WHI TEST REPORT #3070739-D
TEST OF
A WOOD BURNING STOVE
FOR MINIMUM BURN RATE
PER
EPA METHOD 28A

BURNING ROOM – 027
(MODELS: MERU, SABA, HEKLA)

FOR

WOLF BAVARIA GmbH
FROHNHOF 9
91580 PETERSAURACH, GERMANY

BY
INTERTEK TESTING SERVICES NA, INC.
8431 MURPHY DRIVE
MIDDLETON, WISCONSIN 53562

TEST DATE: 5 FEBRUARY 2005
REPORT DATE: 16 FEBRUARY 2005

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APPENDICES

I. INTRODUCTION

I.A. PURPOSE OF TEST

The test conducted and reported on herein was run to determine the minimum burn rate of the subject unit in accordance with U.S. EPA requirements under 40 CFR 60. SUBPART AAA, NSPS for Residential Wood Heaters. The burn rate determination was carried out per EPA Method 28A specifically to demonstrate that the unit is not an affected facility as defined in Section 60.531, "Wood Heater", (C). which states that wood heaters must have a minimum burn rate of 5 kilograms per hour or less. The test was conducted on 5 February 2005.

I.B. LABORATORY

The test was supervised by Rick Armstrong, Technical Projects Manager, Intertek Testing Services NA, Inc., Middleton, Wisconsin Laboratory. Brian Ziegler conducted the test. Michael Wolf of Wolf-Bavaria was present during testing.

The laboratory is located at an elevation of 860 feet above sea level and is accredited by the U.S. EPA, Certificate Number 3.

I.C. GENERAL INFORMATION

Single wall black chimney pipe was installed to eight feet above the platform with factory built double wall chimney installed to 15 feet above the scale platform. A factory provided stack damper was installed.

The test was conducted with the minimum air supply achievable as required by the test method. Time, weight, temperature and gas data were recorded for burn rate and efficiency calculations and emission samples were taken by method 5G3.

I.D. DESCRIPTION OF UNIT

The Wolf-Bavaria, Burning Room – 027 is a freestanding stove of oval shape constructed of steel with ceramic inserts on the side and top of stove. The unit stands on 8.25"x20" legs. There is an air control located above the fuel door, which is used for secondary air. Primary air enters the stove in the bottom rear through five 10-mm diameter holes, which then enters the firebox through the ash grate in the center bottom of the firebox. The test lab installed generic flue damper was set to 62° open, which equals 16.52 in^2 (417 mm^2) of open area in the flue.

Proprietary drawings and manufacturing methods are on file at Intertek.

II. SUMMARY OF TEST

II.A. TEST INFORMATION LOG

The following is a summary of the test conducted on 5 February 2005 on the Wolf-Bavaria, Burning Room – 027.

ACTUAL LOADING

Firebox Volume:	1.81 ft^3
Standard Load Weight:	7 lbs/ft^3 = 12.67 lbs (± 10%)
Standard Log:	Douglas Fir 4x4x12.5 inches and 2x4x12.5 inches w/flanges (flanges measured 1 1/2x3/4x4 1/4)
Number of Pieces:	Four 2x4's and two 4x4's
Load Configuration:	Two 2x4's on bottom, two 4x4's on second row, two 2x4's on third row.

TIME	DESCRIPTION	FUEL WEIGHT	WET BASIS M.C.
8:53	split Douglas Fir scrap to start fire	4.0 lbs.	
9:03	Preload added 2x4x6 inch Doug Fir	14.9 lbs.	17.46%
9:05	Air control and stack damper full closed		
10:05	6-standard pieces loaded on 3.0 lbs. of coals (22.6 % of test load)	13.27 lbs. (6.02 kg)	17.65%
11:04	Weight returned to 3.0 lbs.- End of test Burn duration-59 minutes		

II.B. TEST RESULT CALCULATION

Burn rate Calculation (per method 28,8.3)

$$BR = \frac{60 \times 6.02}{59} \cdot \frac{100 - 17.65}{100} = 5.04 \text{ kg/hr}$$

II.C. SUMMARY OF OTHER DATA

Since this test was conducted only to determine the minimum achievable burn rate per EPA Method 28A, gas analysis was not necessary. Data was recorded, however, in this area as part of the normal test procedure. The dilution tunnel was run as prescribed by Method 5G, but at its maximum velocity. No emissions samples were taken.

TEST SET-UP DESCRIPTION

The unit was run with the air control closed and factory supplied stack damper at 62° open. No air inlets to the firebox could be found other than the intended openings. The location and design of the air control system was judged to be tamper proof.

III. CONCLUSION

The minimum burn rate as determined by this test was 5.04 kg/hr. This is in excess of the 5 kg/hr or lower burn rate required to class this unit as a "Wood Heater" per 40 CFR 60, Subpart AAA, Section 60.531, "Wood Heater", (C). This test, therefore demonstrates that this unit is not an affected facility under the definition given in the regulation.

IV. PROCESS DESCRIPTION

IV.A. UNIT DIMENSIONS

The overall dimensions of Burning Room – 027 are:

Height 40.5", Width 23.5", Depth 20".

IV.B. FIREBOX CONFIGURATION

The firebox of Burning Room -- 027 is 13.375" deep, 14.25" wide and17.75" high. The loading volume measured and calculated included the entire volume from the hearth to the baffle and from the back of the unit to the front.

IV.C. AIR SUPPLY SYSTEM

Combustion air enters Burning Room – 027 through the bottom rear of the stove through five 10-mm diameter holes, which then enters the firebox through the ash grate in the center bottom of the firebox.

IV.D. START UP OPERATION

For this test the unit was started with Douglas Fir scrap 2x4's and split 4x4's. This kindling load was allowed to burn until a hot fire was established. A preload of Douglas Fir 2x4's 6" in length and weighting 14.9 lbs. was added. This load was allowed to burn down to 3.0 lbs remaining. When the preload reached 3.0 lbs. net weight the tare button on the scale was pushed, a stop watch was started and the test load consisting of four 2x4x12.5" and two 4x4x12.5" pieces of Douglas Fir was loaded in 30 seconds. The test charge was burned until the scale returned to zero weight indicating that the remaining fuel was equivalent in weight to the initial charcoal bed. Data was recorded at ten-minute intervals during this burn cycle and the time when the test charge was completely consumed was recorded.

IV.E. TEST FUEL PROPERTIES

	PRELOAD	TEST LOAD
SPECIES	Douglas Fir	Douglas Fir
Piece Size	2x4's 6"	4x4x12.5" and 2x4x12.5"
Spacers	no	yes
Total weight	14.9 lbs.	13.27 lbs.
Load volume		0.3942 ft^3
Wet basis-Average Moisture	17.46%	17.65%
Dry Basis-Average Moisture	21.15%	21.43%

Reported and evaluated by:

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Reviewed by:

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