

# Forced Air Mixing With The Jet-Flame ETHOS 2020

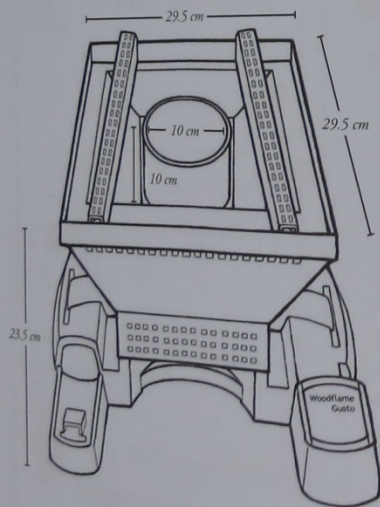
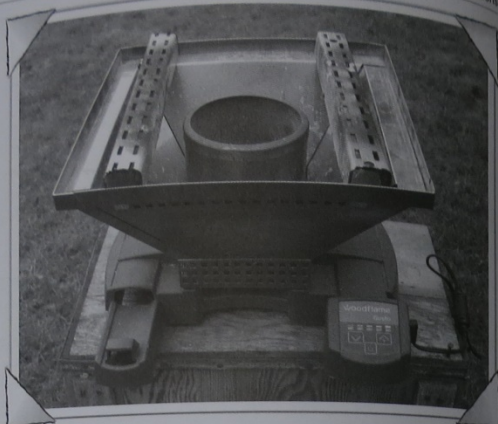


David Evitt

ASAT Inc. / Aprovecho Research Center

## Wood Flame

Origin: Canada  
 Weight: 6 kilos  
 Fuel Type: Wood  
 Contact: Woodflame  
 6155 Des Grandes-Prairies  
 Blvd. Montreal (Québec),  
 Canada H1P 1A5  
 info@woodflame.com  
 tel: (514) 328-2929  
 toll free: (888) 664-6966



### Description:

The Wood Flame stove uses a small, externally powered electric fan to mix wood gases, air and flame to clean up combustion. In the bottom of the metal combustion chamber are many very small holes which send strong jets of air up through the burning wood.

A griddle used for grilling comes with the stove. When tested, the griddle was removed and supports were made to hold up the pot.

The combustion chamber is filled with small pieces of wood and lit. As the fire grows larger, the speed of the fan is increased manually, creating a small blast furnace. Wood is added to the combustion chamber by sliding it under the pot.

Blowing air up into the fire causes the fire to look very "jumpy" and frenzied. Flames turn from yellow to reddish to blue at various stages of burning.

S.K.

## Wood Flame

### Performance:

The Wood Flame stove uses a batch of wood to grill foods. In these tests, the grill is removed so a full Water Boiling Test can be performed.

This is an interesting stove to use, with nine fan speeds. The amount of air is matched to the size of the fire. The stove is amazingly clean burning and uses a reduced amount of fuel. Feeding the stove under the pot is challenging, however.

The stove uses much less wood than the 3 Stone Fire and makes only 16% the CO and 2% of the PM made by the 3 Stone Fire.



Wood Flame

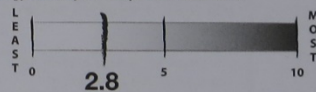
## Test Results

### Fuel Economy



Time to Boil 5L of Water - **19:30**

Energy Consumption compared to other stoves



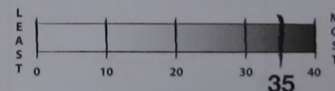
Fuel Used to Boil **249 g**  
 + Fuel Used to Simmer **377 g**  
5L of Water for 45 minutes  
**TOTAL - 626 g**

### Cost and Safety



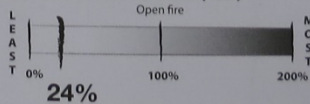
Cost = \$ **229.00**  
 Fuel Use = **38 kg**  
estimated per month

### Safety Rating

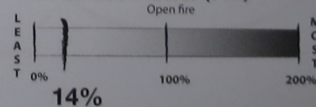


### Emissions

#### Carbon Monoxide (CO)



#### Particulate Matter (PM)



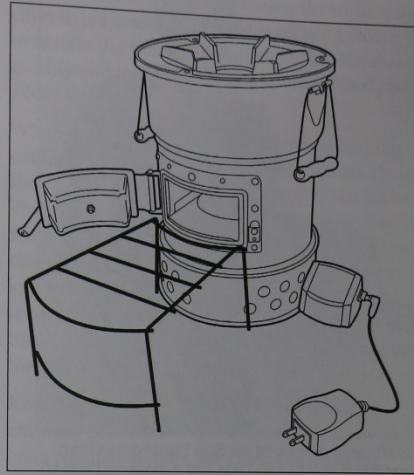
## Chapter 13

# Side Feed Forced Draft Stove

High Power PM 2.5: 4.5mg/min @ 3.3kW    Low Power PM 2.5: 3.8 mg/min @ 1.4kW



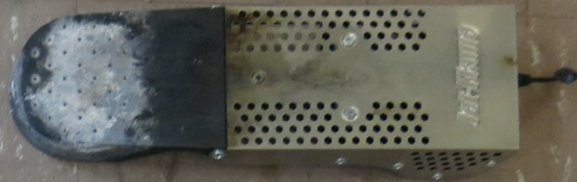
In this Forced Draft Rocket stove, the sticks are pushed horizontally into the fire as they are consumed. The made charcoal falls beneath the sticks and helps to keep the sticks lit by radiation. Adding forced draft to the Rocket stove accomplishes better mixing of gases, flame, smoke, and air. A chimney was added to this stove to comply with new WHO standards.



