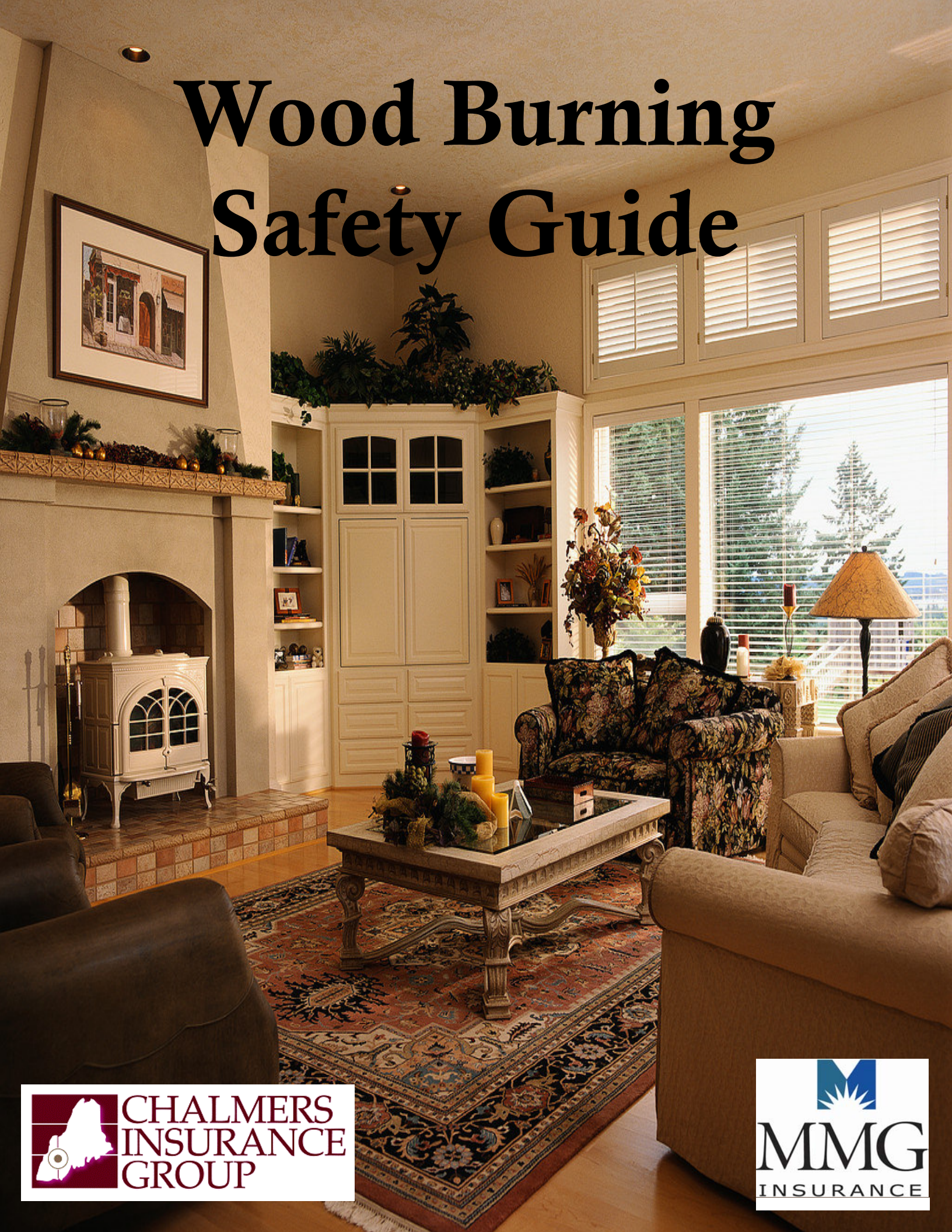


# Wood Burning Safety Guide



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## INTRODUCTION

Many northern New England households use wood as their primary or supplementary source of heat. Because the area is forested, wood is likely to continue to play an important role in meeting a share of our energy needs. Wood furnaces and stoves have numerous safety concerns not normally associated with gas and oil-fired heat sources. If these special concerns are not accounted for, the risk of fire increases dramatically.

