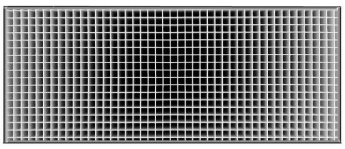
How to Operate Your Catalytic Wood Stove

General guidelines

Catalytic wood stoves reduce smoke emissions by passing the smoke through a catalyst. Non-catalytic stoves use a different strategy. But there are some guidelines that are common to all wood stoves à

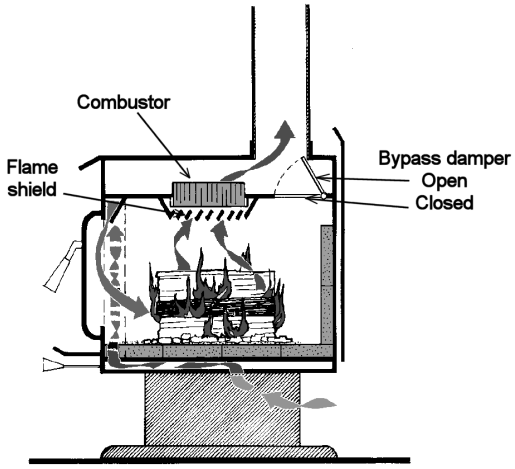
- burn only clean, uncoated, dry firewood
- start fires with plain newspaper or small amounts of sawdust/wax starters
- don't burn any kind of garbage
- connect the stove to an effective chimney system

A wood stove catalyst is either a ceramic or metal honeycomb that is coated with a metal, platinum and/or palladium. When smoke flows through the small passages in the combustor, passing close to the catalytic coating, its ignition temperature is reduced by roughly half, from about 1000°F to 500°F. This low ignition temperature allows a catalytic stove to produce a long steady burn with a low emission level. The catalytic coating is not consumed in the process, although it and the surface it coats degrades as it is used.



The combustor is surrounded by a metal wrap and then a gasket to prevent leakage past it.

Inside a catalytic stove



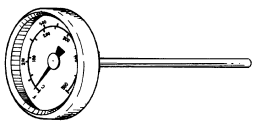
The combustor is at the heart of the catalytic stove and to remain healthy it must be hot enough to be active, but not so hot that it is damaged. The bypass damper is used to bypass the combustor when the loading door is open and when the exhaust is not yet hot enough to make it active. The flame shield protects the combustor from direct flames which can cause uneven heating and shock to the combustor.

Temperature is Important

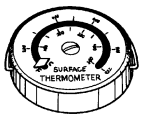
The catalyst becomes active when it is heated above 500°F. When it is active and is fed some smoke, its temperature rises rapidly as the smoke burns. This is usually referred to as 'light off'. Once the catalyst and the surrounding materials are heated beyond the activation temperature, the smoke entering the catalyst can be cooler than 500°F because combustion inside creates the heat needed to sustain catalytic combustion. A catalytic combustor that is being fed dense wood smoke may glow bright red and reach temperatures as high as 1600°F, which can damage the combustor if allowed to continue. To avoid damage, don't run the stove continuously at maximum, except for up to 30 minutes as it heats up after loading.

Using the thermometer

Some catalytic stoves have their own probe thermometer that fits into a particular place on the top of the stove. Other manufacturers supply a standard surface thermometer with the stove, or recommend the use of one. The thermometer tells you when the catalyst is hot enough to be active. Follow the stove manufacturer's instructions on where to place the thermometer and how to interpret the readings. Note that the reading from a surface thermometer is normally about half of the temperature experienced by the combustor inside the stove.

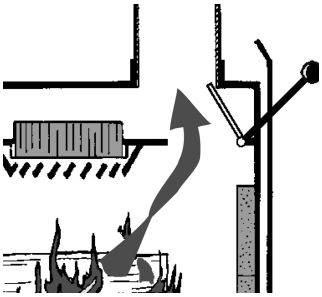


Probe thermometers fit into a particular place on the top of the stove.



Surface thermometers are placed on top of the stove in a particular location.

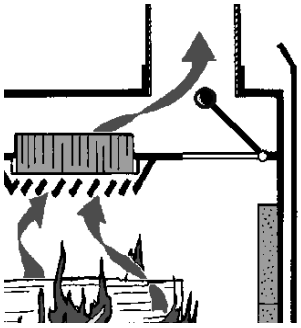
Bypass Open – building a fire and reloading



The bypass damper must be open when starting a new fire, rekindling from charcoal, or adding wood to an existing fire. When the bypass is open, all the smoke from the fire bypasses the combustor and flows directly up the chimney. Always open the bypass damper before opening the loading door. If you forget to open the bypass damper before opening the door when a fire is burning, smoke might spill into the room through the open door. The bypass must be open when starting a new fire because if smoke flows through the combustor before it reaches 'light off' temperature, creosote might coat and plug the combustor.

Bypass Closed – steady heating

A catalytic stove can only burn cleanly and be efficient when the bypass damper is closed and the catalyst is active. The damper must be closed securely so that all the smoke passes through the combustor. In this position, the stove will burn at a steady output for several hours. When the air control is set for a long burn, it is normal not to see much flame through the glass door, and the glass may become stained with soot. This soot should burn off during your next hot fire.



If you smell smoke in the house during a long burn, you may be running the stove too low. Remember that the chimney needs some heat to produce the draft that draws the exhaust up and out of the house. If you smell smoke, open the air control to give the chimney some heat. Build smaller, hotter fires in mild weather.

Using your stove: a quick summary

To Start a Fire

1. Open the bypass damper
2. Open the combustion air control
3. Empty ashes if necessary
4. Build and light the fire
5. As soon as the thermometer reads in the active zone (>500°F), close the bypass
6. Run the stove on high for up to 30 minutes, then adjust the air control for the desired heat output.

To Rekindle a Fire From a Charcoal

1. Open the bypass
2. Open the air control fully
3. Rake the charcoal towards the door
4. Add as much wood as is needed for the conditions
5. As soon as the thermometer reads in the active zone (>500°F), close the bypass
6. Run the stove on high for up to 30 minutes, then adjust the air control for the desired heat output.

Maintaining a healthy combustor

Some bits of flyash may collect on the face of the combustor as it is used. You can see these bits when the stove is cold or when the combustor is glowing red. These can be easily removed by using your vacuum cleaner. Remove the flame shield and pass the brush attachment gently back and forth across the combustor. Depending on how much wood you burn, you may need to vacuum the combustor at least once each year.

When to replace your catalytic combustor

The combustor in your stove can last a long time, but its lifespan depends on three things: 1. how much wood you burn each year, 2. how well you operate the stove, and 3. the quality of the fuel you burn. If you notice a reduction in efficiency, or the temperature doesn't rise when the bypass is closed, or you see smoke from your chimney, your combustor may need replacement. See your dealer.

Prepared for Urban Hearth by Gulland Associates Inc. 2014