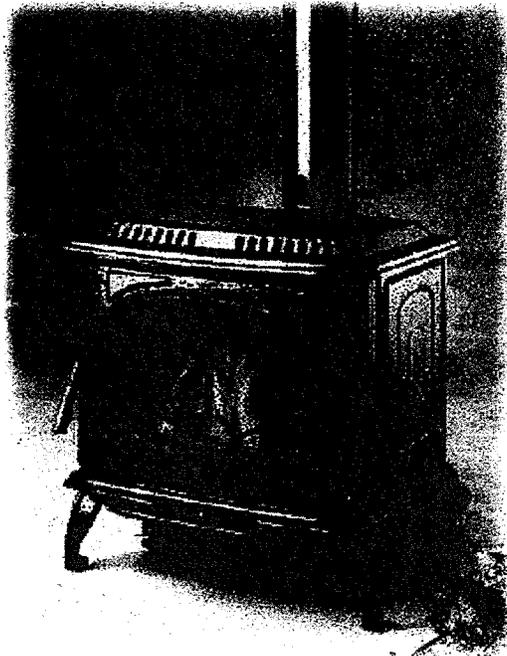


**RECOMMENDED STANDARDS
for the INSTALLATION and
SAFE USE of
WOOD BURNING STOVES**



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RECOMMENDED STANDARDS FOR THE INSTALLATION OF WOOD BURNING STOVES

This guide has been prepared to inform the people of the State of Maine of the recommended standards for the installation of wood burning stoves. These standards have been approved by the Office of State Fire Marshal in accordance with the National Fire Protection Association's Standard #211.

These standards cover all wood burning appliances with the exception of on-site constructed masonry stoves and fireplaces; stoves with water jackets or coils; and wood fueled central heating systems utilizing pipes, ducts, or similar distribution systems. Stoves for use in mobile homes should be specifically listed for such use. All listed wood burning stoves should be installed according to the manufacturers' recommendations.

DEFINITIONS

- APPROVED:** Acceptable to the authority having jurisdiction.
- ASBESTOS MILLBOARD:** A soft insulating board made with compressed asbestos fibers capable of being cut with knife or hand saw.
- CHIMNEY:** A vertical shaft enclosing one or more flues for conveying smoke, hot air, and other gases to the outside atmosphere.
- CHIMNEY CONNECTION:** The conduit connecting the wood stove with the vertical flue (generally stovepipe).
- CIRCULATING STOVE:** A wood burning appliance surrounded by an outer jacket with openings at the top and bottom so that room air passes between the stove and the jacket.
- COMBUSTIBLE WALL:** Any wall section that has the potential to burn. Only solid masonry or corrugated steel walls are considered non-combustible. Merely covering a wood studded wall with a non-combustible material does not constitute a non-combustible wall.
- COOK STOVE:** A wood burning stove used for cooking which includes an oven and surface heating areas.
- DRAFT:** The natural force which conducts smoke, hot air, and other gases to the outside atmosphere.
- FIRE RESISTANT INSULATING BOARD:** Listed or approved materials suitable for protecting combustible surfaces.
- FLUE:** A tube, pipe, or shaft for passage of smoke, hot air, gas, etc., as in a chimney.
- FLUE COLLAR:** That portion of an appliance designed for attachment to the chimney connector.
- FLUE LINER:** A material which resists high temperatures and is designed specifically for lining chimneys or connectors.
- LISTED:** Equipment or materials which meet nationally recognized standards or tests which determine suitability of usage in a specified manner.
- RADIANT STOVE:** Any wood burning appliance not designed as a circulating stove.
- THIMBLE:** Liner for the passageway where the chimney connector enters the chimney flue.
- WOOD BURNING APPLIANCE:** Any free-standing unit which utilizes wood as a fuel to produce heat. This includes stoves installed into fireplace openings.

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I. THINGS TO KNOW ABOUT WOOD BURNING EQUIPMENT

Wood burning equipment has come a very long way from the days when woodstoves were little more than big cast-iron boxes with a door at one end and a stovepipe at the other.

It's still possible to buy simple wood burning stoves, or to construct traditional fireplaces. But the other end of the wood burning spectrum is a high-tech world of new ideas, new hardware and even new fuels that make heating with wood much cleaner and more efficient.

***When it comes to wood burning, bigger is definitely not better. ***

An important point in wood burning technology came about in 1988, when new federal regulations for wood burning appliances went into effect. Now, new wood burning appliances must be rated, much as cars are rated for fuel efficiency. Wood burning stoves, fireplace inserts and other appliances are now rated by the federal Environmental Protection Agency (EPA), and their efficiency ratings are printed on labels attached to the appliances before they are sold.

