettie aux conditions, exclusions et limitations ci-dessous.

B. Composants électriques (ventilateurs, interrupteurs thermostatiques) :

JØTUL garantit à l'acheteur initial que les composants susmentionnés pour poêles ou foyers Jøtul ou Scan sont exempts de défauts de matériaux et de fabrication pour une période d'un (1) an à compter de la date d'achat. Cette garantie est assujettie aux conditions, exclusions et limitations ci-dessous :

JØTUL réparera ou remplacera (incluant les défauts de matériaux et de fabrication), à son choix, tout composant susmentionné que JØTUL jugera couvert par cette garantie. Le client doit, et ce à ses propres frais, faire expédier ou livrer le composant défectueux à un détaillant autorisé Jøtul ou Scan, et s'occuper du retour ou de la cueillette du composant réparé. Si, lors de l'inspection, JØTUL détermine que le composant est couvert par cette garantie, la réparation ou le remplacement sera effectué tel que spécifié ci-dessus. Cette garantie n'est pas transférable et s'applique seulement à l'acheteur initial du poêle ou foyer Jøtul ou Scan. Ce paragraphe établit le seul recours offert en vertu de la présente garantie, en cas de défaillance quelconque d'un poêle ou foyer Jøtul ou Scan.

La période de garantie pour tout composant remplacé sera la portion résiduelle de la période de garantie non expirée du composant initial.

Veuillez conserver toute facture et/ou reçu daté dans vos dossiers, comme preuve d'achat.

Limites et exclusions

Avis : Cette garantie sera annulée si l'installation ou le service après installation n'est pas assuré par un installateur ou service d'entretien autorisé, ou si l'installation n'est pas conforme aux instructions d'installation et d'utilisation fournies dans le présent manuel d'utilisation, ou aux règlements locaux et/ou nationaux des codes du bâtiment et de la sécurité-incendie. Une liste des installateurs, services d'entretien et fournisseurs de gaz autorisés est donnée par le National Fireplace Institute à l'adresse suivante : http://www.nficertified.org/.

Cette garantie ne couvre pas les dommages et frais suivants :

1. La réparation ou le remplacement des pièces dont l'usure est normale durant la période de garantie, ou des pièces qui doivent être remplacées dans le cadre d'un entretien normal. Ces pièces incluent la peinture, les joints d'étanchéité, les plaques de combustion, les déflecteurs, les manifolds d'air, les briques réfractaires, les porte-bûches et la vitre (la vitre est garantie uniquement contre les bris thermiques).
2. Tout dommage causé par une installation incorrecte, c'est-à-dire non conforme aux instructions du présent manuel d'utilisation ou aux règlements locaux et/ou nationaux des codes du bâtiment et de la sécurité-incendie.
3. Tout dommage, incluant les dommages aux surfaces en émail, causé par une utilisation inadéquate, une surchauffe et/ou un emploi abusif. Une utilisation inadéquate, p. ex. faire chauffer le poêle avec la porte à cendres ouverte, peut endommager le poêle. Une surchauffe survient lorsqu'un pièce quelconque du poêle rougeoie. Une surchauffe peut aussi être identifiée par l'un des signes suivants : les plaques se déforment (tordent), la fonte présente des signes de rouille, les pigments de peinture prennent une couleur blanc poudre, le fini émaillé montre des signes de craquelure et de décoloration. Un emploi abusif inclut, entre autres, une utilisation non conforme aux instructions d'utilisation du présent manuel d'utilisation.
4. Tout dommage dû aux services effectués par un installateur ou un service d'entretien, sauf si cela est autorisé par écrit par JØTUL.
5. Dommages dus à une modification, utilisation ou réparation non approuvée.
6. Les frais dus au temps de voyagement et/ou la perte de service.
7. Les frais de main-d'œuvre et autre frais liés à la réparation de composants en dehors des périodes de garantie susmentionnées.
8. Les dommages encourus pendant la période de transit du poêle ou foyer Jøtul ou Scan.

