



OMNI-Test Laboratories, Inc.

Fireplace Emissions Test Report

Prepared for: Clear Skies Unlimited
Lake Elsinore, California

Prepared by: OMNI-Test Laboratories, Inc.
Portland, Oregon

Report Date: March 2, 2009

OMNI-Test Laboratories, Inc. (*OMNI*) performed emissions testing to determine how effective the Clear Skies Unlimited HearthCAT add-on emissions reduction device is for reducing emissions from a standard wood-burning masonry fireplace. The tests reported here were conducted to provide documentation for entering the HearthCAT in the Vesta Awards program for new and innovative hearth products. Vesta winners will be announced at the 2009 Hearth Patio and Barbeque Association Expo in Reno, Nevada on March 20, 2009. Tests were conducted in accordance with the ASTM E 2515¹ sampling protocols for emissions collected by a dilution tunnel and the ASTM E 2558² fueling and operating protocols for wood-fired appliances being tested for particulate emissions.

The first test was conducted without a HearthCAT installed in the test fireplace for the purposes of establishing a baseline emissions factor for comparison to later tests conducted with a HearthCAT installed. All tests were conducted on a standard masonry fireplace meeting all applicable building code requirements. After the baseline test, three additional tests were conducted with the Clear Skies HearthCAT installed upstream from the firebox damper at the firebox exit into the smoke shelf entrance to the chimney. Results for all of the tests conducted are presented in Table 1.



Table 1 – Test Results from Fireplace Emissions Tests Conducted Without and With a Clear Skies HearthCAT Installed

Test Designation	Fuel Burned (kg)	Fuel Moisture (% DB)	Burn Rate (kg/hour)	Emissions Rate (g/hour)	Emissions Factor (g/kg)
Baseline	15.2	20.2	5.9	60.4	10.2
HearthCAT 1	15.8	20.9	7.6	20.7	2.7
HearthCAT 2	15.0	19.5	7.9	26.7	3.4
HearthCAT 3	15.1	20.8	8.0	26.1	3.3

These results show that the HearthCAT reduced fireplace emissions by an average of 69.4% (10.2 g/kg reduced to a three-test average of 3.13 g/kg).

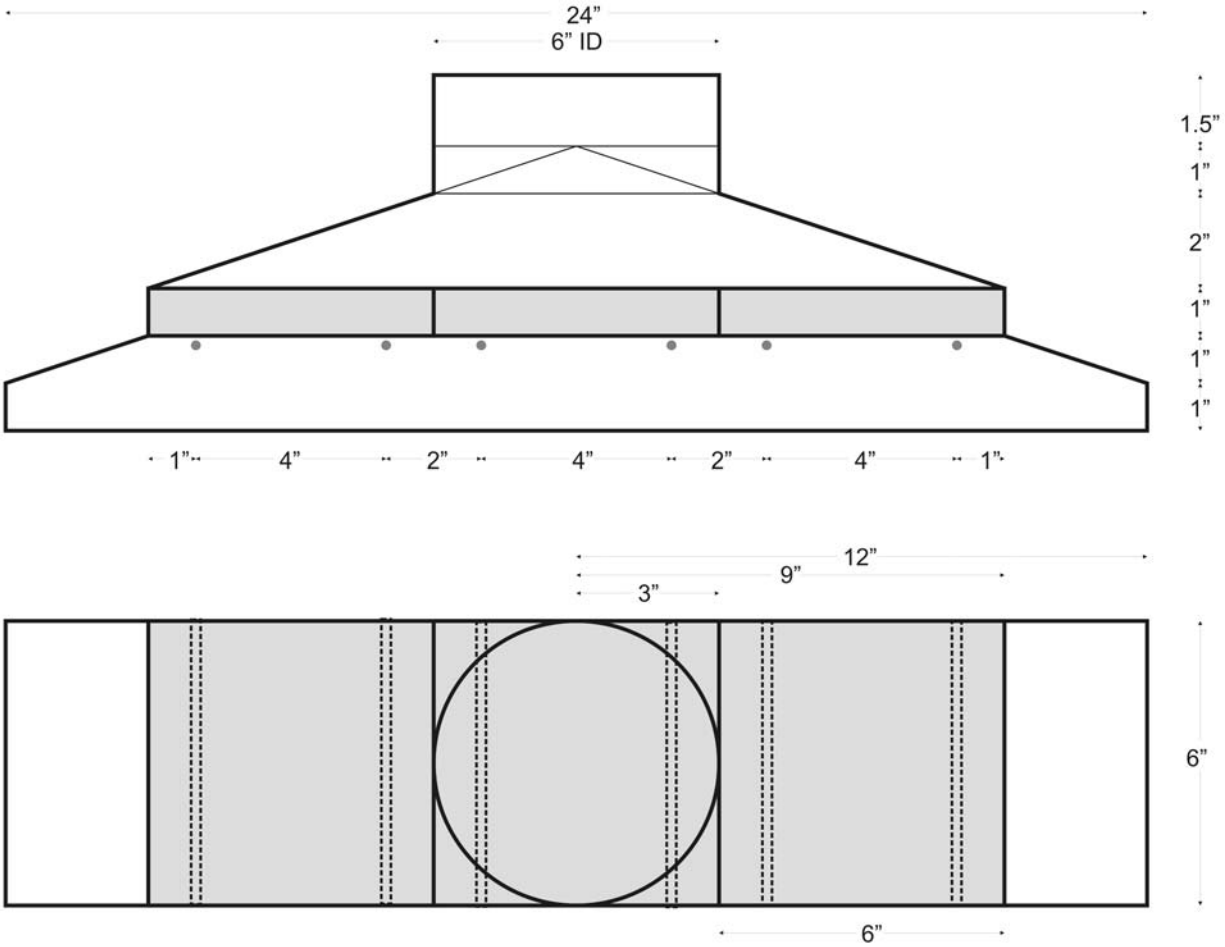
Carbon monoxide was also monitored at a location on the outside of the fireplace and just above the fireplace opening. Carbon monoxide was monitored to determine the potential magnitude of any combustion product spillage into the living area.

