

What Makes A Good Chimney

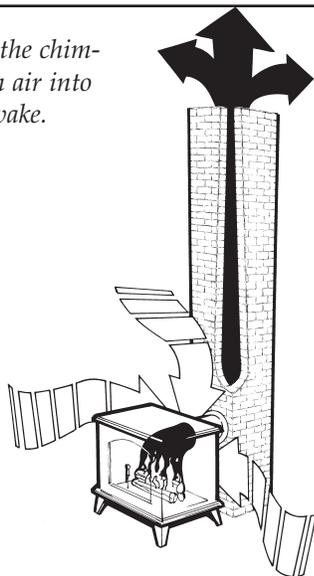
When you think about installing a wood stove, your next thought should be about the chimney. The best, most well built stove, can only perform as well as the chimney that it's connected to. They work together as a system. The chimney drives the system by exhausting flue gases from the stove and simultaneously pulling fresh combustion air into the stove. A continuous supply of air is crucial to maintaining a steady, hot fire. That supply of air is dependent on the ability of the chimney to exhaust flue gases as they are created by the combustion occurring in the stove. Air supply, combustion, and exhaust are all part of the same balanced process in a well-designed system. A lazy, smoldering fire, back puffing, sooting, and down drafting are all symptoms of a poorly designed chimney, or one that wasn't intended for the stove it is being used with.

So what makes the system work? And how can you feel confident that your installation is going to perform well? The good news is by understanding a few basic principles of draft and flow, not to mention safety, you will be well on your way to understanding good chimney design. There are excellent products on the market to install a pre-fabricated chimney from scratch, or to adapt an existing chimney or fireplace to a new wood stove. The design principles are essentially the same for each.

A. Draft and Flow

The most basic principle of chimney design is one that we are all familiar with: hot air rises. In this case we actually mean hot gases. The greater the temperature difference between the gases in the chimney and the outside air, the faster the gases rise. This natural movement of

Hot air rises up the chimney pulling fresh air into the stove in its wake.



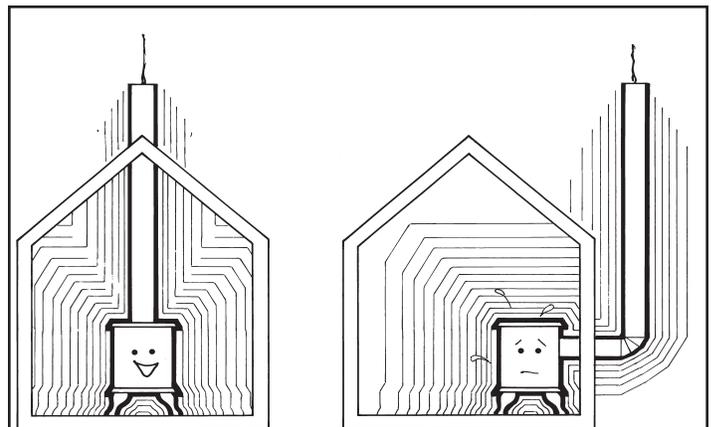
The amount of fresh air being pulled into the stove depends on how quickly smoke is being pulled up the chimney.

gases up the chimney is draft. For there to be adequate draft to maintain proper combustion, a certain volume of gases has to move through the chimney. This volume of gases is the flow. The stronger the draft, the greater the flow.

The other important design principle is the suction effect: air (or gas) always moves from a zone of higher pressure to a zone of lower pressure. As the warm, buoyant gases exit the stove and move up the chimney (draft), they create a low-pressure zone, pulling the lower temperature air near the opening of the stove in behind it. Fresh air for combustion is drawn into the stove at the same rate that exhaust flows out of the stove and up the chimney. This is what makes for a balanced system.

B. The Perfect Chimney

Whether you have an existing chimney or are thinking of adding a new one, it helps to know what makes "The Perfect Chimney". That way you can compare your existing chimney or chimney plan to the perfect model and know what to expect for performance.



An inside chimney stays warm and smoke rises quickly out of the stove and up the chimney. An outside chimney is a cold chimney. The smoke cools quickly and slows down. This slows down the amount of air brought into the firebox and makes it harder for the stove to produce heat in the home.

1. Keep the chimney inside the house

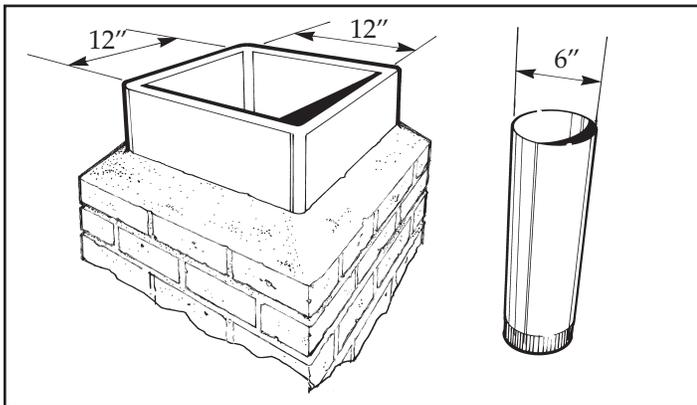
The difference in temperature (and therefore pressure) between the flue gases and the outdoors determines draft. By locating the stove and chimney inside the house you ensure warm exhaust, resulting in better draft. A cold exterior chimney will not draw as well and will be subject to down drafting caused by cold, heavy air working against the warm exhaust. It will also be subject to heavier creosote build up than an interior chimney.

