

Cures For Backpuffing

There can be many different reasons for a stove “backpuffing”. Often, the best clue we have in diagnosing the root cause of backpuffing is to determine when during the burn cycle the smoking occurs. A stove that backpuffs only at start up will generally have a very different root cause than a stove that smokes only when the catalyst is engaged or only at the end of the burning cycle, or one that backpuffs in a seemingly random fashion. Over the years we have seen and heard almost everything and sometimes the answer ends up being what you least expect (for example, the clean out door was left ajar in the basement, or there was a birds nest in the chimney).

A. Smoking At Start-Up

Stoves that backpuff or smoke at start-up are extremely annoying, but fortunately the cure is simple. You need positive draft in your chimney when you light the fire. Without positive draft to pull smoke up the chimney, the smoke from your fire will just build in the firebox until it eventually spills into the room. Lighting a fire if there is either no draft or a downdraft in the chimney is a sure-fire recipe for filling the house with smoke.

The Three Step Cure For Light Up:

You should perform these three steps every time you light a cold stove, and you’ll never have to deal with back-puffing at start-up:

1. Check The Draft.

Open the side door of the stove and hold a lit match inside the stove near the flue exit. A flame pulled into the flue exit and toward the chimney pipe indicates good positive draft. This is good! You can go ahead and light the stove.

If the match flame hovers near vertical without leaning to one side or the other, it indicates neutral draft and may require a bit of encouragement to create positive draft. If the flame is pushed away from the flue exit and the chimney, it indicates negative draft. This is a problem. You will need to reverse the draft before you light a fire.

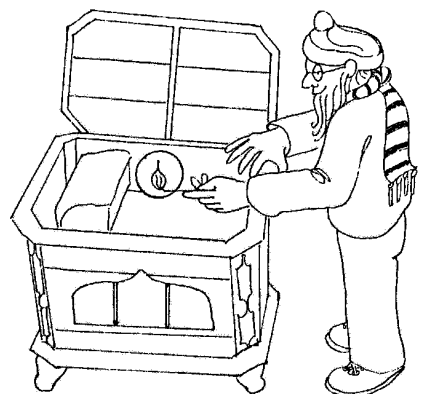
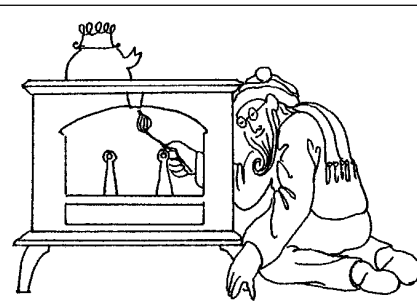
2. Get Some Heat In The Chimney To Establish Draft

If your draft is “neutral”, the best way to encourage positive draft is to send some heat up the chimney. Unpin the draft damper and the catalytic bypass damper. Take a single sheet of newspaper, twist it into a knot, light it, and hold it in the flue exit of the stove. The heat will warm up a cold chimney and induce positive draft. As the paper burns, drop it in the firebox, and close the loading door.

Always check the draft before you light your stove!

Light a match in the flue outlet of the stove. If the flame is pulled into the flue outlet, you have positive draft.

Light a match inside the stove to check the Palladian or Keystove (above). Lift the top lid to check the draft on a Fireview of Classic.



After the paper burns up, light another match and check the draft again. You should have positive draft.

You can do the same thing with a hair dryer or a heat gun. Simply aim the warm air up the chimney for a few minutes and then re-test your draft with a match.

3. Equalize Pressure If Necessary

If your draft is “negative” (air is coming down the chimney into your house), you will probably have to equalize the pressure between the inside and outside. Turn off any exhaust ventilation devices (kitchen exhaust fan or bathroom exhaust fan, for example). Open an outside door or window in the room where the stove is installed. Wait a few minutes and test with a match again. Hopefully, the draft has become neutral. Send some heat up the chimney using either of the methods described above. Once the chimney begins to pull the match flame into the flue exit, you have positive draft and can light the stove without any backpuffing.

If your match test shows that you have strong positive draft and your stove still smokes at start up, do the following: First, check to make sure you have both your catalytic combustor bypass door open and that your primary air draft is completely open. Second, try cracking the loading door of your stove about a half inch. If both of these controls are at their full open position, your match test shows good positive draft, and your stove still smokes when you light a fire – then call us! You may have an unusual draft

problem, but we haven't found many that we couldn't remedy. Call us toll free at 1-800-866-4344 from 9am to 5pm Monday through Saturday and talk to one of our experienced customer service specialists at the factory in West Lebanon, NH.

