

WOOD STOVE MAXIMUM HEAT OUTPUT

EPA METHOD VS. REAL WORLD

The following is an attempt to explain the difference between EPA tested high heat output values and potential high heat output capability of a wood stove.

In summary, the EPA test method for determining the maximum burn rate is not necessarily representative of what a consumer would do or consider as operating the stove at maximum ability. The reason for this is that the EPA had to establish a finite starting and ending point for the test in order to standardize the method. In doing so they choose a refueling point that may not be particularly representative of what someone would do in a situation where they are trying to maintain the temperature comfort level of their living environment. Essentially, the EPA test method refuels much later in the burn cycle than would someone trying to keep warm. Therefore, EPA maximum output values may not be typically representative of real world conditions.

To explain further in more technical detail:

The EPA test method requires that the stove can only be refueled when the remaining charcoal bed weight is between 20 – 25% of the nominal test fuel load weight. So for a stove that has a nominal test fuel load weight of 20 lbs., the charcoal bed weight at refueling would be 4 – 5 lbs. To provide a visualization of charcoal volume, 4-5 lbs. of charcoal would about fit piled up in a Firelight ash pan.

To use a Jotul stove for example, the Firelight has an EPA calculated useable firebox volume of 2.79 cubic feet. The test method specifies a loading density of 7 lbs. of Douglas Fir fuel per cubic foot of firebox volume. Therefore the nominal test fuel load is 19.5 lbs. +/- 10%. Refueling would be allowed when the stove had a remaining charcoal bed weight of 20 – 25% or 3.9 – 4.9lbs. What is shown by this example is that the charcoal bed at the time of refueling is relatively small compared the stove size.

The duration of the test is also a factor. The Firelight maximum output test was 2 hr. 5 minutes in duration. Of the 18.7 lbs. of fuel used for this test, 14 lbs. or 75% was consumed during the first 60 minutes or the equivalent heat output of approximately 63,000 Btu's. The final 65 minutes of the test burned 4.7 lbs. or the equivalent heat output of approximately 17,000 Btu's. As shown by this example, the stove is capable of operating at outputs higher than indicated by the EPA high heat output value of 40,000. What is happening is that the last half of the test significantly lowers the overall average.

What some manufacturers have done in the past, to provide a more realistic indicator of a stoves ability, was to conduct tests where the stove is operated at maximum and refueled every hour. The amount of fuel added each hour is averaged and a maximum Btu output is calculated from the average consumption rate based on EPA default efficiency values. The premise behind this method is that in order to maintain the desired comfort level, a consumer will load the stove more often than is represented by the EPA test procedure.