This article is a general guide to woodburning. MMG Insurance Company makes no warranties or representations whatsoever, either expressed or implied, as to its accuracy or completeness, nor do we assume or accept any liability for the use of, or damages resulting from the use of, any information contained in this guide. While installation specifications in this guide have been taken from national sources, safety codes and standards are being revised. In your area, a building permit may be required to install woodburning stoves. We urge you to check with local governmental bodies for specific installation and inspection requirements.

This article is designed to help make our policyholder a better woodburner. It explains: what to look for in a stove and chimney, the ins and outs of the fuel that goes into the woodstove and what is required to install, operate and maintain a woodstove safely and efficiently.

No matter how you look at wood heat, the one thing that everyone can agree upon is that **heating with wood is NOT automatic!** The efficiency, safety, cleanliness and level of pollution associated with wood heat depends heavily on the person who burns the wood.

## **SELECTING A STOVE**

Be sure your solid fuel burning appliance is made of sturdy, suitable material, such as cast iron or steel. Look for stoves listed by Underwriters Laboratories (UL) or other recognized laboratories.

Before deciding which appliance is best for you, you must determine what size appliance will work best in your home. When it comes to woodburning, **bigger is definitely not better.** Here's why: For wood heat to work properly, the appliance should work at or near its maximum efficiency. That means the appliance must contain a good, hot fire. If the appliance is too large for the space it must heat, it will have to be damped down. That means the fire will smolder rather than burn and that will increase creosote and smoky fires. (For additional information on sizing your woodstove, contact your dealer or equipment manufacturer.)

If you purchase a used solid fuel burning appliance, check it carefully for cracks or other defects. The legs, hinges, gates and draft louvers also should be checked carefully. ***If you live in a Mobile Home be sure your woodstove is a (UL) approved stove specifically designed for use in such a dwelling.***

## **CHIMNEYS FOR WOOD STOVES**

All woodburning appliances need a tight, well designed and constructed chimney to maximize efficiency and to minimize the danger of unwanted fire. Most homeowners who add a woodburning appliance will also have to add a chimney. This guide explains some basic chimney requirements and provides basic information on the construction of the two general types, masonry and factory-built.

The chimney serves two major functions for the operation of a solid fuel burning appliance. It provides a draft (a vacuum which draws oxygen needed for combustion into the stove.) It also discharges the products of combustion outside the living area. Some of the heat from the appliance

and occasional sparks are also discharged through the chimney. For this reason, **chimneys must be carefully constructed and well maintained.**

**Draft** is caused primarily by the natural rising of warm air - **smoke** - up the chimney. In general, the taller the chimney, the greater the draft. **A warm chimney will provide greater draft than a cool chimney because a warm chimney does not cool the rising smoke.** This is why stoves generally perform better after they have been in use long enough to warm the chimney. For the same reason, chimneys which are located within the house generally produce better draft than those located outside the house.

Outside air currents can affect draft if they swirl around obstructions and blow down the chimney rather than across the outlet. Eddy currents of air that affect draft are most often caused by wind blowing across nearby parts of the building roof or trees. For this reason, certain clearances have been established to lessen the problem. A chimney must extend at least three feet above a roof and at least two feet above a roof ridge or any raised part of a roof within 10 feet. Any chimney more than 10 feet from the roof ridge must be 2 feet above the distance 10 feet from the roof line. See Figure 3 for an illustration of these clearances.