EN AUCUN CAS JØTUL, SA SOCIÉTÉ MÈRE, SES ACTIONNAIRES, AFFILIÉS, MEMBRES, EMPLOYÉS, AGENTS OU REPRÉSENTANTS, NE POURRONT ÊTRE TENUS RESPONSABLES ENVERS LE CLIENT POUR TOUT DOMMAGE SPÉCIAL, INDIRECT, ACCESSOIRE, CONSÉQUENT, DOMMAGE-INTÉRÊT OU AUTRE DOMMAGE SIMILAIRE, INCLUANT (ENTRE AUTRES) LA PERTE DE PROFITS OU DE VENTES, LES BLESSURES OU DOMMAGES MATÉRIELS, OU LES DOMMAGES À UNE STRUCTURE OU À SON CONTENU, SURVENANT EN VERTU D'UN ARTICLE DE LOI QUELCONQUE. TOUTES GARANTIES IMPLICITES, INCLUANT LES GARANTIES IMPLICITES DE QUALITÉ MARCHANDE ET D'APTITUDE COMMERCIALE, EN VERTU DE LA PRÉSENTE GARANTIE (OU AUTRE), SONT LIMITÉES EN DURÉE À LA DURÉE DE CETTE GARANTIE ÉCRITE. SAUF SI EXPRESSÉMENT ÉTABLI DANS LA PRÉSENTE GARANTIE, JØTUL NE FAIT AUCUNE AUTRE GARANTIE ORALE, ÉCRITE OU AUTRE, SUR LES POÊLES OU FOYERS JØTUL OU SCAN.

Certains États ne permettent aucune limite ou exclusion aux dommages indirects ou consécutifs, ou aucune limite de durée des garanties implicites. Donc, les limites ou exclusions ci-dessus peuvent ne pas s'appliquer à vous. Cette garantie vous donne des droits légaux spécifiques, et vous pourriez avoir d'autres droits, qui peuvent varier d'un État à l'autre.

JØTUL se réserve le droit de discontinuer, modifier ou changer les matériaux utilisés pour produire le poêle ou foyer Jøtul ou Scan. JØTUL a le droit de remplacer tout composant défectueux par des composants de substitution que JØTUL juge être de qualité et prix essentiellement égaux.

La valeur monétaire maximale que peut débourser JØTUL, en cas de bris de la présente garantie, est limitée exclusivement au coût pour fournir un composant de remplacement. JØTUL ne pourra en aucun cas être tenue responsable des frais de main-d'œuvre encourus par d'autres en rapport avec un composant défectueux quelconque. Tout frais ou dépense au-delà de ceux expressément assumés par JØTUL en vertu de la présente garantie, sera sous la responsabilité exclusive du(des) propriétaire(s) du poêle ou foyer Jøtul ou Scan.

Aucun détaillant, distributeur ou autre personne n'est autorisée à modifier, prolonger ou augmenter les dispositions de cette garantie limitée au nom de JØTUL. **AUCUN CHANGEMENT OU MODIFICATION À CETTE GARANTIE NE SERA VALIDE SAUF SI CELA EST STIPULÉ PAR UN DOCUMENT ÉCRIT ET SIGNÉ À LA MAIN PAR UN REPRÉSENTANT AUTORISÉ DE JØTUL.**

Un installateur autorisé peut avoir reçu certains renseignements particuliers liés au poêle ou foyer Jøtul ou Scan; cependant, aucun installateur autorisé ou autre personne pouvant avoir entretenu cet appareil n'est considéré comme un agent de JØTUL. Aucune inférence ne peut être faite à l'effet que JØTUL a testé, certifié ou déclaré une personne comme étant qualifiée pour installer ou réparer l'appareil. JØTUL ne peut être tenue responsable d'aucune façon, de quelque erreur ou omission par une personne installant ou réparant un poêle ou foyer Jøtul ou Scan.