Up until 1988, airtight woodstoves had an average efficiency of around 50 percent. But since that time, efficiency ratings have moved up quickly. New appliances with catalytic combustors now have average efficiency ratings of 72 percent. New devices without catalytic combustors average 64 percent. The new pellet-burning appliances are even better, averaging 78 percent efficiency.

Before deciding which appliance is best for you, however, you must determine what size appliance will work best in your home. Probably the most common mistake that new wood burners make is selecting an appliance that is too big for the space that it must heat.

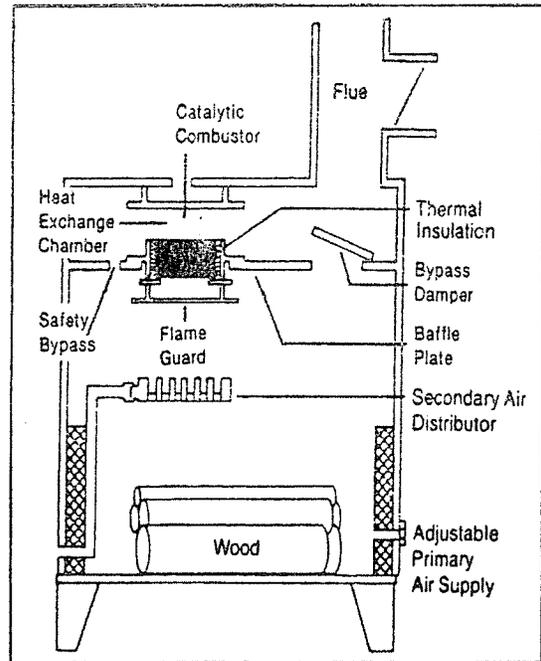
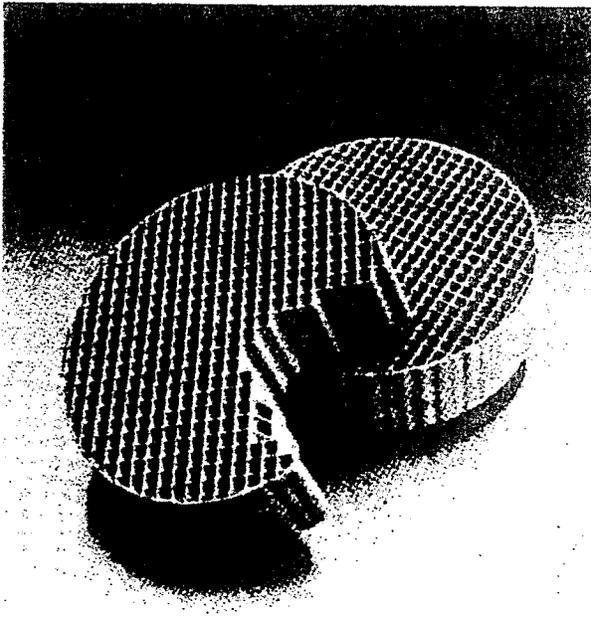
When it comes to wood burning, bigger is definitely not better. Here's why: For wood heat to work properly, the appliance should work at or near its maximum efficiency. That means the appliance must contain a good, hot fire. If the appliance is too large for the space it must heat, it will have to be damped down. That means the fire will smolder rather than burn, and that will increase creosote and pollution. It also means that a fair amount of unburned energy will escape up the chimney.

(For information on sizing your woodstove, contact a dealer or equipment manufacturer.)

Once you have determined the size of the appliance you need, the next step is to determine the type of appliance that would be best for you. As a first step, let's take a look at some of the new wood burning technology. Later, we'll look over the typical appliances that are available.

CATALYTIC COMBUSTORS

A catalytic combustor is a honeycomb-shaped device that works on the same principle as the catalytic converters that are installed in automobiles to reduce emissions. It burns gasses and carbon material that would otherwise go up the chimney.



Catalytic combustors are designed to reduce emissions, and also offer the side benefit of reducing creosote buildup. This prevents chimney fires, and increases the time between chimney cleanings.

Here is how they work: gasses and carbon material in smoke won't ignite until temperatures reach around 1,100 degrees F, and woodstoves generally operate somewhere below 800 degrees F. The catalytic combustor is coated with platinum, palladium or some other catalyst material which reduces the ignition point of the gasses to around 400 degrees F. The smoke and gasses ignite and burn as they pass over the combustor.

Stoves with catalytic combustors are efficient and clean, and they reduce chimney cleaning costs. But there are a few cautions to keep in mind:

The Right Temperature

If stoves with catalytic combustors are operated too hot, the combustor can be damaged. If too cool, particles can stick to the combustor and gum it up. Stoves with catalytic combustors should be equipped with by-passes that allow smoke to move around the combustor until the stove gets up to temperature.

