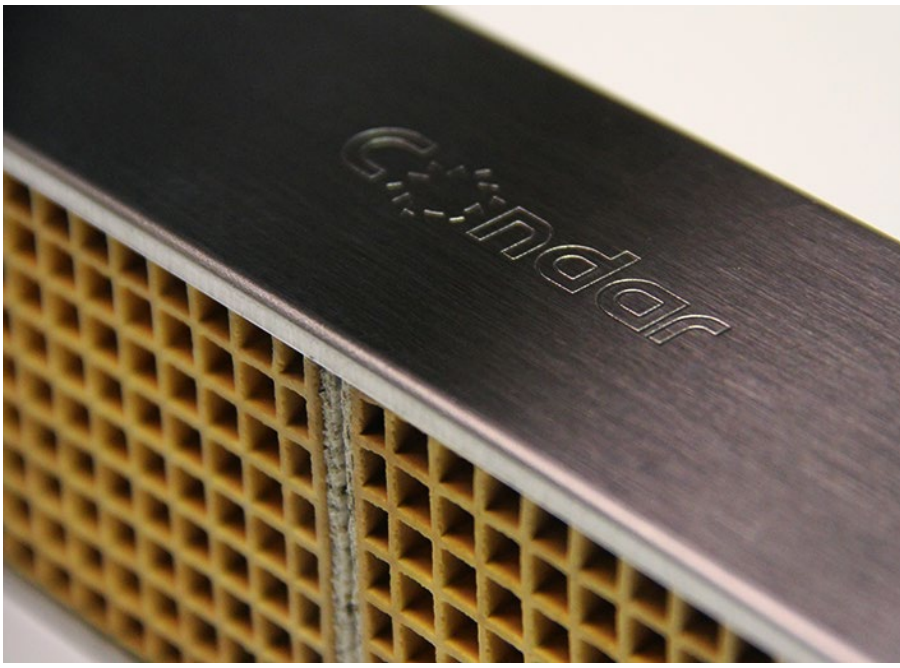
Care and Replacement Manual for Woodstove Catalytic Combustors

A good combustor is designed to withstand approximately 12,000 hours of continuous use. For most people, this will translate into two to five years of use, depending on the length of your heating season and how often you use your stove.

Proper maintenance will increase the combustor's effectiveness and prevent many problems. Inspect your combustor before each heating season, and during the season if your stove's performance seems to change. There are some obvious signs of trouble that your inspection may reveal.

Contents

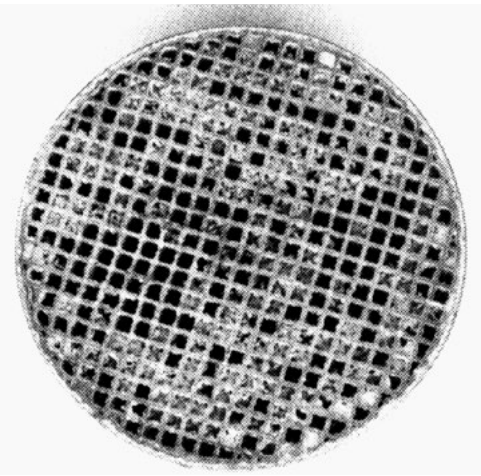
Inspecting your combustor 2
How to tell when you need a new combustor 4
Tips to extend combustor life 6
Burn smarter and protect your combustor 6
Buying a replacement combustor if needed 7



Condar Company 111 Kangaroo Drive, Columbus NC 28722
phone (828) 436-2102
www.Condar.com

copyright © Condar Company
All rights reserved

Inspecting your combustor

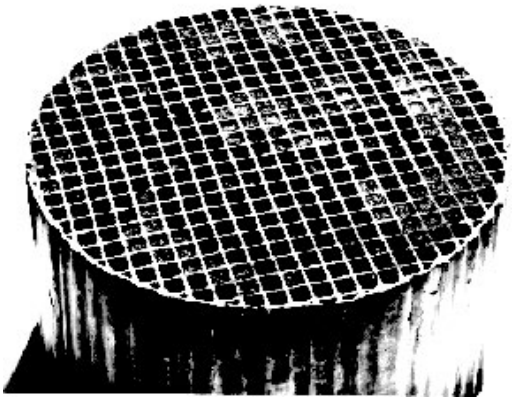


Ash/soot clogging

Ash, a fluffy light grey powder, and soot, a darker granular material, accumulate on the combustor surfaces in normal use. Ashes accumulate both as a result of the smoke being burned within the combustor and by being carried out of the firebox by the chimney draft. Soot is often the result of previous creosote deposits having been burned off or foreign materials having been burned in the firebox.