CAD drawings are found in Appendix C.

### Test Results

Stove type/model	Location	IWA Performance Metrics	units	Side Feed Forced Draft		Average Tier
				Average	COV	
High Power Thermal Efficiency		%		47.1%	4%	4
Low Power Specific Consumption		MJ/min/L		0.010	8%	4
High Power CO		g/MJ <sub>d</sub>		1.76	30%	4
Low Power CO		g/min/L		0.01	24%	4
High Power PM		mg/MJ <sub>d</sub>		47.2	53%	3
Low Power PM		mg/min/L		0.47	48%	4
Indoor Emissions CO		g/min		0.16	22%	4
Indoor Emissions PM		mg/min		4.5	57%	3

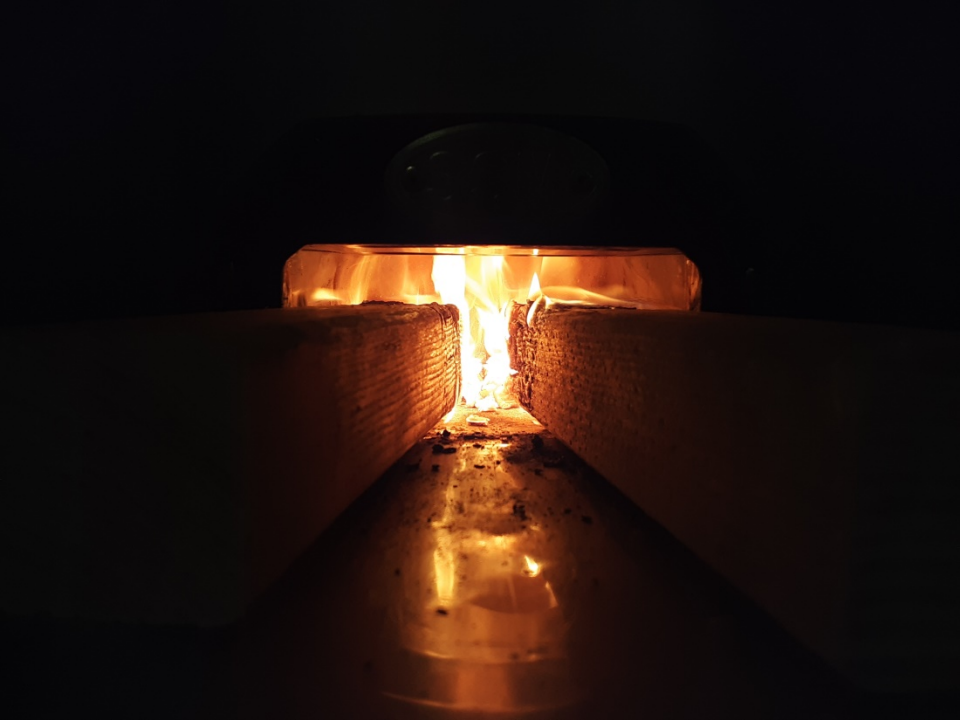
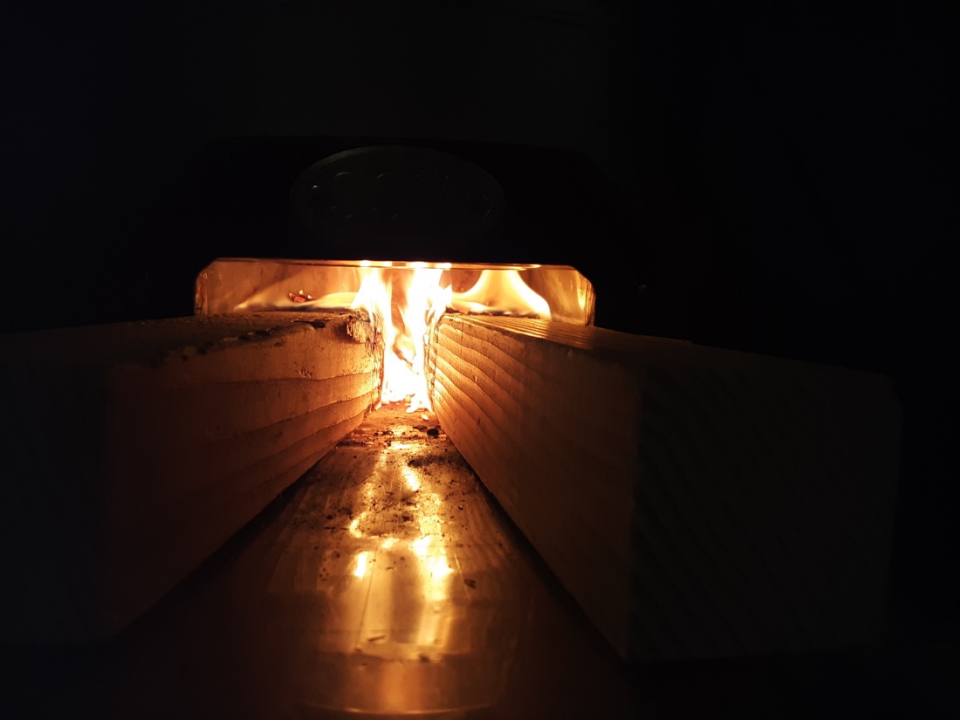






Ject Auto  
17025

10A  
mA  
V  
COM  
VDC  
VAC



***Jet-Flame***