The Right Fuel

The wrong fuels can cause serious damage to a catalytic combustor. If your stove has a combustor, never burn garbage, plastic, painted wood, driftwood, colored paper or any materials that contain lead or potassium.

“NON-CATS”

EPA-certified wood burning appliances that rely on design features other than catalytic combustors are sometimes referred to as “non-cats”. About 40 percent of certified wood burning appliances are non-cats, and that share is increasing as manufacturers develop ways to make wood burning appliances of all kinds more efficient.

This increased efficiency comes from optimizing the amount of air that mixes with the gasses and flames, often by mixing preheated air in the secondary combustion chamber with exhaust gasses. This allows more of the gas and soot particles to burn, rather than escape up the chimney.

Non-cats don't require much attention and they don't need periodic part replacement. When noncat lifetime performance is compared to the lifetime performance of stoves with catalytic combustors, performance levels are about the same.

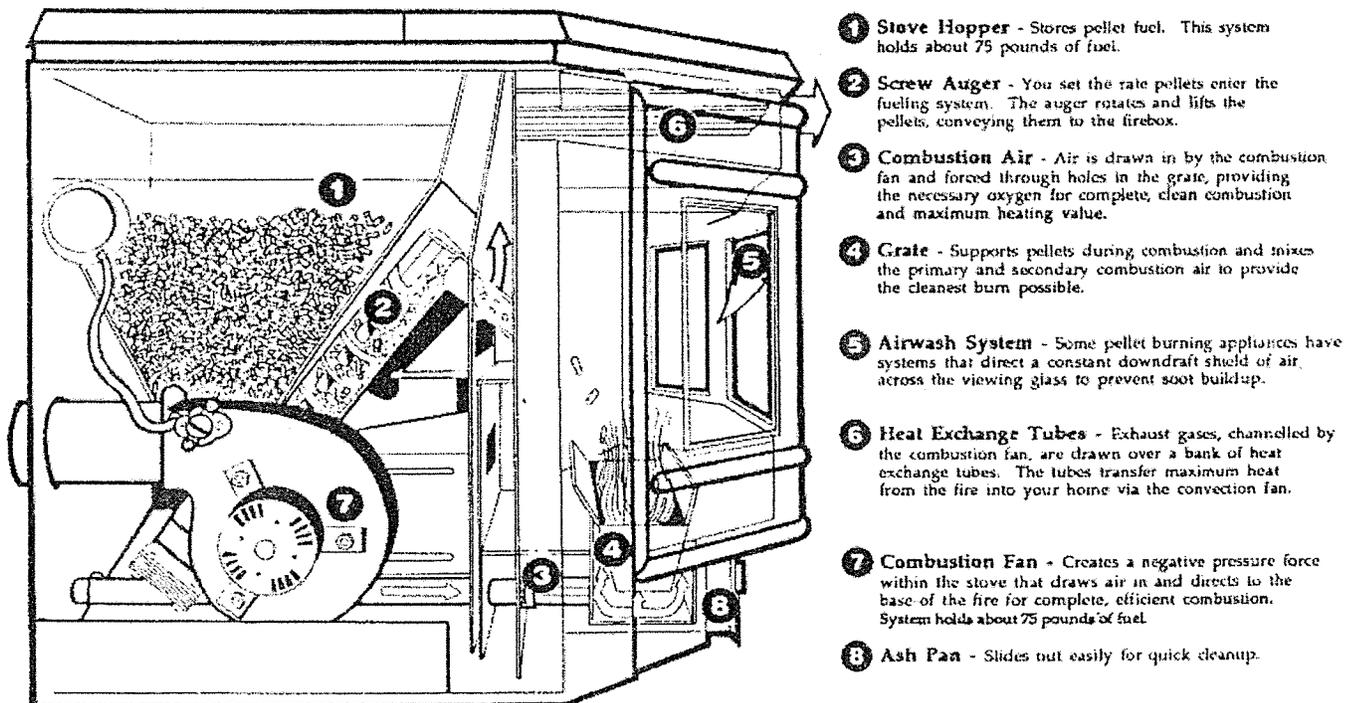
PELLET STOVES

Pellet burning appliances are fueled by wood pellets which are made from compressed wood and such agricultural waste as rice hulls and corn husks. The pellets, which resemble rabbit food, are fed into the appliance's combustion chamber automatically, often controlled by computer. Pellet fuel appliances may have more than one burn setting, may be equipped with thermostats, and may deliver heat via forced air systems.

Pellet burning stoves are very efficient, often supplying between 10,000 and 70,000 BTU per hour and operating at 78 percent efficiency. Some burn so cleanly that they do not need chimneys, relying instead on wall vents made from special insulated pipe.