These carbon monoxide measurements indicated that there was some carbon monoxide spillage both when the HearthCAT was not installed and when the HearthCAT was installed. The magnitude of all carbon monoxide measurements was consistently below the allowed concentration limits specified by OSHA for workplace exposures. It is theorized that the brief carbon monoxide incursions occurred whenever fuel pieces collapsed into the hearth grate or fell onto the hearth or when there was any air movement in proximity to the fireplace opening.

References:

1. ASTM E 2515, "Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel."
2. ASTM E 2558, "Test Method for Determining Particulate Matter Emissions from Fires in Low Mass Wood-Burning Fireplaces."

REVISIONS			
REV.	DESCRIPTION	DATE	BY



HearthCAT™ Fireplace Hood Emission Control Device ECD

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CLEAR SKIES UNLIMITED INC.
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 Albuquerque, New Mexico 87123
 Phone 505-237-9519

TOLERANCES:
 Thickness = .X
 Other Dim. = .X
 All Dimensions in Inches

APPROVALS:	DATE
DWN	
ENG	
QUAL	
APVD	

TITLE:
Smoke Capture Hood
 HearthCAT ECD
 Masonry Retro-Fit

Clear Skies
 Unlimited Inc.
 Patented Technology


SCALE	SIZE	FSCM NO
NONE	A	N/A
REF:		