Si vous croyez que votre poêle ou foyer Jøtul ou Scan est défectueux, vous devez contacter votre détaillant autorisé Jøtul ou Scan le plus près de chez vous, lequel préparera une réclamation de garantie. **POUR VALIDER LA COUVERTURE DE GARANTIE, JØTUL DOIT RECEVOIR UN AVIS DE DÉFAUT POSSIBLE, ET CE DANS UN DÉLAI DE SOIXANTE (60) JOURS À COMPTER DE LA DATE À LAQUELLE CE DÉFAUT A ÉTÉ DÉCOUVERT POUR LA PREMIÈRE FOIS, OU AURAIT RAISONNABLEMENT PU AVOIR ÉTÉ DÉCOUVERT.**

Cette garantie est établie par Jøtul North America, Inc., 55 Hutcherson Drive, Gorham, Maine 04038 USA

Jøtul F 602 Woodstove Clearances

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" 300mm	8" 205mm	8" 205mm
Double wall pipe W/out rear heatshield	24" 610mm	15" 380mm	15" 380mm	12" 305mm	8" 205mm	8" 205mm

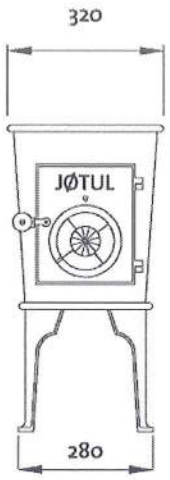
Connector (pipe)	Unprotected surface Vertical installation	Protected surface (NFPA 211) Vertical installation	dearances
Single wall pipe	18" 460mm	6" 150mm	
Double wall pipe	pipe mfgr.listing	pipe mfgr.listing	

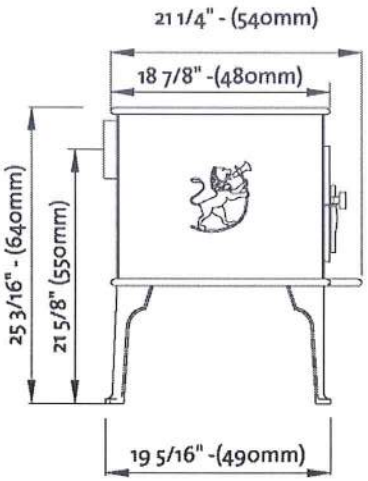
Connector (pipe)	Unprotected surface Horizontal installation	Protected surface (NFPA 211) Horizontal installation	dearances
Single wall pipe	18" 460mm	9" 230mm	
Double wall pipe	pipe mfgr.listing	pipe mfgr.listing	

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





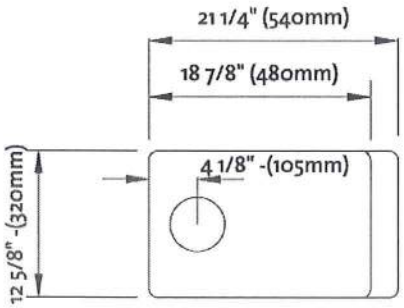
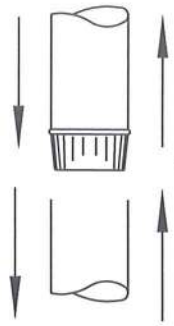


Fig. 2



Chimney Connector points toward stove.

Flue gas direction.