Pellet stoves must be refueled anywhere from once a day to twice a week. Refueling is simple – just pour pellets into a hopper which holds between 35 and 150 pounds of fuel pellets. The pellets are drawn into the firebox as needed by an auger.

Schematic of Wood Pellet Stove



FREE-STANDING STOVES

Free-standing woodstoves have been around for years, and they are available in a variety of shapes and sizes. The major difference between the stoves of today and the stoves of a generation ago is that efficiency of modern stoves must be EPA-certified, and have efficiency ratings of 68 to 75 percent.

Most modern stoves are made of cast iron, plate steel, sheet metal or some combination of those materials. Cast iron stoves are more susceptible to cracking, and they take a bit longer to heat up. Steel stoves are more prone to warping when exposed to high heat. Sheet metal stoves usually use 16- to 20-gauge steel as an exterior material, and are usually lined with cast iron or heavy plate steel.

Whatever the material, stoves may have doors on the front, the side or on top. Top loaders are usually easiest to load, but they are also most likely to expel smoke into the room. Some modern stoves have glass doors that make the flames visible. Some of these models use airflow systems that keep the glass doors free of soot.

***** Whatever stove you choose, don't neglect the chimney. Make sure that any existing chimney is in good repair and is capable of serving your new stove. *****

Such modern wood burning technology as catalytic combustors and wood pellet fuel systems are available in modern woodstoves. Other features may include fan-driven heat exchangers, firebox pipe systems or secondary burn chambers, which trap heat from catalytic combustors and radiate it into the room. Stoves are also available in a variety of styles and colors, and may have marble or porcelain exterior panels.

Whatever stove you choose, don't neglect the chimney. Make sure that any existing chimney is in good repair and is capable of serving your new stove. New masonry chimneys are expensive, but you may be able to use a prefabricated metal chimney. These chimneys are relatively easy to install, but make sure the chimney has been tested and approved for wood burning. For more information on chimneys, be sure to read the "Burning Wood Safely" chapter in this booklet.

FIREPLACES, FIREPLACE INSERTS & FACTORY-BUILT FIREPLACES

Masonry Fireplaces are cozy, beautiful, and terribly inefficient. They suck up huge amounts of warm indoor air and send it up the chimney, whether the fireplace is in use or not. In fact, fireplaces can actually send more heat up the chimney than they radiate into the room.

A fireplace insert is really a woodstove that fits into a fireplace. The EPA certifies inserts in the same way that it certifies woodstoves, so inserts are considerably more efficient than they used to be.

Some inserts fit completely into the fireplace cavity, while others protrude out onto the hearth. The style that protrudes can be more efficient, since the sides and top of the insert can radiate warmth into the room.

The National Fire Protection Association requires that inserts be installed with a positive connection to the chimney.

*** Some inserts fit completely into the fireplace cavity, while others protrude out onto the hearth. The style that protrudes can be efficient, since the sides and top of the insert can radiate warmth into the room. ***

Factory Built Fireplaces are sometimes called “zero-clearance” fireplaces, and they apply modern woodstove technology to fireplace construction. By using tight-fitting glass doors, combustion air control and passive or fan-driven heat vents, some of these fireplaces can reach efficiency levels as high as 67 percent.

A type of manufactured fireplace is the modular masonry fireplace – metal or masonry fireboxes often framed in enameled cast iron. These fireplaces use some of the technology used in masonry stoves (see below) – heat storing thermal mass and efficient combustion.

MASONRY STOVES

Heat-storing masonry stoves, sometimes known as “Russian fireplaces”, have been popular for years in Europe, but are finding more acceptance in northern parts of the United States. Masonry stoves are really huge woodstoves that store and radiate heat.

Masonry stoves have three components – masonry mass, a firebox, and a long smoke/heat channel. Small but intense fires are lit in the fire box once or twice a day. The heat from the fire is stored in the masonry mass, and radiates out into the home over several hours.

*** Masonry stoves are really huge woodstoves that store and radiate heat. ***

Masonry stoves are custom built and can include a number of features, including an oven, a cook top, or heated benches.

While masonry stoves are efficient and can heat large areas, they have a number of drawbacks. Because the masonry mass heats and cools so slowly, room temperature cannot be easily regulated.

CENTRAL FURNACES AND BOILERS

Central wood burning furnaces and boilers are good choices when a home’s layout prevents heating with a single woodstove. They can tie into existing heat distribution systems, and can be controlled by a thermostat, just as an oil or gas furnace can be regulated. Wood-fired furnaces can either stand alone or can be purchased as wood/oil or wood/gas combination units.

Wood furnaces are exempt from EPA emission standards. Their combustion efficiency ratings are usually well below woodstoves – often around 5 percent.