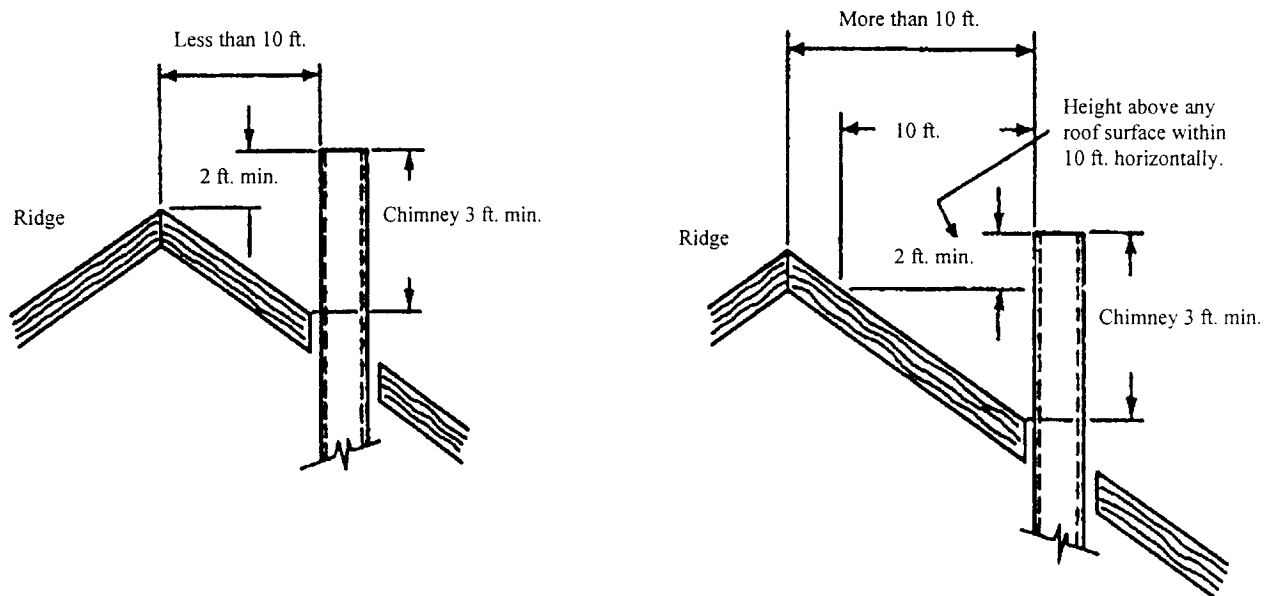


Figure 3

Sometimes getting enough vertical clearance to prevent eddy currents from affecting chimney draft is impossible. This may be because of unusual heights of nearby trees. A hood or chimney cap can sometimes be used to prevent eddies from interfering with draft. Caps and hoods also minimize rain as well as birds or other animals entry into the chimney during periods of non-use.

## FLUE

The opening in the chimney through which smoke passes is called the **flue**. Smoke moves up the flue in a swirling pattern. Round flues are more efficient than square or rectangular ones because they offer little obstruction to the natural flow of smoke. For best performance, the inner surface of flues should be as smooth as possible.



### ***Chimney Installation Guidelines***

1. *Support the chimney on a properly designed foundation.*
2. *Do not change the size or shape of the chimney within six inches above or below the roof joists or rafters, where the chimney passes through the roof or any other combustible construction.*
3. *Install ferrous metal frames and doors in cleanout openings. Doors should be able to be shut tightly when not in use.*
4. *Make sure a two-inch space exists between the chimney and surrounding combustible building materials. Firestops of 24-gauge sheet metal spanning this space must be installed at each ceiling and floor.*
5. *Line the chimney with fire clay, or with an equivalent flue lining.*
6. *To ensure a proper draft, make sure the chimney rises at least three feet above the highest point where it passes through the roof, and at least two feet higher than any portion of the building within 10 feet of the chimney.*
7. *Smoke-test the chimney to discover any leaks.*
8. *If your home has a fireplace, make sure the hearth extension is made of non-combustible material beneath the hearth. Make sure there is no combustible material within six inches of the sides or fireplace opening.*

### **FACTORY-BUILT CHIMNEY UNITS**

Factory-built chimneys used for wood stoves must bear the Underwriters Laboratories (UL) listed label, (Note: Underwriters Laboratories of Canada listings may apply) and be designed as “all fuel” chimney units. **UL listed vents commonly used for oil or gas-fired heaters are not suitable for use with wood stoves.**

There are two UL listings which must be noted. UL 103 and UL 103 HT. The 103 HT chimney is required with stoves that operate with the loading door closed. Freestanding fireplaces and heaters that operate with the door open can be connected to chimneys with the UL 103 listing. Open door heaters burn cleaner, create little creosote and, therefore, less potential of a chimney fire. Airtight wood stoves with closed doors produce a smoldering fire, and create heavy creosote with much higher potential of chimney fire, thereby requiring the UL 103 HT (high temperature) factory-built chimney.

