

Catalytic Combustors & The Wood Stove Industry

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The 1970's energy crisis caused a surge in the use of wood stoves and Inserts. In 1990 the United States environmental protection agency (EPA) implemented strict new emission standards for wood burning appliances, measured in grams of particulate per hour. (g/hr). The new standard of 7.5 g/hr created the environment for the pioneers of the modern wood stove, including Pacific Energy. Wood stoves and Inserts prior to the new standard could create up to 100 g/hr.

Technology and innovation was forced to accommodate the standard. Essentially two methods were developed, catalytic and non-catalytic re-burn systems. Pacific Energy has developed and manufactured both methods, finally settling on non-catalytic as the superior more reliable and durable technology.

Catalytic combustors were a quick way to reduce emissions and pass the standard but proved complicated for a consumer to operate due to manual bypasses for start-up and reload; as well, catalytics proved to be very fragile, degraded over time and are expensive to replace. Many major manufacturers moved away from the unreliable catalytic combustors to re-burn systems.

Currently the EPA has introduced and implemented two new emissions targets, May 2015 was set at 4.5 grams of particulate per hour (g/hr) and phase 2 on May 16, 2020, 2 g/hr. Several manufactures unfortunately are relying on catalytic technology and/or fixed burn rates to get them over the 2 g/hr hurdle.

Pacific Energy has researched the current catalytic technology and consulted catalytic manufactures. We determined other than placement and some material improvements it is essentially unchanged, subject to manual operation, damage and degradation. We believe that wider use of catalytics is a mistake for the environment and; worse, completely unnecessary.

A document commissioned by the EPA in 1998 essentially states what we found.

Excerpts from the:

***Residential Wood Combustion Technology Review Volume 1. Technical Report
Dec 1998, prepared by Omni environmental, for the Environmental Protection Agency***

"The two most common degradation effects seen in catalytic stoves are damage to the catalyst bypass and the deterioration of the catalyst itself either through physical breaking, peeling or plugging or through the loss of catalytic activity. Under normal use the emissions of particles from most catalytic wood stoves will increase, in some cases reaching conventional stove levels within five years of use due to the loss of catalytic activity"

*"...under extended high temperature use a catalyst could fail very rapidly. Once a catalyst fails, the emissions for some models would be close to those from a conventional uncertified stove..." **This means the emissions could reach up to 100 grams per hour.***

Conclusions

"The significant deterioration of catalytic activity often seen in catalytic wood stoves in a three-to-five-year time frame and the identification of viable approaches to ensure catalyst inspection/replacement continues to be an unaddressed problem"

Pacific Energy has several non catalytic woodstoves that will meet the new standards, and new non catalytic technology in development. We are confident that all our woodstoves will meet the new standard by 2020 and best of all, without the catalytic or fixed burn rate handicap.

What you should know before buying a catalytic wood stove.

- **Q: What is a catalytic combustor?**

A: A Catalytic combustor is a honey combed device located near the flue outlet containing chemicals and materials that will assist in burning smoke particulate when a high enough internal temperature has been reached.

- **Q: Do they burn cleaner than non catalytic stoves?**

A: Yes, and No. Catalytic combustors assist significantly in the relatively short start-up phase when you first light the stove. They also can achieve very good results on extremely low settings. However, if you operate your stove as most people do in the mid burn cycle the results are less dramatic. If they are not operated properly and over time they can be significantly less clean than a non catalytic modern woodstove.

- **Q: How does the stove operate compared to a non catalytic stove.**

A: Virtually all catalytic stoves will require operator knowledge and manual control of a bypass damper during the start-up phase, this prevents the plugging of the device with smoke and particles before operational temperature has been achieved.

- **Q: Does a catalytic stove require more maintenance?**

A: Maintenance can be more difficult as the catalytic combustor typically needs to be removed when cleaning and they can be very fragile. Also, outside colder chimneys can require frequent cleaning due to the cooler stack temperatures, many experienced retailers avoid outside chimneys with catalytic stoves.

- **Q: Is there restrictions on what fuel I can burn?**

A: Most typical cord woods are fine, but catalytic combustors can be highly susceptible to damage from burning foreign materials such as glossy colored papers and other chemical laden materials, these can render the catalytic inoperable.

- **Q: How long will a catalytic last.**

A: Catalytic combustors are subject to damage from physical contact, thermal shock, plugging up from not properly using the bypass or unseasoned fuel and degradation of the actual combustor chemicals over time. The actual useful life span is highly variable on these factors.

- **Q: How do I know if my catalytic stops working?**

A: In some cases, when the catalytic plugs up the stove will not burn in other cases such as in chemical failure of the combustor or physical breakage you may not be able to tell.

- **Q: If catalytic combustors are unreliable and fragile why do many manufacturers use them?**

A: Catalytic combustors are useful in larger fireboxes that tend to burn dirtier than medium and small fireboxes, they are also a very economical way to have a stove pass the current emissions standards. Over time, the current thinking does not support long term benefits of catalytic combustors based on the reliability and required user interaction.