



## The Facts about Chimney Fires: Causes & Cures

*A Public Safety Bulletin from the Chimney Safety Institute of America*

“Chimneys really decorate the roofline of a home . . . and they’re maintenance-free, besides. Right?”

**WRONG!**

Your chimney – and the flue or flues that line it – may add architectural interest to your home, but their real function is to carry dangerous fireplace, wood stove or furnace\* gases and smoke safely out of your home. A chimney helps your household air stay breathable . . . just as your windows and your bathroom, attic and kitchen vents do. Unlike those other exhaust points in your home, however, fireplace and wood stove chimneys need a special kind of care.

As you snuggle in front of a cozy fire or bask in the warmth of your wood stove, you are taking part in a ritual of comfort and enjoyment handed down through the centuries. The last thing you are likely to be thinking about is the condition of your chimney. However, if you don’t give some thought to it before you light those winter fires, your enjoyment may be very short-lived. Why? Dirty chimneys can cause chimney fires, which damage structures, destroy homes and injure or kill people.

### *No One Welcomes a Chimney Fire*

A chimney fire in action can be impressive. It has been described variously as crating:

- Loud cracking and popping noises
- A lot of dense smoke, and
- An intense, hot smell

Chimney fires can burn explosively –noisy and dramatic enough to be detected by neighbors or passers-by. Flames or dense smoke may shoot from the top of the chimney. Homeowners report being startled by a low rumbling sound that reminds them of a freight train or a low flying airplane. However, those are only the chimney fires you know about. Slow-burning chimney fires don’t get enough air nor have enough fuel to be as dramatic or visible. But, the temperatures they reach are very high and can cause as much damage to the chimney structure – and nearby combustible parts of the house – as their more spectacular cousins. With proper chimney system care, chimney fires are entirely preventable.

### *Creosote & Chimney Fires: What You Must Know*

Fireplaces and wood stoves are designed to safely contain wood-fueled fires, while providing heat for a home. The chimneys that serve them have the job of expelling the by-products of combustion – the substances given off when wood burns. These include smoke, water vapor, gases, unburned wood particles, hydrocarbon volatiles, tar fog and assorted minerals. As these substances exit the fireplace or wood stove, and flow up into the relatively cooler chimney, condensation occurs. The resulting residue that sticks to the inner walls of the chimney is called creosote.

Creosote is black or brown in appearance. It can be crusty and flaky . . . tar-like, drippy and sticky . . . Or shiny and hardened. Often, all forms will occur in one chimney system. Whatever form it takes, creosote is highly combustible. If it builds up in sufficient quantities – and catches fire inside the chimney flue instead of the firebox of the fireplace or wood stove – the result will be a chimney fire. Although any amount of creosote can burn, sweeps are concerned when creosote builds up in sufficient quantities to sustain a long, hot, destructive chimney fire.

Certain conditions encourage the buildup of creosote. Simply put, restricted air supply, unseasoned wood and cooler-than-normal chimney temperatures are all factors that can accelerate the buildup of creosote on chimney flue walls. Air supply on fireplaces may be restricted by closed glass doors or by failure to open the damper wide enough to move heated smoke up the chimney rapidly (the longer the smoke’s “residence time” in the flue, the more likely is it that creosote will form). A wood stove’s air supply can be limited by closing down the stove damper or air inlets too soon and too much, and by improperly using the stovepipe damper to restrict air movement. Burning unseasoned wood – because so much energy is used initially just to drive off the water trapped in the cells of the logs – keeps the resulting smoke cooler, as it moves through the system,

than if dried, seasoned wood is used. In the case of wood stoves, fully packed loads of wood (that give large cool fires and eight or 10-hour burn times) also contribute to creosote buildup. Cool flue temperatures speed creosote production, too. Condensation of the unburned by-products of combustion occurs more rapidly in an exterior chimney, for example, than in a chimney that runs through the center of a house and exposes only the upper reaches of the flue to the elements.

### ***How Chimney Fires Hurt Chimneys***

***Masonry chimneys.*** When chimney fires occur in masonry chimneys – whether the flues are an older, unlined type or are tile lined to meet current safety codes – the high temperatures at which they burn (around 2000°F) can “melt” mortar, crack tiles, cause liners to collapse and damage the outer masonry material. Most often tiles crack and mortar is displaced, which provides a pathway for flames to reach the combustible wood frame of the house. One chimney fire may not harm a home. A second can burn it down.