Factory-built chimneys are available in several sizes, and a variety of accessories are available to accommodate different types of installation. There generally is a required 2-inch clearance between these units and combustible material. Manufacturers’ installation requirements must be adhered to.

### **SMOKY FIRES**

Sometimes even properly constructed and operated stove-chimney combinations result in smoky fires.

Bird nests, fallen bricks and a variety of other objects have all been found in chimneys. Any object which restricts the smooth flow of exhaust gases can cause smoky fires. Occasionally, smoking can be caused by:

- a. Unusual wind direction resulting in abnormal eddy currents. If this is a persistent problem, extending the chimney height or adding a cap may help.

- b. Burning green or wet wood or too cool a fire can prevent the chimney from warming up and developing a full draft.

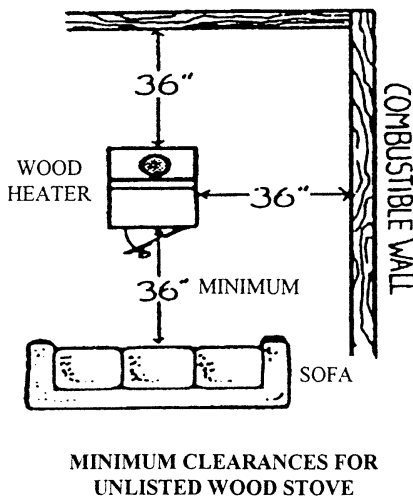
## BURNING WOOD SAFELY

According to the Consumer Product Safety Commission, wood stoves and other types of fixed heaters cause more than 30,000 residential fires in the United States every year. The wood stove user must pay close attention to **SAFETY -- SAFETY** at the time of installation, **SAFETY** when it comes to operating the woodstove, **SAFETY** in disposing of the ashes and **SAFETY** in maintaining the appliance, the stove pipe and the chimney.

Any solid-fuel appliance that is professionally installed, and all appliances installed in public buildings, must meet strict standards established by each state. **These standards should be followed by homeowners who install their own appliances, whether they burn wood, wood pellets or coal. (Refer to NFPA 211 and NFPA 90B Warm Air Heating Systems.) To order, call NFPA at 1-800-344-3555.**

## CLEARANCES

**Take particular care to provide enough clearance for your woodburning device.** The amount of clearance needed will depend to some degree on the type of device you are installing -- whether it is a radiant device or a circulating device. **These clearances may vary and therefore Maine Mutual Fire Insurance Company requires the completion of our Supplemental Heating Questionnaire MMG-77 (12-95).**



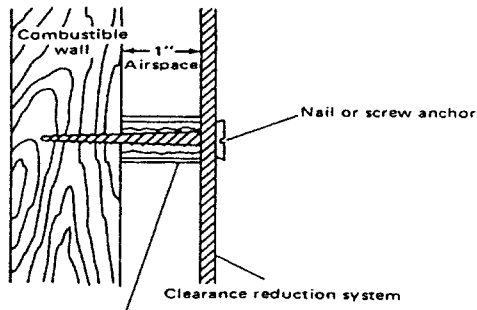
Radiant heaters have no air space -- the single wall encloses the firebox. Heat radiates into the room via infrared waves directly from the walls of the device. The infrared waves carry heat directly into nearby combustible materials, changing their composition and lowering the temperature at which they can spontaneously combust. Because of these factors, more clearance is needed.

Extreme care needs to be taken to keep radiant appliances from combustible materials -- materials such as magazine racks, furniture, drapes, paneling and even the wood box. Plaster and sheet rock walls are considered combustible because of the wooden studs behind the walls.

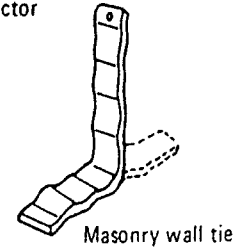
Heating surfaces of radiant stoves should be at least 36 inches from any combustible material. The **MINIMUM** clearance should be observed no matter what the stove's exterior material -- when considering clearances, there is virtually no difference between cast iron or heavy steel.