Fig. 3

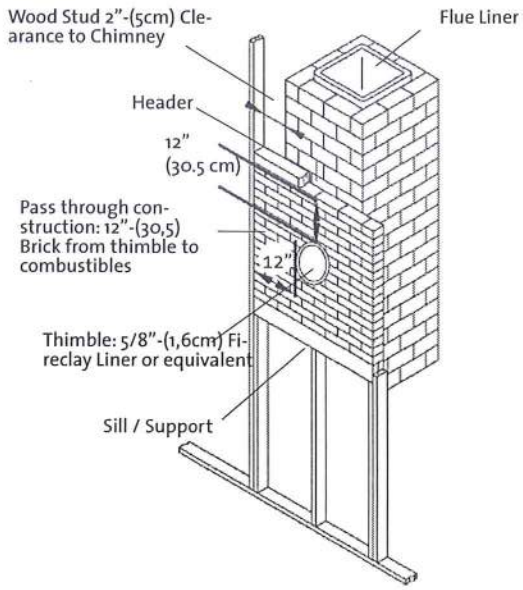
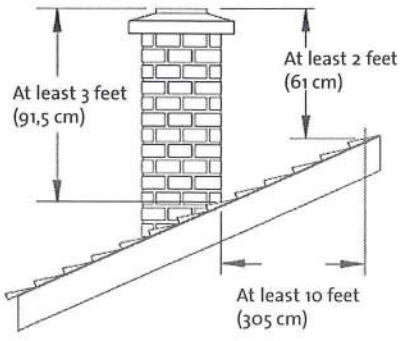


Fig. 4



(Measurements in cm - for Canada)

Fig. 5

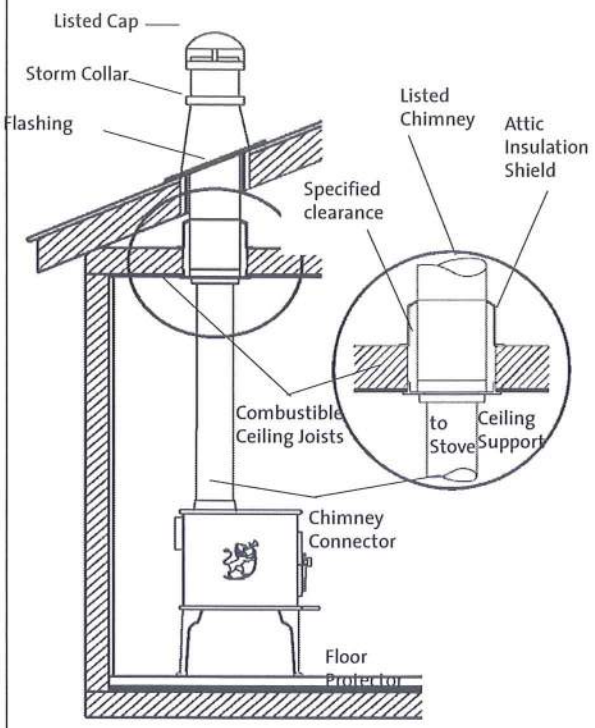
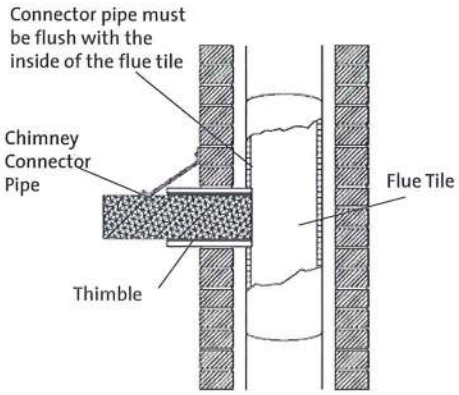


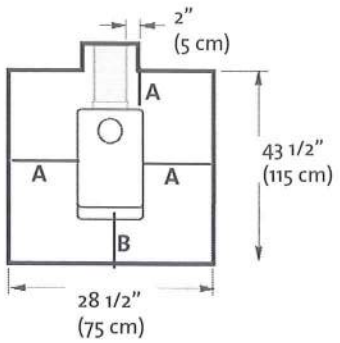
Fig. 6



(Measurements in cm - for Canada)

Fig. 7

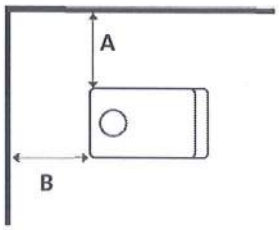
Hearth protection



A: 8" (20 cm)
B: 16" (46 cm)

