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CATALYTIC RETROFITS FOR WOOD STOVES

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When applied and used properly, the catalytic combustor has tremendous potential for making the airtight wood stove a much safer, cleaner and more efficient appliance. Creosote reductions of up to 90 percent are possible. In addition, the catalytic combustor reduces wood consumption by 20% to 25% for the same amount of heat, reduces air pollution by 75 percent, and requires less refueling as wood burns for 8, 10, up to even 15 hours. In response to these obvious benefits, consumers have begun to ask questions about the catalytic combustor. This publication answers typical questions, discusses limitations, points out safety precautions and suggests guidelines to follow when purchasing a catalytic add-on combustor.

1. What is a catalytic combustor?

A catalytic combustor is a device that burns smoke at a temperature far below those normally required. A chemical substance works as a catalyst allowing the smoke to burn at 500°F instead of 1100°F. Once the catalyst has ignited, the combustor will operate as long as the incoming smoke remains above 250°F.

2. How much does the average catalyst retrofit cost?

Catalytic retrofits are available for \$125.00 and up. It may take anywhere from one year to four years for the catalytic retrofit to pay for itself and its replacement.

3. How does the catalytic combustor work?

A catalytic combustor is installed in the firebox or in the stovepipe of a free-standing stove or on the collar of fireplace inserts. Because the combustor restricts natural draft to

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some extent, a bypass damper is needed to prevent the stove from smoking. The bypass is an opening that directs the smoke around the catalytic combustor and up the flue. To start a cold stove the bypass damper is completely opened, a fire is started and allowed to achieve a medium to high burn that is maintained for 20 minutes to bring the stove up to the operating temperature of 500°F to 600°F. The bypass damper is then slowly closed to "light-off" the catalytic combustor; that allows not only the wood, but also the smoke to be burned. About five minutes after the bypass is closed, the air inlets are turned down to achieve the desired burn rate. It is important to remember to open the bypass whenever loading or inspecting the stove. Failure to do so may cause the room to fill with smoke or cause a flaming backlash.

4. How can I tell if the catalytic combustor is working?

You can tell if the catalytic combustor is working by monitoring it with a temperature gauge. The temperature will rise dramatically after the combustor "lights-off" and will fall if the catalyst goes out for some reason. The combustor may also glow red to yellow when "lit-off" and operating at a high temperature. However, the catalytic combustor may operate efficiently without showing a color change, which makes the temperature gauge a more trustworthy measure of performance.

5. Will a catalytic retrofit fit my particular type of woodstove?

A catalytic retrofit will fit most types of wood stoves but the stove must be airtight for the catalytic combustor to work efficiently. A stove is considered airtight if all the combustion air enters only through the air inlets. A good way to check to see if your stove is airtight is to see if the stove can achieve an over-night burn; or if you can dampen flames to one inch or less by shutting down the air inlets.

6. Can I burn anything in a catalytic equipped wood stove?

No, only natural wood can be used as fuel. The catalyst may be damaged if trash, treated or painted lumber, chemical flue cleaners or synthetic logs are burned.

7. How long will the catalytic combustor last?

Tests show that the catalytic converter lasts for about 6,000 to 12,000 hours. This means you can expect the converter to last for 2 to 5 years or for about 15 to 30 cords of wood.

Limitations of the Catalytic Retrofits for Woodstoves

Three factors limit the use of catalytic retrofits for woodstoves: 1) insufficient draft, 2) increased water condensation, and 3) increased effort in operation.

Air flow is restricted somewhat when it passes through the combustor. This restriction does not create a problem in a chimney with a strong up draft, but it could create a problem in a chimney with a weak draft and produce a system that will not vent.

Water vapor is the major by-product of the catalytic reaction. Masonry chimneys located on an outside wall have cooler flue gas temperatures than interior chimneys. The additional water vapor from catalytic reaction could cause water condensation problems in the flue of an exterior masonry chimney.

A wood stove equipped with a catalytic combustor does require more thought to operate than a standard wood heater. The unit has to be brought up to temperature in order to "light off" the combustor. Air inlet controls have to be operated at different settings before and after "light off". Loading and reloading patterns have to change in order for the combustor to work well. Only natural wood can be used as fuel.

Safety Precautions

1. Make sure that the stove pipe is at least 18 inches from a wall.
2. Always open the bypass damper before the doors to the stove are opened.
3. Burn only natural wood. Burning paper and cardboard can plug the combustor and cause the room to fill with smoke.
4. Clean the chimney at least once a year.
5. Follow the guidelines set forth in the owner's manual. Most manufacturers have excellent descriptions of proper operation procedures in their owner's manual.

Guidelines for Choosing Catalytic Retrofits

1. Make sure the chimney has a reasonably strong updraft (.02 to .06 inches of water, as measured by a draft gauge). Retrofits should not be installed if the chimney has a weak draft. Insufficient heat, smoking, or poor response to changes in the air inlet settings are characteristic of a weak draft.
2. Read the owner's manual before buying a catalytic retrofit for your stove. Be certain that you understand the directions for operation and installation.
3. Have a dealer show you how to light and operate the combustor.
4. The catalytic combustor should come with a calibrated thermometer to eliminate and confusion regarding "light off", catalyst activity or proper stove operation.
5. Make sure the manufacturer's recommended clearance is compatible with your stove and chimney.
6. Rear heat shields should be provided on the combustor housing for stovepipe retrofits. The shield reduces temperatures on the wall behind the combustor.