There is a way to move your woodburning appliance or stovepipe closer to a combustible surface: You may use wall or ceiling protectors. These protectors mount on the wall or ceiling and reflect heat away from combustibles. The protectors have mounts or spacers, **that hold them one**

inch away from the wall or ceiling and allow air to pass between the wall or ceiling surface and the surface of the protectors. Besides the spacers that can be purchased, metal washers, thin tubing, electrical insulators and masonry wall ties may be used. **Protectors should be mounted so as to leave a one-inch space between the bottom of the protector and the floor.**



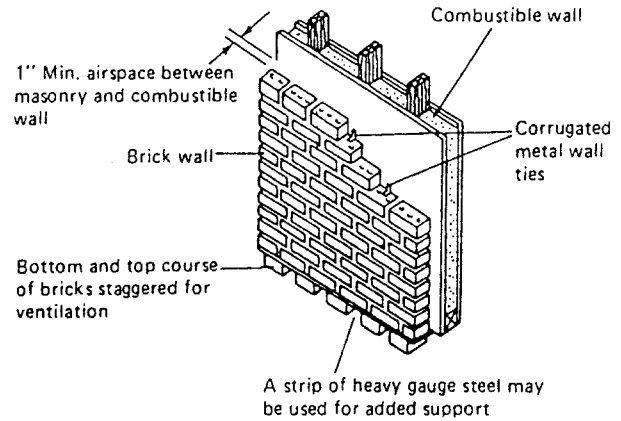
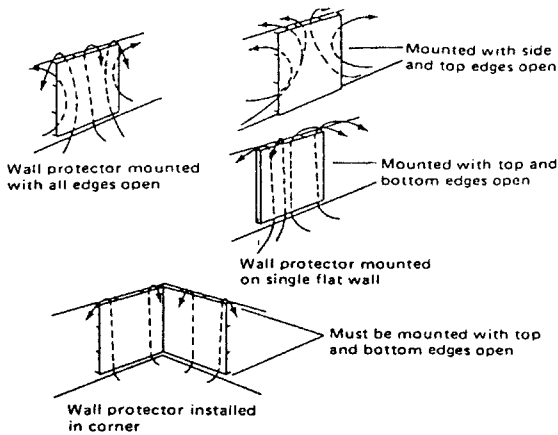
NOTE: Do not place masonry wall ties directly behind appliance or connector



1" Noncombustible spacer such as stacked washers, small diameter pipe, tubing, or electrical conduit.

Masonry walls may be attached to combustable walls using wall ties.

Do not use spacers directly behind appliance or connector.



Wall protectors are made of a variety of materials, 24-gauge or thicker sheet metal or 3 1/2-inch masonry wall can be used. See Table 1.

**Table 1**

*Minimum clearance allowed when installing protectors between woodstoves or stovepipes and combustable ceilings or walls.*

<u>Type of protection</u>	<u>distance allowed</u>		<u>Stovepipe from Connectors</u>
	<u>from protected ceiling</u>	<u>from protected wall</u>	
1) 3 1/2" masonry wall - no ventilation	NA	24"	12"
2) 1/2" non-combustible insulation board over 1" glass fiber or mineral wool batts - no ventilation	24"	18"	12"
3) Minimum 24-gauge metal, 1" ventilated space	18"	12"	9"
4) 3 1/2" masonry wall, 1" ventilated space	NA	12"	6"
5) Listed prefabricated systems	Per manufacturer's specs		

Note:

*When using wall clearance reduction systems, no clearance is to be less than 12 inches. This applies to listed and unlisted appliances, unless stated by the manufacturer.*

## FLOOR PROTECTION

All combustible floors must be protected. The amount of protection depends upon the length of the appliance's legs. **The floor protection should extend at least 18 inches in all directions from the stove** (see Table 2).

<b>Table 2</b>	
<b>Floor clearances (For listed and unlisted appliances)</b>	
<u>Length of stove leg</u>	<u>Floor clearance and protection</u>
Less than 2 inches	Fire resistant floor (non-combustible)
2 - 6 inches	Combustible floor protected by 4" of hollow masonry, laid to provide circulation through the masonry layer, covered by 24-gauge sheet metal.
Over 6 inches	Combustible floor protected by 2" thick masonry, placed over a sheet of 24-gauge sheet metal.