II. THINGS TO KNOW ABOUT WOOD FUELS

When it comes to wood heat, what you burn is every bit as important as how you burn it. The very best wood burning appliance won’t help you if you burn the wrong kind of wood, or if the wood isn’t prepared for burning when it goes into the firebox.

*** When it comes to wood heat, what you burn is every bit as important as how you burn it. ***

Whether you plan to cut your own wood or buy it from a dealer, there are a number of things to be aware of. Here are a few questions to keep in mind:

What kind of wood is it?

Any wood will burn, but some species burn better than others. And if you're splitting your own wood, remember that some woods split easily while others don't. If you plan to buy your wood, remember that wood with low heating value should cost less per cord than wood with high heating value.

Generally, the heavier or denser the wood, the higher the heating value. Different wood species have different heating values. But remember that weight can also be affected by water content.

Is it seasoned?

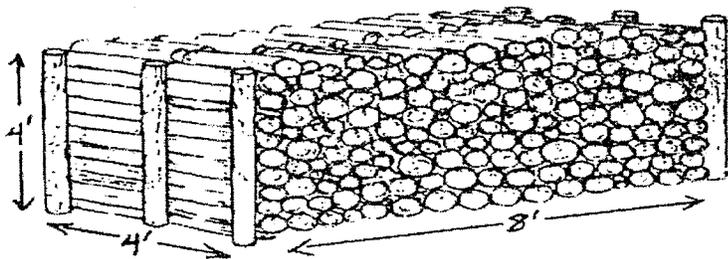
Up to 50 percent of the weight of green wood is water. That water has to be removed for the volatile materials in the wood to burn properly. Green wood will burn, but much of the heat produced will be used to evaporate the water, and that will greatly reduce the amount of heat your stove will generate.

Remember that most of the wood you buy will be delivered green – buy it enough in advance of the burning season to give the wood time to season, or dry. It usually takes at least six months of air drying under cover for wood to be considered dry. “Air dried” wood is wood that contains 20 percent moisture or less.

Sometimes wood dealers will advertise “seasoned” or “dry” wood, and it is usually more expensive than green wood. Make sure the dealer's claims are true – seasoned wood should be cut, split, and then stored under cover for a least six months before it is sold.

Is it a full measure?

Wood is usually sold by the cord, a traditional wood measure that is equal to a stack which is four feet wide, four feet high, and eight feet long. A cord contains 128 cubic feet of wood. A “loose cord” is made up of 12-inch or 16-inch pieces would occupy 180 cubic feet, while a loose cord of 24-inch wood would occupy 195 cubic feet. In both cases, the wood would occupy the standard 128 cubic feet if it were stacked.



If you are buying your wood and you buy it by the cord, make sure you get your money's worth. And remember a cord of wood will NOT fit in the back of a normal-sized pickup truck. If you feel you have been shortchanged, there are a number of avenues open to you.

The first step should be a direct conversation with the dealer. If that attempt doesn't work out to your satisfaction, you may contact the Bureau of Weights and Measures in Augusta at 287-3841.

III. BURNING WOOD SAFELY

According to the Consumer Product Safety Commission, woodstoves and other types of fixed heaters cause more than 30,000 residential fires in the United States every year. Anyone who considers wood heat 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 stovepipe and the chimney.

Smoke detectors

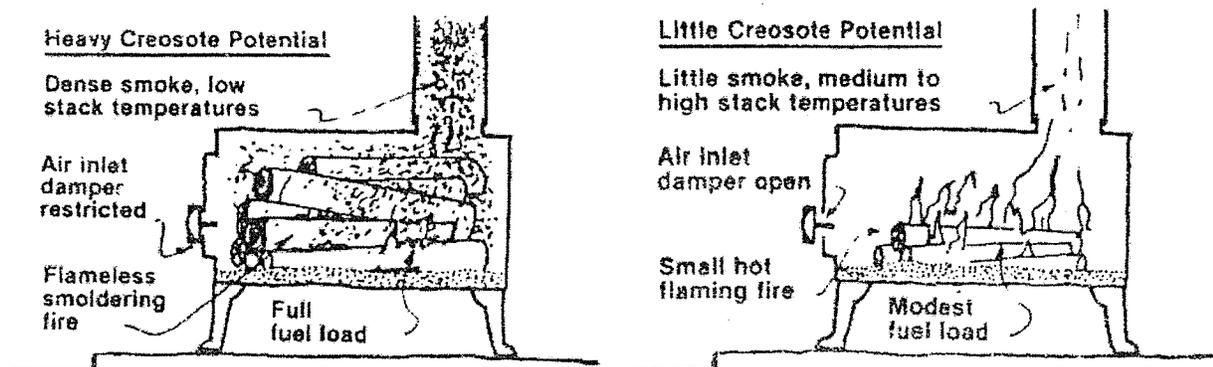
By State Law, all homes must have at least one smoke detector on each living space level, whether the home is heated with wood or not. The detectors must be mounted on the ceiling, or on the wall within 12 inches of the ceiling.

