

## University of Missouri Extension

G1731, Reviewed October 1993

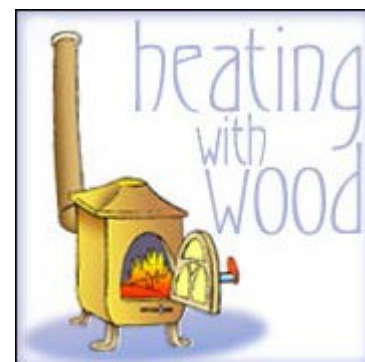
# Wood Stove Maintenance and Operation

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After selecting and installing a wood stove you will be anxious to get it going. Learn to operate and maintain the stove so it can provide warmth and comfort in a safe and efficient manner.

## Operation

Once a good stove has been selected and installed correctly, the next important factor is proper operation. Many problems that arise with a correctly installed stove are the direct result of incomplete combustion.



## Combustion

Combustion consists of a complex chemical reaction between the fuel (wood) and oxygen. The combustion of wood in a stove results in heat and water vapors, carbon dioxide and other products of combustion such as gases and ash. To ensure satisfactory combustion and safe operation, you must meet several conditions:

- Keep a continuous supply of oxygen for the fire and the occupants of the room or area.
- Use a proper amount of fuel (wood) — not enough to cause overheating, but enough to maintain a flue temperature that prevents the accumulation of creosote residues.
- Burn properly to avoid wasted fuel and toxic products of combustion such as carbon dioxide.
- Remove unwanted products of combustion. Gaseous products should be continuously removed while the stove is in operation, and solid products such as ashes should be disposed of safely.

Ensure complete combustion by supplying air and maintaining a sufficient heat level. Incomplete combustion results from an insufficient air supply, misapplied air or insufficient heat.

## Wood combustion

There are three basic stages to wood combustion:

- Water is removed by evaporation and vaporization. This heat does not warm the stove or room.
- At 500 degrees Fahrenheit, the wood starts to break down chemically, and volatile gases are formed. These vapors contain from 50 to 60 percent of the heat value of wood. At approximately 1,100 degrees Fahrenheit, these gases, when mixed with the proper amount of air, break into flames and burn. To ensure complete combustion, maintain this temperature and a sufficient air supply.
- After the release of gases, the remaining material (charcoal) burns at a temperature in excess of 1,100 degrees Fahrenheit. When charcoal is completely burned, a small amount of ash remains.

## Starting a fire

Since moisture must be evaporated and expelled before wood will burn, the wood should be cut and seasoned. Use well-seasoned wood with a low moisture content to reduce the likelihood of creosote buildup.

When building a fire, follow the manufacturer's recommendations. The following steps will also serve as a guide:

- Open the damper completely.
- Place paper and/or kindling over the entire bottom of the fire box to achieve an evenly burning fire. Never use flammable liquids such as gasoline, lighting fluid or kerosene to start a fire — an explosion may result.
- To achieve a better chimney draft, hold a lighted roll of paper near the flue opening inside the stove to warm the flue and start it drafting.
- Light the wood and paper in the grate. When the kindling is burning, add additional seasoned wood to build up a hotter fire. Be careful at first when adding wood to avoid smothering the fire.
- With the fire door closed, use the draft regulator to maintain the desired heat. The proper heat can only be obtained by trial and error because conditions of the fuel (moisture content, hard or soft wood), space being heated, individual preference, outside temperature and wind vary. After some experience with your stove, you should learn the best setting for your needs.

New stoves with cast-iron parts should be "seasoned" to avoid cracking. Do this by building only small fires for the first two or three times.

The entire system must be properly maintained to operate safely and efficiently. The chimney connectors, joints and flues must be clean and in proper working order.

## **Control creosote buildup**

When wood is burning rather slowly, the smoke usually contains a substance called creosote that collects in the relatively cool chimney flue. The main causes of creosote buildup are:

- Wet or unseasoned wood
- Incomplete combustion
- Cool surfaces

The best way to control creosote is to prevent its buildup by maintaining a briskly burning fire with dry, well-seasoned wood. Maintain a flue temperature exceeding 250 degrees Fahrenheit to prevent creosote condensation.

Some new, more efficient stoves deliver more heat to the room than an open stove or fireplace. This reduces the amount of heat escaping up the chimney and lowers the flue temperature. Make sure creosote is not building up as a result of improper operation of these stoves. Additional inspections and clean-outs may be needed.

## **Chimney fires**

With the increased accumulation of creosote in the flue comes the increased possibility of a chimney fire. The combustion of these creosote deposits is most likely to occur during a very hot fire in your stove. Burning creosote deposits cause a very intense fire, a roaring noise, and flames and sparks shooting from the top of the chimney.

Any chimney, metal or masonry, can be weakened or deformed by a chimney fire. The complete chimney should be inspected after a fire, and any repair should be made or parts replaced before re-starting the stove.

If a fire occurs, follow these steps to reduce your losses:

- Call your local fire department immediately.
- Close all openings and draft controls on the stove.
- If the fire is burning vigorously, squirt a multi-purpose dry chemical extinguisher or throw baking soda onto the fire in the stove. The chemicals will travel up the chimney and may extinguish the fire. If possible, avoid introducing water into the chimney; the water could damage a relatively brittle heated flue liner.

## **Chimney inspections and cleaning**

Stovepipes and chimney flues should be inspected each year before you use your stove. Look for cracked flue liners, broken or missing bricks, heavy creosote deposits, bird nests and other foreign material. Thoroughly clean the flue and stovepipe of any soot and other residues. Repair the chimney or replace the stovepipe to avoid any problem later in the season.

The stovepipe and chimney should be inspected frequently during the heating season for creosote buildup. If you use an air-tight stove, check the stovepipe at least once a month.

Your chimney cleaning schedule will depend on how frequently your stove is used and how it is operated. Should your chimney have an excessive buildup, a stiff wire chimney cleaning brush like the ones used by professional chimney sweeps are available at a reasonable cost.

Some people recommend pulling a bag containing wire netting weighted with chains or rock up and down the chimney; others use tire chains or wire netting without a bag. The effectiveness of these techniques is questionable. Tire chains or a weighted bag may damage the flue liner.

## **Disposal of ashes**

Store ashes in a non-combustible 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 pending final disposal.

## **Fire extinguishers and detectors**

In addition to the extinguishers already in the home, a multipurpose fire extinguisher should be installed for each stove. The extinguisher should be located near the stove within easy reach. To offer your family additional protection in case of fire, equip your home with an early warning fire detection system.

## **Safety points**

- Because of high temperatures when the stove is operating, locate the heater out of traffic and away from furniture and draperies.
- Tell children about the high surface temperatures and keep them away from the stove so they avoid getting burned or igniting their clothes.
- Carefully supervise young children when they are in the same room with the heater.
- Do not place clothing or other flammable material on or near the heater.
- Have a qualified person install and service the stove and inspect it before use and at least annually.
- Keep combustible materials away from heaters to avoid the possibility of igniting such materials. These include combustible walls, ceilings, furniture, rugs, draperies and fuels.

## Related MU Extension publications

- G1730, Wood Stoves and Their Installation  
<http://extension.missouri.edu/p/G1730>
- G1732, Chimneys for Wood Stoves  
<http://extension.missouri.edu/p/G1732>
- G1733, Catalytic Combustors for Wood Burning Stoves and Furnaces  
<http://extension.missouri.edu/p/G1733>
- G1735, Cleaning Stovepipes and Chimneys  
<http://extension.missouri.edu/p/G1735>

Order publications online at <http://extension.missouri.edu/explore/shop/> or call toll-free 800-292-0969.



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