## STOVEPIPES

Of the 30,000 residential wood appliance fires, about 10 percent start in the vicinity of the stovepipe -- the part that connects the appliance with the chimney.

Stovepipes should be made of steel no thinner than 24-gauge. No part of the stovepipe should be closer than 18 inches to any combustible material. The ceiling should be considered combustible material. The distance may be reduced as outlined in Table 1.

In new construction, each combustion appliance must have its own flue. **A stovepipe should not be connected to a flue serving a fireplace or oil furnace -- each should have its own flue.**

### *Stovepipe Installation Guidelines*

- 1. Use a UL approved metal or fireclay thimble to pass a stovepipe through a non-combustible wall and into the chimney. Attach the thimble to the masonry with refractory cement. The thimble should extend to the inner surface of the chimney liner, but not beyond. The stovepipe should end flush with the inner end of the thimble.*
- 2. Use stovepipe that has a diameter as large as the flue collar where the pipe joins the stove.*
- 3. Stovepipe should be as straight as possible. No more than two bends should be used. Additional bends may cause creosote to collect in the stovepipe or chimney, and that may block the flow of flue gas, thereby increasing the risk of fire.*
- 4. Install the stovepipe with a rise of a quarter-inch for each foot of pipe in a horizontal run. The highest point should be at the thimble or point of entry to the chimney.*
- 5. Horizontal runs should be no longer than 75 percent of the vertical chimney height above the thimble where the connector pipe enters the chimney.*
- 6. Overlap at least 2 inches of stovepipe at the joints with the crimped end pointed down to prevent creosote leaks. Secure the joint with three sheet metal screws.*
- 7. Be sure the stovepipe fits snugly, including connections with the stove and thimble. The pipe must not stick into the chimney flue itself because this would hamper the draft.*
- 8. Never pass a stovepipe through a roof, ceiling, closet or concealed area.*

## MULTIPLE CONNECTIONS

If a woodburning appliance is attached to a flue already serving a fireplace, sparks may enter the house through the fireplace opening. In the event of a chimney fire, the fireplace opening may deliver large amounts of air to the fire and obstruct attempts to extinguish it. A similar problem may be encountered if the flue services an oil furnace, since air may enter the chimney through the furnace's barometric damper. A woodburning appliance may also lessen the efficiency of an oil furnace on the same flue because of changes in the flue's draft characteristics. **NFPA recommends that each appliance be connected to a separate flue.**

## FIRE EXTINGUISHERS AND SMOKE DETECTORS

A multi-purpose ABC dry chemical fire extinguisher should be installed for each woodstove. The extinguisher should be located near the stove and be easy to reach.

All homes should have at least one smoke detector on each living space level, whether the home is heated with wood or not. The detectors should be mounted on the ceiling or on the wall within 12 inches of the ceiling.

In homes equipped with woodburning appliances, the detectors should be mounted between the woodburning device and the home's bedrooms. **Don't forget to test the smoke detectors regularly.**

## DISPOSAL OF ASHES

Store ashes in a non-combustible metal container with a tight-fitting lid. The closed container should be placed on a non-combustible floor or on the ground, well away from all combustible materials, awaiting final disposal.

