

Fireplace Safety

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When wood burns, the fire goes through three stages. In the first stage (up to around 500 degrees F), the heat of the fire simply dries the wood. In the second stage (500 to 1100 degrees F), sometimes referred to as pyrolysis, the wood breaks down chemically, emitting flammable gases that contain more than half of the heat energy of the wood. In the third stage (over about 1100 degrees F), the gases and remaining charcoal burn.

Just for fun, if you watch a log burn in an open fireplace, you might catch a glimpse of a jet of hot gases blowing out the end of a log. You may actually see that the gases are escaping from the log, but not igniting until the jet of gas is a measurable distance away from the surface of the wood.

Problems develop when the flammable gases enter the chimney or vent pipe before they have burned. As the gases cool below 250 degrees, they condense as acids on the inside of the chimney. As they dry and coagulate, the acids thicken into a highly flammable, tar-like substance called creosote.

Because the creosote formation is caused by cooling the unburned gases, anything that leads to incomplete combustion or cool chimney temperatures will increase the problem. Wet wood uses more of the fire's heat to evaporate water and reduces the exhaust gas temperature. Restricting the combustion air to the fire slows the burning rate and leads to incomplete combustion and lower temperatures. Even using heat exchangers to capture more chimney heat will lead to cooler chimney temperatures and more creosote formation.

Slow burning fires and efficient heat transfer to the room would seem to be desirable situations. However, the risk associated with creosote formation is that if the chimney gets hot enough, the creosote will ignite, causing a chimney fire.

Chimney fires are easily identified. You may first hear a "crackling" in the chimney. If enough creosote fuel is present, the crackling may develop into a roar. The chimney will become extremely hot. Metal vents may actually glow red or orange. The chimney may become hot enough to ignite nearby building materials and start a house fire. Flames and sparks shooting out the top of the chimney may cause a fire on the house roof or on surrounding buildings. The chimney liner may be cracked or warped by the hot fire, making the chimney unsafe for future use.

You can avoid chimney fires by preventing creosote build-up in your chimney. Here are some pointers:

- Season wood properly before burning. Wet, unseasoned wood causes more creosote than dry wood. Dry pine is also more likely to create creosote build-up than oak and juniper.
- Avoid long, slow-burning fires. Restricting the fresh air supply causes incomplete combustion and more creosote build-up in the chimney.

- Allow frequent hot fires. A brief hot fire every day or two can help remove small creosote deposits.
- Check your chimney monthly. Clean your chimney with a stiff wire chimney brush annually, or before the creosote reaches a thickness of one-eighth inch.
- Use a catalytic stove that allows the volatile gases to burn at a much lower temperature, greatly reducing wood smoke and creosote, and also increasing heat output by 25 to 30 percent. These catalytic combustors can be purchased in new stoves or can be added to existing stoves. They generally add around \$200 to the cost of a stove and must be replaced every several years.

If a chimney fire does happen, take these steps:

1. Call the fire department and evacuate the house.
2. Close all air inlets but leave the damper open to avoid pushing the fire into the interior of the home.
3. Discharge a UL listed fire extinguisher into the stove.
4. Wet the roof and watch for outside fires caused by sparks.
5. Have your chimney inspected before putting it back into service.

Chimney fires are a real and dangerous possibility when heating with wood. A 1982 study by the U.S. Consumer Product Safety Commission reported that wood-burning appliance fires accounted for 20 percent of all residential fires and 5 percent of all fire deaths. While most chimney fires are confined to the chimney itself, the intense heat sometimes ignites surrounding building materials and furnishings.

While we're talking safety, let's not forget disposal of ashes. Ashes must be stored in a metal container with a tight lid. The closed container should be placed on a non-combustible floor or on the ground well away from all combustible materials. Wood ashes do contain small amounts of phosphorus and potassium, essential plant nutrients. However, wood ashes are also very alkaline. Adding large amounts of ashes to the soil can raise pH to undesirable levels and cause plant growth problems. Before you add ashes to your garden, test the pH of your soil. If the pH is above 7.5, don't add ashes. If you do add ashes, spread them uniformly at no more than 15 pounds per 1000 square feet. If you are unsure about using ashes on your garden, check with your local Cooperative Extension office.

Careful operation and maintenance can help minimize the risk of accidental chimney fires. For more information on chimney installation and maintenance, talk to your local fire department, building inspector, or home insurance carrier.