***Pre-fabricated, factory-built, metal chimneys.*** To be installed in most jurisdictions in the United States, factory-built, metal chimneys that are designed to vent wood burning stoves or pre-fabricated metal fireplaces must pass special tests determined by Underwriter’s Laboratories (UL).

Most tests require the chimneys to withstand flue temperatures up to 2100°F – without sustaining damage. Under chimney fire conditions, damage to these systems still may occur. When pre-fabricated, factory-built metal chimneys are damaged by a chimney fire, they should no longer be used and must be replaced.

***Special Effects on Wood Stoves.*** Wood stoves are made to contain hot fires. The connector pipes that run from the stove to the chimney are another matter. They cannot withstand the high temperatures produced during a chimney fire and can warp, buckle and even separate from the vibrations created by air turbulence during a fire. If damaged by a chimney fire, they must be replaced.

### ***Ways to Keep the Fire You Want ... from Starting One You Don't! Chimney fires don't have to happen. Here are some ways to avoid them.***

- Use seasoned woods only (dryness is more important than hard wood versus soft wood considerations)
- Build smaller, hotter fires that burn more completely and produce less smoke
- Never burn cardboard boxes, wrapping paper, trash or Christmas trees; these can spark a chimney fire
- Install stovepipe thermometers to help monitor flue temperatures where wood stoves are in use, so you can adjust burning practices as needed
- Inspect and clean catalytic combustors on a regular basis, where applicable

### ***Nine Signs that You've Had a Chimney Fire***

Since chimney fires can occur without anyone being aware of them . . . and since damage from such fires can endanger a home and its occupants, how do you tell if you've experienced a chimney fire? Here are the signs a professional chimney sweep looks for:

- “Puffy” creosote, with rainbow colored streaks, that has expanded beyond creosote’s normal form
- Warped metal of the damper, metal smoke chamber, connector pipe of factory-built metal chimney
- Cracked or collapsed flue tiles, or tiles with large chunks missing
- Discolored and distorted rain cap
- Heat-damaged TV antenna attached to the chimney
- Creosote flakes and pieces found on the roof or ground
- Roofing material damaged from hot creosote
- Crack in exterior masonry
- Evidence of smoke escaping through mortar joints of masonry or tile liners

If you think a chimney fire has occurred, call a SSIA Certified Chimney Sweep for a professional evaluation. If your suspicions are confirmed, a certified sweep will be able to make recommendations about how to bring the system back into

compliance with safety standards. Depending on the situation, you might need a few flue tiles replaced, a relining system installed or an entire chimney rebuilt. Each situation is unique and will dictate its own solution.

### *Proper Maintenance*

Clean chimneys don't catch fire. Make sure a CSIA Certified Chimney Sweep inspects your solid fuel venting system annually, and cleans and repairs it whenever needed. Your sweep may have other maintenance recommendations depending on how you use your fireplace or stove. CSIA recommends that you call on certified chimney sweeps, since they are regularly tested on their understanding of the complexities of chimney and venting systems.

### *What to Do if You Have a Chimney Fire*

If you realize a chimney fire is occurring, follow these steps:

- Get everyone out of the house, including yourself
- Call the fire department

If you can do so without risk to yourself, these additional steps may help save your home. **Remember, however, that homes are replaceable, but lives are not:**

- Put a chimney fire extinguisher into the fireplace or wood stove
- Close the glass doors on the fireplace
- Close the air inlets on the wood stove
- Use a garden hose to spray down the roof (not the chimney) so the fire won't spread to the rest of the structure

*Once it's over, call a CSIA Certified Chimney Sweep to inspect for damage. Chimney fire damage and repair normally is covered by homeowner insurance policies.*

### *CSIA & Certified Chimney Sweeps*

*The Chimney Safety Institute of America (CSIA) is a non-profit, tax exempt educational institution established in 1983. CSIA is dedicated to chimney and venting system safety and to the elimination of residential chimney fires, carbon monoxide intrusion and other chimney-related hazards that result in the loss of lives and property. CSIA devotes its resources to educating the public, chimney service professionals, and other fire prevention specialists about the prevention and correction of chimney and venting system hazards. For additional information, contact:*

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