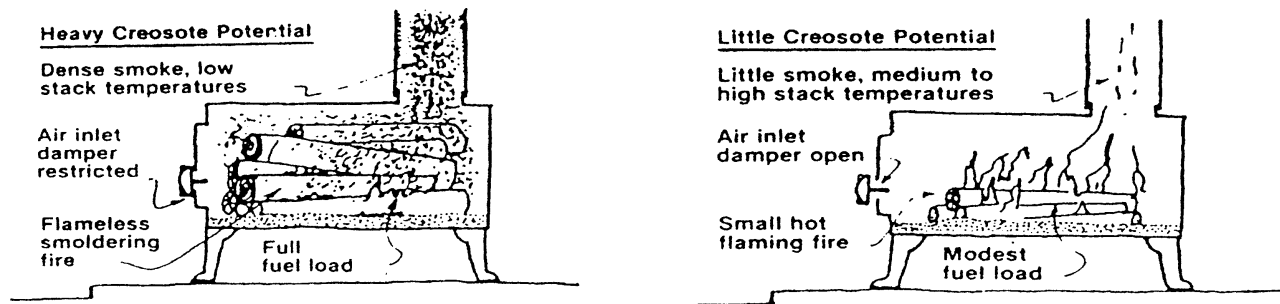
## CHIMNEY AND STOVEPIPE CLEANING

If every woodstove worked perfectly, if every stick of firewood was completely seasoned, and if every woodstove owner knew everything there was to know about efficient woodstove operation, we wouldn't hear very much about creosote. Of course, that isn't the case. Creosote is a fact of life for the wood burner, and knowing how to deal with it is an essential part of the wood burning process.

What is creosote? It is a dark brown or black substance that is formed by the incomplete combustion of wood. It is most likely to form when dense smoke makes contact with a cool chimney surface. It may be a tar-like substance, although at times, it is more watery. It can collect in most any part of your woodburning system.

People used to think creosote was more apt to form as a result of using green firewood or by burning softwoods rather than hardwoods. But research has shown us that creosote is more a result of **HOW** you burn, rather than **WHAT** you burn. Good seasoned hardwood will still form large

amounts of creosote if it is burned in a damped-down stove. Unseasoned, green firewood will produce large amounts of creosote, but that seems to be more a function of the water that must be driven out of the wood before it can burn at a high enough temperature to prevent creosote production.



The temperature of the chimney also plays an important part in creosote production. That's why outside chimneys and long runs of stovepipe are more apt to host creosote formation -- they tend to be colder than inside chimneys or short runs of stovepipe.

All woodburning systems require some form of regular cleaning. Creosote should be removed when it reaches a thickness of quarter-inch or more. **At the very least, chimneys and stovepipes should be cleaned once a year.**

Many people do this annual job in the spring, before there is too much rain and snow. Rain and snow can mix with the creosote, forming caustic substances. It can also smooth out the creosote, making it much harder to remove.

***Here are some of the things you will need to do:***

- You can clean your chimney from inside the house if your chimney has a cleanout door or if the chimney is connected to a fireplace. Otherwise, you will have to clean it from outside the house.
- If you clean the chimney from inside the house, close off the bottom of the chimney or the fireplace, and make sure to cover the surrounding area with dust covers -- it can be a very messy job!
- If you are working on a chimney that is attached to a fireplace, don't forget to clean the shelf above the damper. This is a very likely spot for the accumulation of creosote.
- There are a number of brushes and other cleaning devices available for chimney cleaning. Buy brushes that fit the shape of your chimney. If you have a masonry chimney, use a steel brush. Flat wire bristles are better at removing hard creosote than round bristles.
- If you have a stainless steel or factory-built chimney, use a plastic brush -- metal brushes can scour the metal of the chimney, causing more rapid deterioration of the chimney by the caustic elements in the wood smoke.

- Besides brushes, various types of metal and plastic scrapers are also available for removing stubborn creosote. All of these implements are available at hardware stores or stove shops. Experiment to find the type that works best for you.
- Some brushes are equipped with loops at both ends so ropes can be attached. With this implement, one person on the roof can pull the brush up while another person in the house can pull the brush down. Others have a loop for the attachment of a weight that will pull the brush down the chimney. Still others have connectors for the attachment of extension rods.
- If the creosote buildup is minimal, one pass through the chimney may be enough. If the creosote is heavier or harder, you may have to scrub one area until it is clean before moving on to another section.
- Some components of creosote are carcinogenic, so always wear protective clothing and a dust mask.
- Disassemble the stovepipe and take it outside to clean. You may have to purchase brushes and other implements that are shaped differently from the ones you purchased for the stove. Scrape and scrub the inside of the stovepipe in the same manner you used on the chimney.
- Don't forget to clean the inside of the stove, too! Creosote can collect in areas of the stove just as it collects in the stovepipe and chimney.

**Because of the inherent risks in solid fuel burning appliances, it is important to take the precautions of continuous maintenance and use the appliance in strict accordance with manufacturer's guidelines.**

References:

- National Fire Protection Association
- Department of Economic and Community Development (Maine)
- National Association of Mutual Insurance Companies
- Insurance Information Institute