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

Chimney and stovepipe cleaning

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 wood burning 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 wood burning systems require some form of regular cleaning. Creosote should be removed when it reaches a thickness of a 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. Rain 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 or tee, or if the chimney is connected to a fireplace. Otherwise, you will have to clean it from outside the house. If you work on the roof, make sure your ladder and footholds are secure.

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.

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.

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.

***** Some components of creosote are carcinogenic, so always wear protective clothing and a dust mask. *****

When you're scrubbing and cleaning is completed, check the chimney for leaks. Start a fire and then cover the top and bottom openings of the chimney with wet rags. You should be able to spot leaks by watching for escaping smoke.

How to detect creosote buildup

Watch for creosote dripping from stovepipe joints.

Listen for a dull, heavy "thump" when the stovepipe is tapped.

Visually inspect the system. Look through the door or cleanout, and use a mirror and flashlight to look up the chimney.

Visually inspect the chimney from the room, using a light bulb or flashlight.

Visually inspect the stovepipe by removing a section.

Appliance installation guidelines

DO NOT install your wood burning device in confined spaces, unless the installation is done in accordance with the listing and the manufacturer's instructions. The specified clearance should be maintained **REGARDLESS** of whether the enclosure is of combustible or non-combustible material.

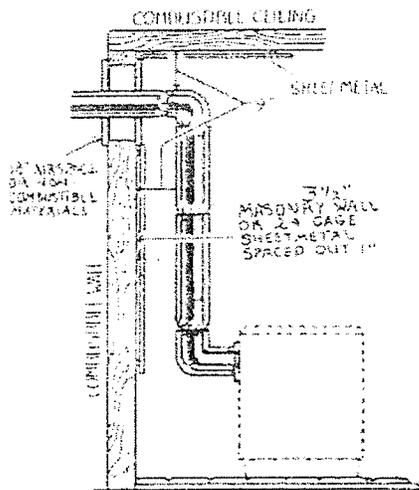
DO NOT install your wood burning device where gasoline or flammable vapors or gasses may be present, such as in a residential garage.

DO install your wood burning device where the ventilation permits good fuel combustion, proper chimney draft and maintenance of safe temperature for its use.

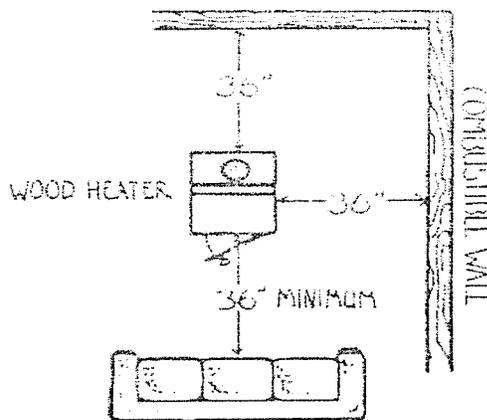
DO have an outside air supply in buildings which are so tight that normal infiltration does not provide necessary amounts of air.

DO design, locate and install the stovepipe and chimney in such a way that they can be easily inspected and cleaned.

DO use listed factory-built accessories such as heat exchangers, stove mats, floor pads, and protection shields. Use them according to manufacturer's recommendations. If these accessories are not listed, check with your local fire department or with the Fire Marshal's Office for installation advice.



CLEARANCE REDUCTION FOR STOVEPIPE



MINIMUM CLEARANCES FOR UNLISTED WOOD STOVE

IV. CLEARANCES FROM WOOD BURNING STOVES

Stoves must be provided with adequate clearances from combustible materials. The minimum clearances needed for safety are specified in National Fire Protection Association Standard # 211, Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances, 2003 Edition.

a. Clearances to Walls and Ceilings

Clearances indicated in Table 1 (below) are the minimum clearances from wood burning stoves to unprotected combustible wall and ceiling surfaces.