B. Smoking When The Combustor Is Engaged

On occasion, we hear from folks who say that their stove performs great until they engage the catalytic combustor. At that point, one of two things begins to happen. First the fire may seem to die and they begin to get a smoky odor near the stove. Alternatively, the smoky smell starts about 20 minutes after they have engaged the combustor and reduced the primary air into the stove.

The Two Step Cure For Backpuffing After The Combustor Has Been Engaged:

In most of these cases, there are two potential causes, or a combination of the two.

1. Be Sure The Combustor Is Ignited

If you engage the combustor before the exhaust gasses have reached 500 degrees, the combustor can act like an in-line damper and reduce the draft. After it is ignited, the combustor acts like an incinerator, producing heat and increasing draft. It is critical that temperatures be high enough to ignite the catalytic combustor when you close the bypass. A slow, smoldering fire with wet wood can also reduce or terminate catalytic activity (see Catalytic Combustor Tips PDF)

2. Be Sure The Combustor Is Clean

When was the last time you inspected and/or cleaned the catalytic combustor? If the catalytic combustor gets partially plugged with airborne fly ash, then the air flow through the stove is restricted. Restricted flow can cause smoke and combustible gas to accumulate in the firebox, rather than go up the chimney. If enough smoke and gas builds up, it will leak into the room. Sometimes small pockets of combustible gas will ignite inside the firebox and create a small "poof" inside the stove, with enough pressure to force very small amounts of smoke or odor into the room.

The short term solution to this type of problem is to open your primary air supply a bit more and create more heat, more draft, and a somewhat more active fire with less smoke.

Long term, the catalytic combustor should be cleaned about once every 6 weeks or once per cord of wood, whichever comes first. It takes just a few minutes with a

soft-bristled paint brush or vacuum to clean the catalyst. Putting your combustor on a regular cleaning regimen will give your combustor longer life and keep your stove operating at prime efficiency.

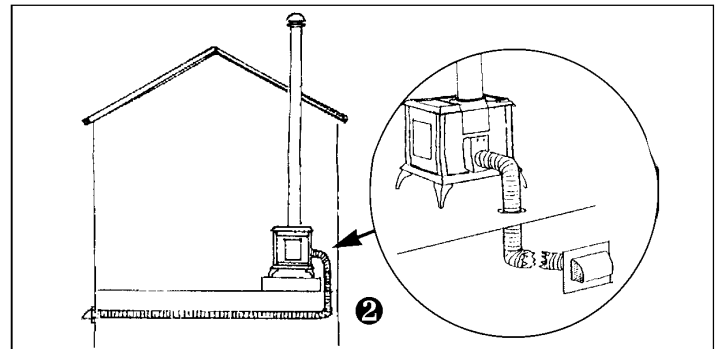
C. Backpuffing As The Stove Cools, At The End Of The Burning Cycle

Generally if a stove backpuffs only at the end of the burning cycle, it is because the chimney draft starts to reverse as the stove and chimney cool. Flow reversal at the end of the burning cycle is often caused by negative house pressure.

If the house itself has negative pressure, it will want to pull air down the chimney, rather than letting air from the house go up the chimney. Negative pressure is a common problem in houses that are new, very well insulated, and lack a balanced ventilation plan. In a balanced ventilation plan, all of the exhaust devices (including bathroom and kitchen fans, ranges, dryers and other appliances) are "balanced" by equal amounts of fresh, make-up air entering the house.

The Cure For Negative Pressure

Generally, stove performance problems caused by negative pressure can be corrected by introducing make-up air into



Adding an outside air duct for your woodstove will help if your house is very tight, or if you have negative pressure.

the room where the stove is installed. A greater supply of combustion air will balance out negative pressure, and allow the stove's chimney to draw.

Before investing in a permanent solution, try opening slightly an outside door or window near where the stove is installed. If house tightness or negative pressure is a problem, the stove will burn better with a door or window slightly ajar than it will with the outside doors and windows closed.

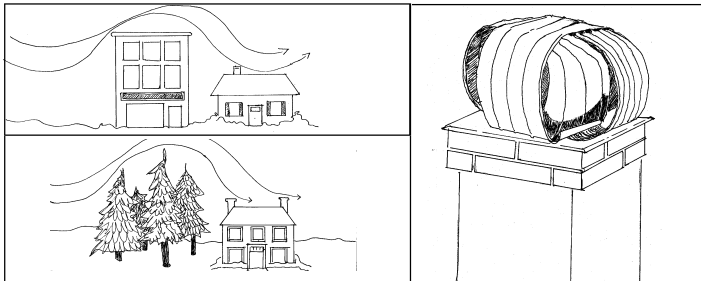
Opening a door or window is not a long-term solution, but it can help diagnose the problem. A good long term solution will bring air into the house without creating cold drafts or wasting energy. The two best options are an outside air duct to supply fresh combustion air to the stove or,

if you are building, a Heat Recovery Ventilator which will maintain positive or neutral pressure throughout the house, as well as maintain good air quality. Fixing the problem will do more than just insure that the stove will work better: proper house ventilation will improve indoor air quality; reduce odors, condensation and mold; and act as preventive medicine against runny noses and headaches.