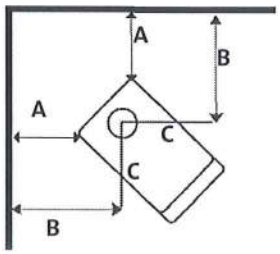
Clearance to Adjacent Combustible

Fig. 8



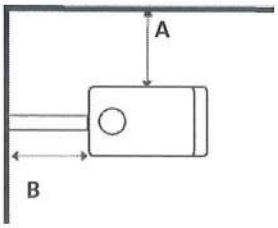
A: 21" (53,5cm)
B: 13,5 " (34,5 cm)

Fig. 9



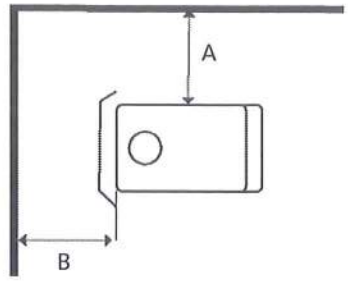
A: 13" (33,5 cm)
B: 20 1/4" (51,5cm)

Fig. 10



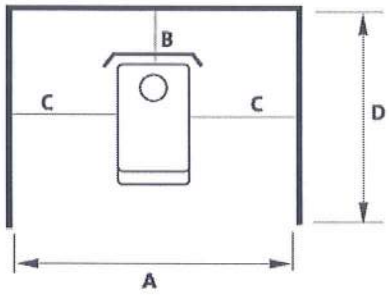
A: 24" (61 cm)
B: 19" (48,3cm)

Fig. 11 **Rear Heat Shield to reduce clearance**
Single wall pipe, top exit only



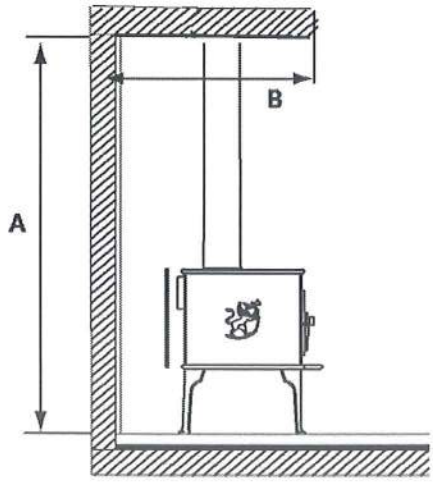
A: 21" - (53,5 cm)
B: 11" -(28 cm)

Fig. 12 **Alcove Installation**
Double wall pipe and stove heat shield



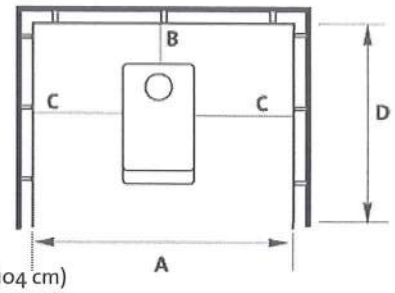
A: 55" - (140 cm)
B: 15" - (39,5 cm)
C: 21" - (53,5 cm)
D: 48" - (122 cm)

Fig.13 **Alcove with rear heatshield**



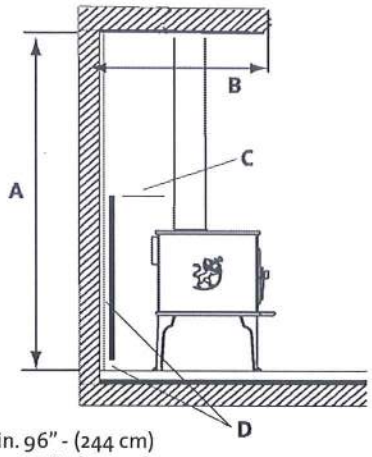
A: Min. 96" - (244 cm)'
B: Max. 24" - (61 cm)'