TABLE 1
Minimum Clearances from Wood Burning Stoves to Combustible Surfaces with No Added Protection

	Radiant	Circulating	Cookstove Clay lined Firepot	Cookstove Unlined Firepot	Stovepipe	Listed Stoves
Ceiling	36"	36"	30"	30"	18"	Install According to Manufacturers Recommendations
Front	36"	24"			18"	
Side	36"	12"	Firing side 24" Opposite side 18"	Firing side 36" Opposite side 18"	18"	
Rear	36"	12"	24"	36"	18"	

NOTE

Stoves may be installed with clearances less than those specified in Table 1 provided the combustible material is protected as described in Table 2

TABLE 2
Minimum Clearances from Wood Burning Stoves with Specified Forms of Protection

Clearance reduction applied to and covering all combustile surfaces within the distance specified as required clearance with no protection	Maximum allowable reduction in clearance (%)		Where the required clearance with no protection is 36 in. the clearances below the minimum allowable clearances. For other required clearances with no protection, calculate minimum allowable clearances from maximum allowable reduction.	
			inches	inches
(a) 3 1/2 in. thick masonry wall without ventilated air space	33	-	24	-
(b) 1/2 in. thick noncombustible insulation board over 1-in. glass fiber or mineral wool batts without ventilated air space	50	33	18	24
(c) 0.024-in., 24 gauge sheet metal over 1-in. glass fiber or mineral wool batts reinforced with wire or equivalent, on rear face with ventilated air space	66	50	12	18
(d) 3 1/2 in. thick masonry wall with ventilated air space	66	-	12	-
(e) 0.024-in., 24 gauge sheet metal with ventilated air space	66	50	12	18
(f) 1/2 in. thick noncombustible insulation board with ventilated air space	66	50	12	18
(g) 0.024-in., 24 gauge sheet metal with ventilated air space over 0.024-in. 24 gauge sheet metal with ventilated air space	66	50	12	18
(h) 1-in. glass fiber or mineral wool batts sandwiched between two sheets 0.024-in., 24 gauge metal with ventilated air space	66	50	12	18

Table 2 Guidelines and Details
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Table 2 Guidelines and Details

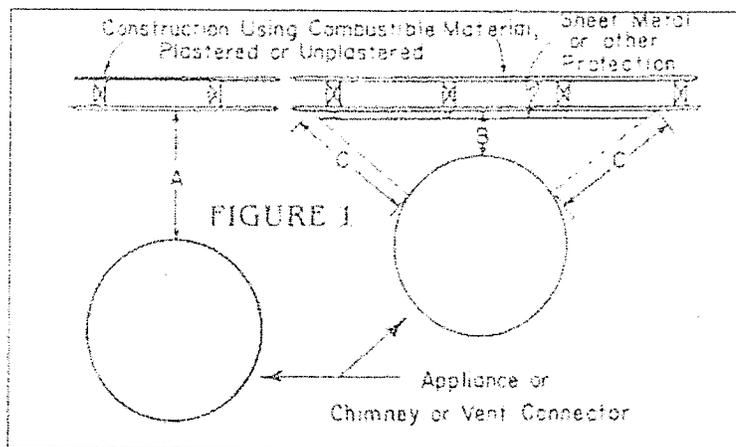
Notes:

1. Spacers and ties shall be of noncombustible material. No spacers or ties shall be directly behind appliance or conductor.
2. With all clearance reduction systems using a ventilated air space, adequate air circulation shall be provided as described in section 9-6.2.4 of NFPA # 211. There shall be a least 1 inch between the clearance reduction system and combustible walls and ceilings for clearance reduction systems using a ventilated air space.
3. Mineral wool batts (blanket or board) shall have a minimum density of 8 lb/ft³ and have a minimum melting point of 1500°F (816°C).
4. Insulation material used as part of clearance reduction system shall have a thermal conductivity of 1.0 (Btu-in.)/(ft²-hr-°F) or less. Insulation board shall be formed of noncombustible material.
5. If a single-wall connector passes through a masonry wall used as a wall shield, there shall be at least ½ in. (13mm) of open, ventilated air space between the connector and the masonry.
6. There shall be at least 1 in. (25.4 mm) between the appliance and the protector. In no case shall the clearance between the appliance and the wall surface be reduced below that allowed in this table.
7. Clearances in front of the loading door or ash removal door, or both, of the appliance shall not be reduced from those in Section 9-5, NFPA 211.
8. All clearances and thickness are minimums; larger clearances and thickness shall be permitted.
9. To calculate the minimum allowable clearance, the following formula can be used:
$$C@r = C@n \times [1 - (R/100)]$$

C@r is the minimum allowable clearance, C@n is the required clearance with no protection, and R is the maximum allowable reduction in clearance.
10. Refer to Figures 9-6.2.1(e) and 9-6.2.1 (f), NFPA 211, for other reduced clearances using materials found in (a) through (h) of this table.

FIGURE 1

"A" equals the required clearance with no protection as specified in Table 1.



"B" equals the reduced clearance permitted in accordance with Table 2. The protection, applied to the construction using combustible material, should extend far enough in each direction to make "C" equal to "A".