Intermittent Backpuffing

Sudden and/or intermittent backpuffing can be the most difficult problems to diagnose. Here are four factors to consider

1. Weather. If your stove backpuffs on high wind days, or when the wind blows from a particular direction, you may want to invest in a special chimney cap that actually creates more draft in your chimney when the wind blows rather than allowing the wind to come down your chimney. Mild, low pressure days can also wreak havoc with

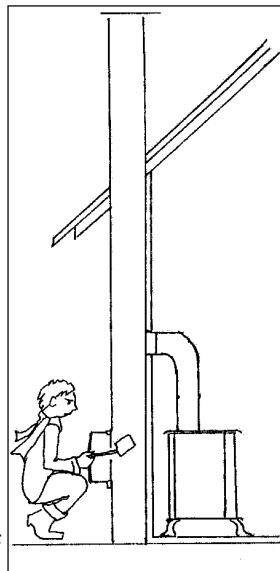


A wind cap (right) can eliminate downdrafts and backpuffing caused by wind.

chimney draft. The smaller the difference between the inside and outside temperatures and the heavier the air, the more difficult it is to encourage positive chimney draft. Warm, damp days in the 50's or 60's can sometimes be very difficult for maintaining good draft. These cases are best served by getting some heat in the chimney by burning newspaper or with a hair dryer before starting the stove, and then burning short, hot fires and letting the fire go out rather than long smoldering fires, with uncertain draft.

3. Obstructions. Check to be sure that the combustor, the stovepipe, and the chimney are all clean and free of obstructions.

3. Chimney specifications. Be sure your chimney meets minimum specifications. It must rise at least 14 feet above the flue collar of the stove. It must also rise at least three feet above the roofline, and be at least two feet above anything within a ten foot radius of the chimney (usually an upper story of the house or nearby trees). If the



chimney does not meet these minimum specifications, then it may not draw properly.

4. Stack Effect Of The House. "Stack Effect" can influence the performance of a stove

installed on the bottom floor, or in the basement, of a multi-story house. "Stack effect" is the house itself acting like a chimney. All houses are subject to a certain amount of stack effect. The entire house is warmer than the outside air. Warm air rises inside the house from lower to upper floors. The rising warm air tends to create a negative pressure on the lowest levels of the house (where the woodstove is often installed), and a slight positive pressure at the top of the house. The negative pressure at the lowest levels of the house can cause the stove to backpuff.

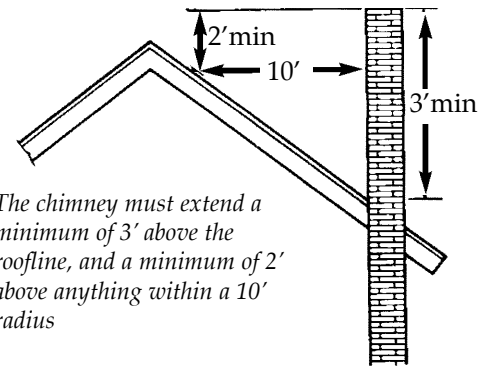
When the stove is installed on a lower floor of the house, the house "stack" competes with the chimney "stack". The house tries to draw air into the house through any opening, including down the stove chimney.

A simple draft gauge is an easy way to diagnose this condition.

You can minimize stack effect by being sure that upper level windows and doors, and attic doors, are not left open.

Recessed lights in cathedral ceilings are often poorly insulated, and act as little stacks. These, and any other openings, should be insulated so uncontrolled exhaust cannot occur.

Backpuffing isn't always easy to diagnose. Sometimes two or three factors can combine to cause backpuffing, and it can be hard to make a proper diagnosis and treat the problem. If you've checked our suggestions but are still having problems – give us a call. We are happy to help troubleshoot any problems with our stoves. Our hours are 9am to 5pm Monday through Saturday at our factory and showroom in West Lebanon, NH or by phone, toll-free 1-800-866-4344.



The chimney must extend a minimum of 3' above the roofline, and a minimum of 2' above anything within a 10' radius

Illustration of "Stack Effect", where house competing with chimney to act as stack.

