

Certification Test Report

Sherwood Industries Ltd.
Freestanding Pellet Stove
Model: Empress FS

Prepared for: Sherwood Industries Ltd.
6782 Oldfield Road
Saanichton, BC V8M 2A3
CANADA

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Test Period: April 9-13, 2009

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Section 5

Sampling Procedures and Test Results

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INTRODUCTION

Sherwood Industries Ltd. retained OMNI-Test Laboratories, Inc. (*OMNI*) to perform U.S. Environmental Protection Agency (EPA) certification testing on the Empress FS. The Empress FS is a freestanding, pellet-fired room heater.

The testing was performed at *OMNI*'s testing facility in Portland, Oregon. The altitude of the laboratory is 30 feet above sea level. The unit was received in good condition and logged in at the *OMNI*'s testing facility on March 24, 2009. It was assigned and labeled with *OMNI* ID #1401. *OMNI* representative Bruce Davis conducted the certification testing and completed all testing by April 13, 2009. A testing contract, including provisions for Random Compliance Audit (RCA) testing, has been signed by Brian Drescher of Sherwood Industries Ltd. and is on file at *OMNI*.

The Empress FS was tested in accordance with the U.S. EPA 40 CFR Part 60, Subpart AAA – Standard of Performance for Residential Wood Heaters (Appendix A, Methods 28 and 5G). Particulate emissions were measured using a Method 5G sampling train consisting of two filters (front and back). The weighted average emissions of the four test runs indicate a particulate emission level of 1.7 g/hr. Test runs were conducted in each of four burn rate categories (<0.80 kg/hr; 0.80-1.25 kg/hr; 1.25-1.90 kg/hr; and maximum). Emissions for each of the individual test runs did not exceed the cap. The Empress FS results are within the emission limit of 7.5 g/hr for non-catalytic affected facilities manufactured on or after July 1, 1990, or sold at retail on or after July 1, 1992.

This report is organized in accordance with the EPA-recommended outline and is summarized in the Table of Contents immediately preceding this report. The results in this report are limited to the item submitted.

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Table 1.1 – Particulate Emissions

Run	Burn Rate (kg/hr dry)	Method 5G Emissions (g/hr)
1	0.96	1.23
2	1.48	1.63
3	1.86	3.58
4	0.69	1.07
Weighted particulate emission average of four test runs: 1.7 g/hr		

Table 1.2 – Test Facility Conditions

Run	Room Temperature (°F)		Barometric Pressure (Hg)		Air Velocity (ft/min)	
	Before	After	Before	After	Before	After
1	71	75	29.97	29.99	<50	<50
2	77	73	29.94	29.94	<50	<50
3	70	71	30.01	30.00	<50	<50
4	71	70	30.26	30.26	<50	<50

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Table 1.3.1 – Fuel Measurement Summary – PRETEST

Run	Beginning Fuel Weight (lbs)	Ending Fuel Weight (lbs)
1	50.8	48.8
2	44.4	41.0
3	16.7	11.7
4	12.0	10.4

Table 1.3.2 – Fuel Measurement Summary – TEST

Run	Beginning Fuel Weight (lbs)	Fuel Moisture Content (Dry basis - %)	Ending Fuel Weight (lbs)
1	48.8	1.3	44.5
2	41.0	1.3	34.4
3	11.7	1.3	3.4
4	10.4	1.3	7.3

Table 1.4 – Dilution Tunnel Gas Measurements and Sampling Data Summary

Run	Length of Test (min)	Average Dilution Tunnel Gas Measurements		
		Velocity (ft/sec)	Flow Rate (dscf/min)	Temperature (°F)
1	120	13.13	140.8	96.5
2	120	13.23	140.5	104.0
3	120	13.15	140.4	97.5
4	120	12.75	141.8	84.3

Table 1.5 - Heater Operation Data (Average Temperature Data)

Run	Beginning Surface Temperature Average ^a	Ending Surface Temperature Average ^a	Surface Delta T ^b
1	375.4	397.3	22
2	501.0	475.3	26
3	524.6	524.6	0
4	323.2	327.4	4

a. All temperatures are in °F.
 b. Represents the difference between beginning and ending average surface temperature.

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Table 1.6 – Pretest Configuration

Run	Stove Temperature Control	Feed Adjuster	Temperature Control	Time (min)
1	Heat Level Setting 2	N/A	N/A	60
2	Heat Level Setting 4	N/A	N/A	60
3	Heat Level Setting at Maximum	N/A	N/A	72
4	Heat Level Setting 1	N/A	N/A	66

Table 1.7 – Test Configuration

Run	Stove Temperature Control	Feed Adjuster	Temperature Control	Time (min)
1	Heat Level Setting 2	N/A	N/A	120
2	Heat Level Setting 4	N/A	N/A	120
3	Heat Level Setting at Maximum	N/A	N/A	120
4	Heat Level Setting 1	N/A	N/A	120

Table 1.8 – Run Data

Run	Average Dry Burn Rate (kg/hr)	Initial (Induced) Draft (in H ₂ O)	Average Draft (in H ₂ O)	Run Time (min)
1	0.96	0	-0.036	120
2	1.48	0	-0.043	120
3	1.86	0	-0.048	120
4	0.69	0	-0.034	120

TEST RESULTS AND DISCUSSION

A total of four test runs were conducted in the following categories: one in the <0.80 kg/hr dry category, one in the 0.80 to 1.25 kg/hr dry category, one in the 1.25 to 1.90 kg/hr dry category, and one at maximum.

The weighted particulate emission level was measured to be 1.7 g/hr.

The proportionality results for all four test runs were acceptable. Quality check results for each test run are presented in Section 2 of this report.