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



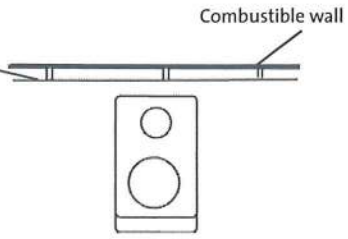
A: 41" - (104 cm)
B: 8" - (20,5cm)
C: 14" - (36 cm)
D: 48" - (122 cm)

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 cm - for Canada)

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

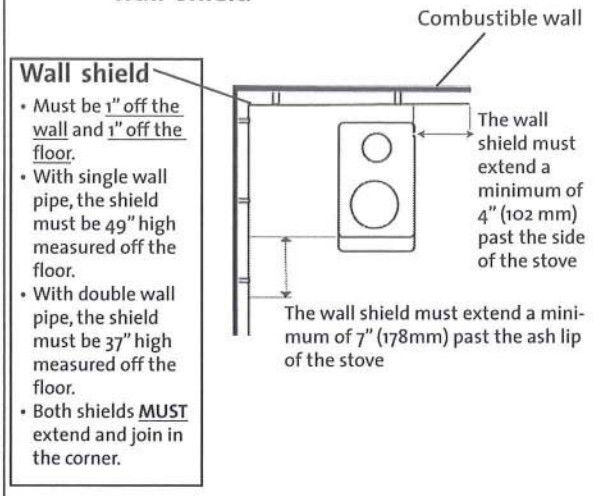


Fig. 18 **Corner installation with wall shield**

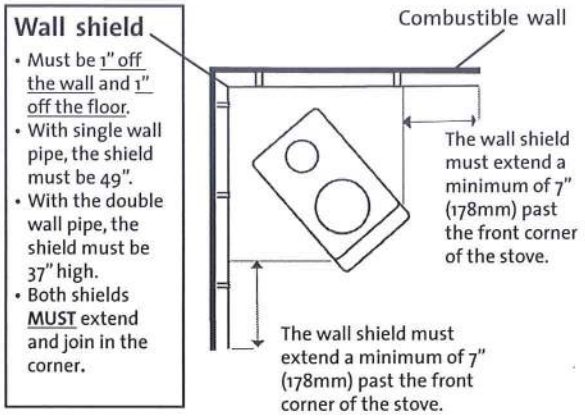
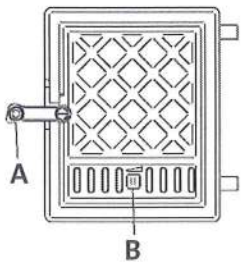