Signs of clogging include reduced heat output and sluggish performance. If inspection reveals most of the honeycomb cells are clogged you may need to replace your combustor.

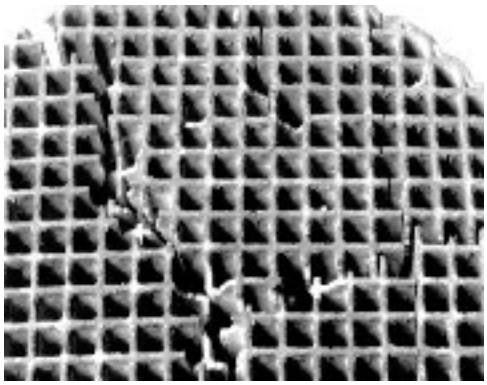
Creosote is a tarry brown substance that can accumulate on the combustor if it is engaged before the smoke is hot enough to activate the catalyst. Once in place, it "masks" the catalytic material on the surface of the combustor and does not allow the combustor to become active. At this point, the combustor can quickly accumulate additional creosote.



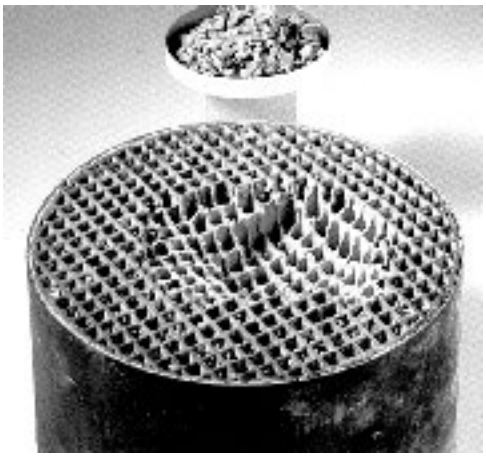
Creosote fouling

The only way to remove creosote is to burn it off the combustor. To do this, you will have to burn your stove at higher than normal temperatures before engaging the combustor, and leave it engaged until it has all burned away.

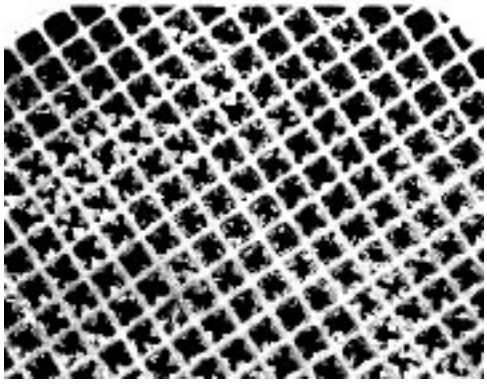
Warning: If the combustor is coated with creosote, it is possible the pipe and chimney are also coated with creosote. The very hot fire needed to clean creosote off your combustor could also ignite this accumulation. Check the chimney and pipe for build-up and clean if needed before attempting to burn off the creosote with a hot fire.



Cracking



Crumbling



Peeling catalyst

Cracking and crumbling are a result of thermal shock. Thermal shock occurs when the combustor is heated or cooled too quickly (see tips on page 6). A cracked or slightly crumbling combustor will continue to work well as long as there are no large pieces of the ceramic missing.

If your combustor has a metal band around the ceramic, this is designed to hold the ceramic in place even when cracked. Handle a cracked combustor with extra care to avoid losing pieces. If large parts of the ceramic are missing, or if the combustor cannot easily be put back into the stove due to cracks, replace the combustor.

A catalytic combustor is made of a ceramic or steel 'honeycomb' which has a coating that contains the catalytic metals palladium and/or platinum. On an unused combustor, this coating will be brown, but after the first fire it will turn gray.

Occasionally, this coating may separate from the honeycomb, revealing the white ceramic or bright steel beneath. This can be caused by abrasion of ash particles in the case of a very strong chimney draft. Areas where the coating is peeling may appear "fuzzy" or may have patches of white/bright steel. In some cases, turning the combustor over to expose the opposite side will gain an additional season of use, but you should replace a combustor which is severely peeled or mostly white/bright steel.

How to tell when you need a new combustor

A visual inspection of your combustor will reveal any obvious problems, but it doesn't tell the entire story. Sometimes what appears to be a flawless combustor could be failing to do its job properly. In addition to a visual inspection, your stove's performance will tell you a lot about the how the combustor is functioning and whether it needs to be replaced.

Decreased Heat Output

If your stove seems to be making less heat than it has in the past, this is an indication that the catalytic combustor is beginning to fail. Since many factors can affect heat output, such as the quality of your wood and draft conditions, the only sure way to tell if the combustor is not coming up to temperature is with a catalytic thermometer. If your thermometer indicates that the combustor does not come up to temperature as quickly, or that it does not reach temperatures as high as in the past, it may be time to replace the combustor. Remember to also check the thermometer probe for deterioration and replace if needed.

