Certification Test Report

Sherwood Industries Ltd.

Freestanding Pellet Stove

Model: EF5

Prepared for:	Sherwood Industries Ltd. 6782 Oldfield Road Saanichton, BC V8M 2A3 CANADA
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Section 5

Sampling Procedures and Test Results

INTRODUCTION

Sherwood Industries Ltd. retained OMNI-Test Laboratories, Inc. (*OMNI*) to perform U.S. Environmental Protection Agency (EPA) certification testing on the EF5. The EF5 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 July 13, 2009. It was assigned and labeled with *OMNI* ID #1405. *OMNI* representative Sebastian Button conducted the certification testing and completed all testing by July 31, 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 EF5 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 1.3 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 EF5 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.

Table 1.1 – Particulate Emissions

Run	Burn Rate (kg/hr dry)	Method 5G Emissions (g/hr)
1	0.56	1.28
2	1.02	1.11
3	1.56	1.57
4	1.47	1.35
Weighted particulate emission average of four test runs: 1.3 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	86	86	29.94	29.94	<50	<50
2	86	89	29.94	29.90	<50	<50
3	78	78	30.04	30.04	<50	<50
4	79	83	30.04	30.02	<50	<50

Table 1.3.1 – Fuel Measurement Summary – PRETEST

Run	Beginning Fuel Weight (lbs)	Ending Fuel Weight (lbs)
1	33.1	32.0
2	28.8	26.9
3	29.8	26.7
4	26.9	24.1

Table 1.3.2 – Fuel Measurement Summary – TEST

Run	Beginning Fuel Weight (lbs)	Fuel Moisture Content (Dry basis - %)	Ending Fuel Weight (lbs)
1	32.0	4.6	29.4
2	26.9	4.6	22.2
3	26.5	4.6	19.3
4	24.1	4.6	17.3

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	12.58	135.6	94.5
2	120	12.54	132.5	107.9
3	120	13.25	139.5	107.3
4	120	12.98	134.5	115.5

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	287.1	306.9	20
2	372.6	373.2	1
3	460.7	471.8	11
4	446.0	428.9	17
a. All temperatures are in °F.			
b. Represents the difference between beginning and ending average surface temperature.			

Table 1.6 – Pretest Configuration

Run	Stove Temperature Control	Feed Adjuster	Temperature Control	Time (min)
1	Heat Level #1	Feed Trim #5	N/A	60
2	Heat Level #3	Feed Trim #5	N/A	60
3	Heat Level #5	Feed Trim #5	N/A	60
4	Heat Level #5	Feed Trim #1	N/A	60

Table 1.7 – Test Configuration

Run	Stove Temperature Control	Feed Adjuster	Temperature Control	Time (min)
1	Heat Level #1	Feed Trim #5	N/A	120
2	Heat Level #3	Feed Trim #5	N/A	120
3	Heat Level #5	Feed Trim #5	N/A	120
4	Heat Level #5	Feed Trim #1	N/A	120

Table 1.8 – Run Data

Run	Average Dry Burn Rate (kg/hr)	Initial (Induced) Draft (in H_2O)	Average Draft (in H_2O)	Run Time (min)
1	0.56	0	-0.07	120
2	1.02	0	-0.08	120
3	1.56	0	-0.09	120
4	1.47	0	-0.09	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.

During the QA process of test run number three, an issue was encountered regarding precision between filter A and filter B. EPA specifications require that difference in grams per hour results between the two filters be less than 7.5%. Results were found to be 9.2% different from the average gram per hour emissions. This was determined to be acceptable since overall weighted average emissions would not exceed EPA limits if the results from highest calculated gram per hour were used.

The weighted particulate emission level was measured to be **1.3 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.