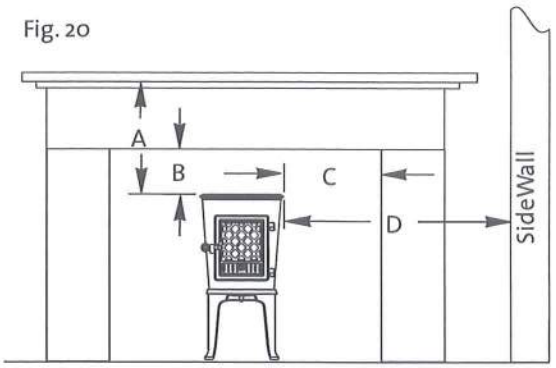
Fig. 19



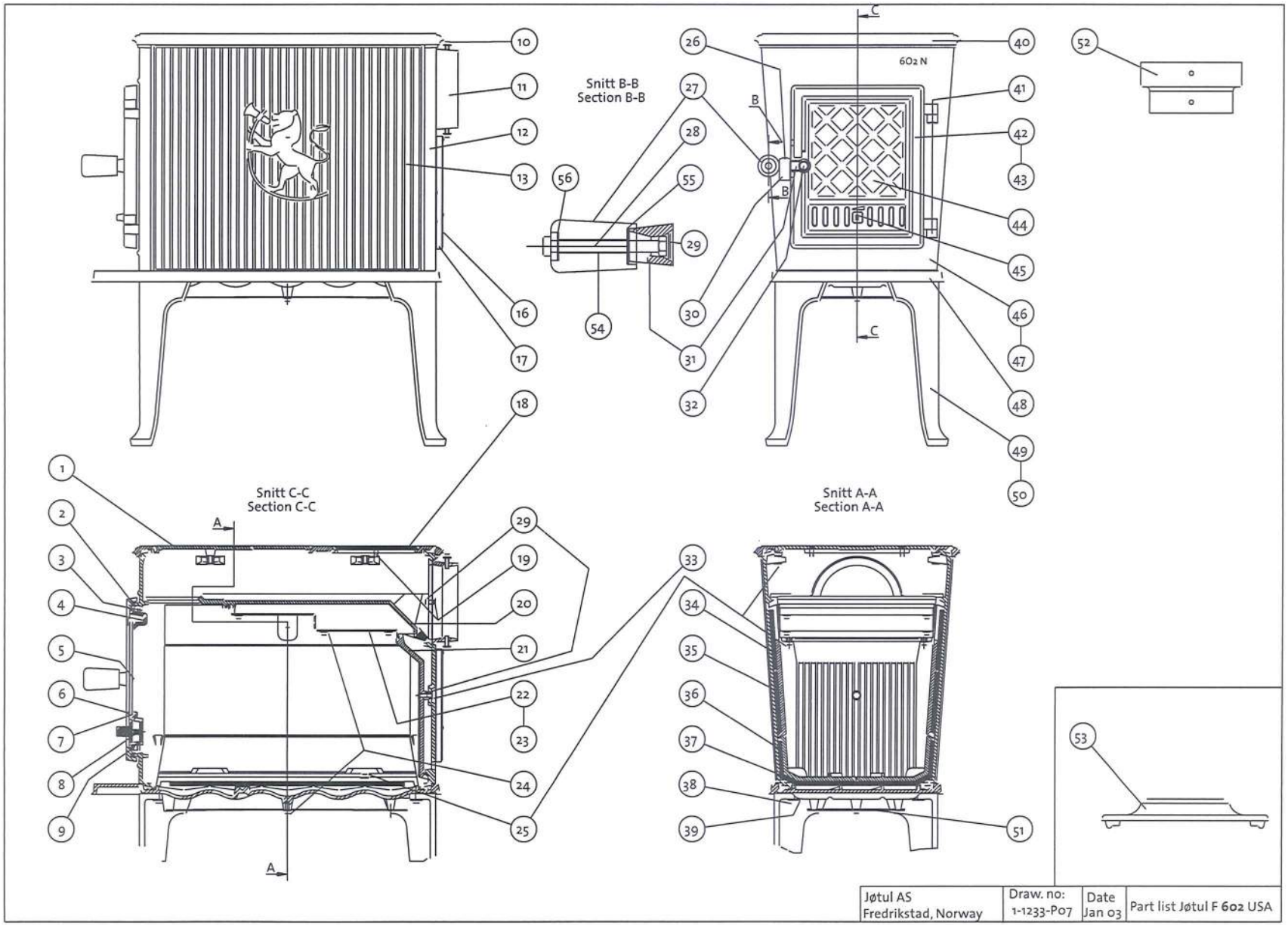
A: Lift to open
B: Left - closed, Right - open

(Measurements in cm - for Canada)

Fig. 20



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)
D: Unit to Side Wall -	24 in. (61 cm)


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

Partlist Jøtul F 602 USA

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, cylinder head	M6x30 DIN 84 S.krom.
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.	

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 =

$$R = \frac{btu}{(Hr)(ft2)(f)} = \frac{(m2)(k)}{W} = \frac{(btu)(inch)}{(hr)(ft2)(f)}$$