Creosote Accumulation

A properly operating catalytic stove will make very little creosote, so noticeable accumulation is a sign of decreased combustor performance.

Please Note: A normal byproduct of the catalytic reaction is water vapor that may condense on the walls of your chimney. This may be especially noticeable on exterior masonry chimneys that tend to be cooler. The water that may form can have enough condensed smoke in it to smell strongly of creosote, but you should not see any significant accumulation of creosote on the chimney walls.

Sluggish Performance

If the performance of your stove seems to change over time, this may be a sign that the combustor is failing. Changes in your home, such as new windows and other weatherization improvements, can also change how your stove operates. If your stove seems to draw well when the combustor is not engaged, but draws poorly when the combustor is engaged, this is a sign of combustor failure.

Smoke from Your Chimney

Your combustor was designed to dramatically reduce the amount of smoke that comes out of your chimney. If you see significant amounts of smoke while the combustor is engaged, this is a sign that the combustor is not doing its job. *Please Note:* A properly operating combustor produces water vapor as a byproduct of combustion, so be sure that what you see coming from your chimney is smoke rather than water vapor. Water vapor will be white and will dissipate quickly in the atmosphere. Smoke is darker, thicker and tends to persist in the atmosphere.

How to Replace the Combustor

Sizing

It is important to replace your combustor with the same size as the one that was supplied with the stove. Carefully measure the combustor when it is removed, or consult your stove's owner's manual. Note whether the original combustor was banded in metal. The metal band helps to hold the combustor together.

Holder

In some cases, the combustor may fit into a holder supplied by the stove manufacturer, which will typically be made out of heavy-duty steel or cast iron. Do not discard this holder, as your new combustor will need to be fitted into it prior to installation.

Gaskets

Some stoves may also require a gasket to insure that the combustor fits back into the stove properly and that smoke cannot go around it when it is engaged. Special catalytic gaskets are required to withstand the intense heat around the combustor. These gaskets, such as Condar's CatGard™ may fit loosely when first installed, but swell to many times their size when heated. It is sometimes useful to tape the gasket onto the combustor with masking tape to keep it in place. You may simply leave the tape in place, as it will burn off when the combustor is used.



Making combustors in the Condar plant at Columbus, North Carolina

Tips to extend the life of your Combustor

• **Avoid Thermal Shock.** Thermal shock occurs when your ceramic combustor is heated or cooled too quickly. Thermal shock can lead to cracking or crumbling of a combustor's honeycomb. A very active combustor can easily reach temperatures over 1800°F. When a fresh load of fuel is put into the stove, relatively cool gasses and steam are released from the wood as it ignites. If a very hot combustor is re-engaged at this phase, the sudden drop in temperature may damage honeycomb. Burn seasoned, dry wood only. The introduction of moisture-laden wood to a burning stove can damage a combustor by thermal shock.

• **Monitor catalytic temperatures.** A proper catalytic monitor will tell you when to engage your combustor, when to turn down your stove, and when your combustor needs to be cleaned or replaced. A catalytic thermometer is the single most important factor in proper operation and longevity of your combustor.

• **Do not overfire the stove.** It is not necessary to reach high temperatures to burn cleanly in a catalytic stove. Once catalytic temperatures have been reached, adjust the stove for desired heat output. The combustor does not have to glow to be working.

• **Avoid direct flame contact with the honeycomb.** Under high fire and/or high draft conditions, flames can be pulled up into the combustor, which can lessen the catalytic reaction, shorten combustor life, and possibly damage the unit. Immediately reduce draft if flame contact is observed.

• **Avoid the use of unnatural fuels.** Chemical fire starters, garbage, treated wood, painted wood, colored paper, rubber and plastics can poison the combustor, rendering it inactive. Burn only natural wood and small amounts of paper to ignite it.

• **Inspect the combustor regularly.** Inspect the combustor whenever you clean the stove and chimney. Evidence of creosote, fly ash, and plugging suggest making adjustments to your burning practices before a problem arises.

• **Handle your combustor with care!** The ceramic substrate is fragile, especially once it has been fired in the stove. Use care when removing and replacing the combustor and when cleaning stove pipes and chimney.

If you need a new Combustor...



If you're not sure what model number or size combustor you need, please have your stove's model and manufacturer name when you call. If you're unable to decide what size combustor your stove requires, contact your hearth specialty retailer or call Condar Company at (828) 436-2102. We'll be happy to help you figure out the proper combustor for your stove, or even build a custom combustor to fit your needs.

N:\Condar/Printing/combustors/care manual/combustorcaremanual.pdf