

Masonry Heater Performance Guide

The purpose of this article is to provide a simple summary of the technical performance related to masonry heaters. Mainly this refers to particulate emissions, combustion efficiency, and overall efficiency.

Basic concepts and terminology

Particulate emissions:

Particulates, alternatively

referred to as particulate matter

(PM) or fine particles, are tiny particles of solid or liquid suspended in a gas. In the case of wood burning, PM refers to particulates in exhaust gases (smoke) that exit the chimney and enter the atmosphere. PM consists of ash, tar, and other organic compounds.

Combustion efficiency: This term refers the ability of the appliance to burn fuel. In terms of masonry heaters, this term more directly describes how completely the heater is burning the cordwood fuel load. If a stove is thought to burn clean it will have a high combustion efficiency and low emissions. Combustion efficiency is described as a percentage. For example, a combustion efficiency of 95% would mean that stove is able to burn 95% of the available matter in a given load of fuel, with 5% going up the stack (chimney) as waste, either in the form of gases or PM.



Nobert Senf in the testing lab, Shawville, Quebec, 2008

Overall efficiency: In wood burning appliances, overall efficiency describes how well the stove transfers energy released from combustion of the wood fuel source into useable heat energy radiated from the appliance. In North America, this standard (in terms of cordwood combustion) will always subtract 15% as a loss to compensate for the moisture content in the fuel. As such, by North American standards the highest overall efficiency is 85%. In Europe (where the moisture factor is not subtracted) the highest potential overall efficiency is 100%. This is good to keep in mind when comparing data from North American and European masonry heater manufactures.

Summary of Masonry Heater Technical Performance

The following summary information comes from the technical data produced from the testing of masonry heaters in North American testing labs. The formal testing of masonry heaters (in North America) began in the mid 1980's and continues to the present.

Particulate Emissions: The average of averages for the study data on masonry heaters is 2.9 g/kg PM, with the overall range typically found to be between 1.4 to 5.8 g/kg PM. Every custom built heater is unique to some degree, and used by a different user with individual habits and with varying fuels. Many older, un-certified wood burning stoves average in the range of 12 g/kg PM. Modern EPA Phase 2 stoves average 6 g/kg PM. (MHA/HPBA White Paper, 2008)

Combustion Efficiency: Most masonry heaters have a combustion efficiency ranging between 95 to 98%.

Overall Efficiency: A well designed heater will have an overall efficiency between 70 and 85%.