DWG NO.	REV.
HOOD 024-2 – RETRO-FIT	NC
SHEET 1 of 2	

REVISIONS			
REV.	DESCRIPTION	DATE	BY

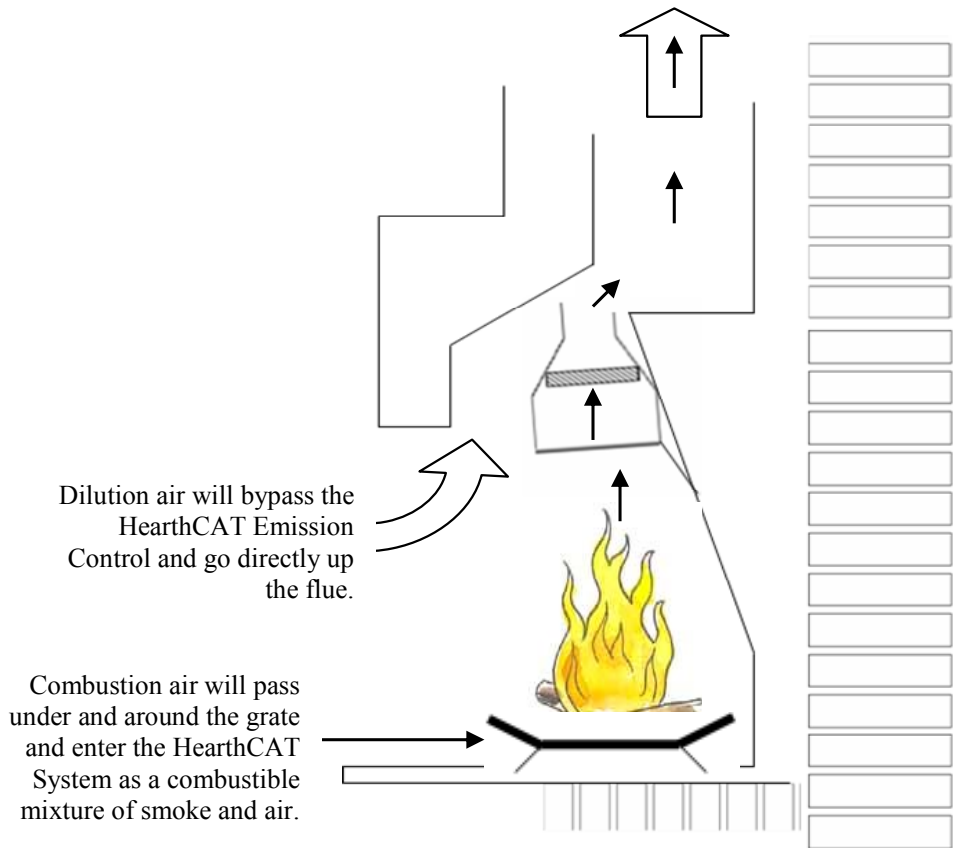
General Notes:

1. Patented as "WOODBURNING FIREPLACE EXHAUST CATALYTIC CLEANER". Patent no. 6,237,587 dated May 29, 2001.
2. Product Testing & Certification by Omni-Test Laboratories.
 - a. The fueling protocol used was as per the ASTM E2558 "Standard Test Method for Determining Particulate Matter from Fires in a Low Mass Wood-Burning Fireplace.
 - b. The particulate sampling used was as per the ASTM E2515 "Standard Test Method for Determination of Particulate Matter Collected by a Dilution Tunnel."
 - c. All tests were conducted on a standard masonry fireplace meeting all applicable building code requirements.
3. CS-100 Series HearthCAT™ Combustors are manufactured IAW Clear Skies Process Control Procedure 03-150 Rev. B.
4. Ceramic Catalytic support is 3-5 PPI Alumina Reticulated Structure per DWG 158858.
5. Catalytic Coating is Palladium @ 15 g/ft³ IAW Clear Skies Coating Specification MAN-01-1.
6. HearthCAT™ Combustors are "canned" with 20 Gage A-309 Stainless Steel.
7. The HearthCAT ECD Smoke Capture Hood is manufactured from 20 Gage A-309 Stainless Steel.
8. Gasket material is Interam™ or equivalent. Gasket strip will be applied inside of stainless steel "can".
9. Packaging IAW Clear Skies Packaging & Handling Specification dtd 25 Jan 2002 or customer packaging requirements as specified in customer purchase contract.
10. Warranty —
 - a. "Clear Skies Unlimited Inc. warrants to the consumer who purchases a new HearthCAT Catalytic System or a wood burning appliance containing one of its catalysts as a new component, to replace the catalyst at no charge should it cease to function within two years from the date of purchase.
 - b. During this same two year period, any replacement catalyst will be covered by this same warranty. A third year of replacement applies if the catalyst fails due to thermal degradation of the catalytic substrate. Proof of purchase is required.
 - c. Labor for removal and installation of the HearthCAT™ Combustor is not the responsibility of the manufacturer."
11. Revisions to this document shall be provided t as released by Clear Skies Unlimited Inc.

 Patented Technology	SCALE NONE	SIZE A	FSCM NO N/A	DWG NO. HOOD 024-2 – RETRO- FIT	REV. NC
	REF:				SHEET 2 of 2

REVISIONS			
REV.	DESCRIPTION	DATE	BY

HearthCAT™ Installation Typical Masonry Fireplace Retro-Fit




Patented

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Albuquerque, New Mexico 87123
Phone 505-237-9519

TOLERANCES: Thickness = .X Other Dim. = .X All Dimensions in Inches	APPROVALS:		DATE	TITLE: HearthCAT™ Emission Control System Air Flow Diagram Graphic Illustration Only Not to Scale	
	DWN				
	ENG				
	QUAL				
	APVD				
 Patented Technology PROPRIETARY	SCALE NONE	SIZE A	FSCM NO N/A	DWG NO. HearthCAT™ ECD-110	REV. NC
	PROPRIETARY TECHNOLOGY			SHEET 1 of 1	