Creosote is the tarry substance created when warm smoke condenses on a cold surface. When an exterior chimney cannot be avoided, it should be located on the gable end of the home and insulated, either by using insulated chimney pipe or building an insulated chase (simply, a framed box, sided to match the house siding) around an existing masonry chimney.

2. Match the flue size of the stove

The flue is the opening in the chimney that allows for the passage of exhaust. The size of the flue is mainly determined by the size of the flue collar on the stove. Wood stoves are designed and tested for the flue size that maximizes combustion. A flue that is too small will constrict the flow. A flue that is too large will cause a drop in pressure, and therefore a decrease of flow. Picture water flowing in a stream. When the stream bed is narrow, the water flows quickly. If the streambed becomes wider, the water slows down. The same thing happens to smoke as it flows through a chimney. An oversized flue allows the smoke to slow down and condense inside the chimney - resulting in water, creosote, and sluggish draft.

A six or seven inch flue is ideal for our stoves. A chimney that is either 8" in diameter if round, or 8" x 8" square, will still provide good draft for our stoves, as well as for most wood stoves available today. If you are designing a new chimney, it's better to go with a round flue. They create less resistance to flow and are easier to clean. Creosote tends to build up in corners of rectangular flues.



Venting into a chimney that is too large allows smoke to cool quickly resulting in creosote, condensation, and sluggish draft.

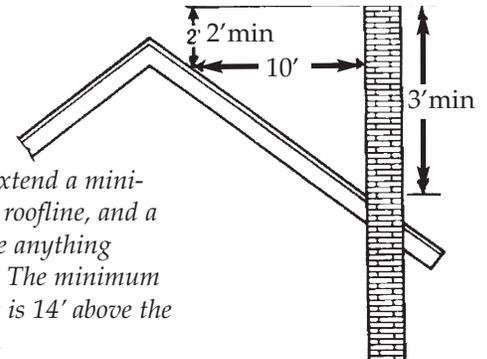
3. Give yourself enough height

A tall chimney performs better than a short one. The taller the column of warm gases the greater the difference between its pressure and that of the outdoor air. We recommend a minimum chimney height of fourteen feet for our stoves. Additionally, all chimneys must conform to the "3 foot, 2 foot, 10 foot rule". This means it must be a minimum of three feet above the roof on the uphill side of the chimney, and at least two feet higher than any part of the roof within 10 feet (measured horizontally). Where possible, the chimney should be located as close as possible to the highest point in the house.

In some cases, a chimney can be too tall, possibly resulting in over drafting which, in turn, can cause a fire to burn too hot. Over drafting can usually be controlled with the stove damper or a pipe damper, or a combination of the two.

4. Limit the bends

Resistance can be caused by elbows, tees, offsets,



The chimney must extend a minimum of 3' above the roofline, and a minimum of 2' above anything within a 10' radius. The minimum height for good draft is 14' above the flue exit of the stove.

obstructions, or long horizontal runs in the chimney. Many chimneys will require some elbows, tees, or other restrictions, but the best performing chimneys will have a limit to how many. Generally, a rear-vented stove should have no more than three elbows, and a top-vented stove should have no more than two.

5. One per flue, please

There is a lot of contradictory information regarding using a chimney flue for more than one appliance, especially if they use different types of fuel. State and local codes differ on the subject from one place to another and are always changing and being updated. It is our recommendation that a wood stove have its own flue, both for safety and to ensure good draft.

C. How Will Your Chimney Measure Up?

If by now you've gotten the impression that the ideal chimney is one that runs straight up from the stove through the center of the house and out the roof, with no elbows or bends, you'd be right. However, your house layout or other factors simply may not allow for "the perfect chimney". This does not mean you can't install a wood stove with a chimney that performs well. There is latitude in most of the guidelines above. In fact, there are very few installations that meet all of the "perfect" characteristics. Our hope is that by understanding the principles of what makes a good chimney work you can avoid some obvious mistakes right from the start.

For more information on venting your stove into an existing brick or stone chimney, check out our article "Masonry Chimneys". If you are planning to install a prefabricated metal chimney you may want to read our article "Prefabricated Chimneys". Or give us a call at 1-800-866-4344. We would be happy to help you plan a safe and effective chimney system.

Woodstock Soapstone Company, Inc.

66 Airpark Road, West Lebanon, NH 03784 • Toll Free: 1-800-866-4344 • Fax: 603-298-5958 • Email: info@woodstove.com