Clearances To Floors General Requirements

Residential-type solid fuel-burning appliances that are tested and listed by a recognized testing laboratory for installation on floors constructed of combustible materials shall be placed on floors in accordance with the requirements of the listing and conditions of approval. Such appliances that are not listed by a recognized testing laboratory shall be provided with floor protection in accordance with the provisions of 9-5.1.2 or 9-5.1.3 of NFPA # 211.

Exception: Residential-type solid fuel-burning appliances shall be permitted to be placed without floor protection in any one of the following manners:

- (a) On concrete bases adequately supported on compacted soil; crushed rock, or gravel
- (b) On concrete slabs or masonry arches that do not have combustible materials attached to the underside.
- (c) On approved assemblies constructed of only noncombustible materials and having a fire resistance rating of not less than 2 hours, with floors constructed of noncombustible material
- (d) On properly stabilized ground that can support the load of the appliance

Any floor assembly, slab, or arch shall extend not less than 18 in. (457 mm) beyond the appliance on all sides.

**FLOOR CLEARANCES
FOR LISTED AND UNLISTED APPLIANCES**

FLOOR CLEARANCES	
Length of Stove Leg	Floor Clearance and Protection
Less than 2 inches	Fire resistant floor
2 – 6 inches	Combustible floor protection by 4 inches 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 inch thick masonry, placed over a sheet of 24-gauge sheet metal.

- **Listed fire-resistant insulating board can be installed according to the manufacturer's recommendations.**

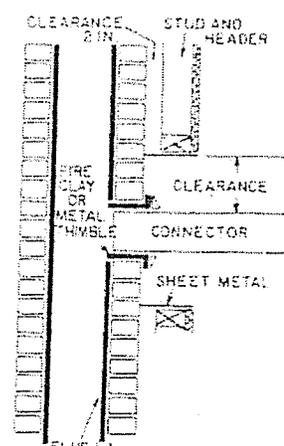
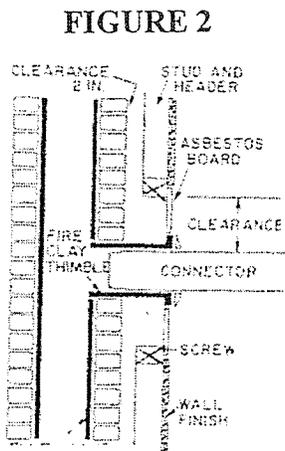
II. CHIMNEY CONNECTORS

A chimney connector links a stove to the chimney flue. Chimney connectors should be made from steel of minimum 24 gauge thickness. Lower gauge numbers indicate thicker stovepipe.

a. Clearances from Connectors

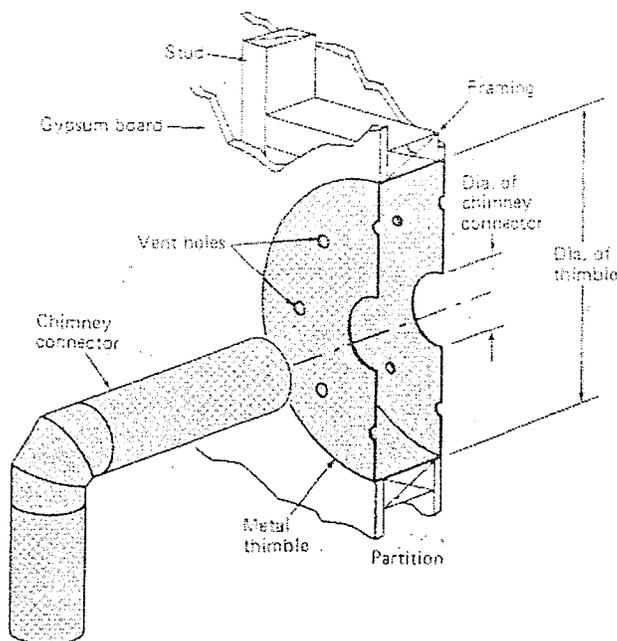
The clearance from a chimney connector to a combustible material should be not less than three times the diameter of the connector. Where the combustible material is protected, the clearance may be reduced.

There are three methods for passing a chimney connector through a combustible wall. Figures 2, 3, & 4 illustrate these methods. In Figure 2 sheet metal or metal lathe and plaster finish may be used. When installing as illustrated in Figures 2 & 3, the distance from the connector to combustible materials must be equal to three times the diameter of the connector.



Try to avoid passing a connector pipe through an interior wall. If this must be done, use a ventilating thimble (See Figure 4). The thimble diameter must be at least 12 inches larger than that of the stovepipe, thus giving at least 6 inches of metal-lined, ventilated clearance. If you do not use a thimble, the clearance must be three times the pipe diameter. A 6 inch pipe would need a 42 inch diameter hole cut through a combustible wall.

FIGURE 4

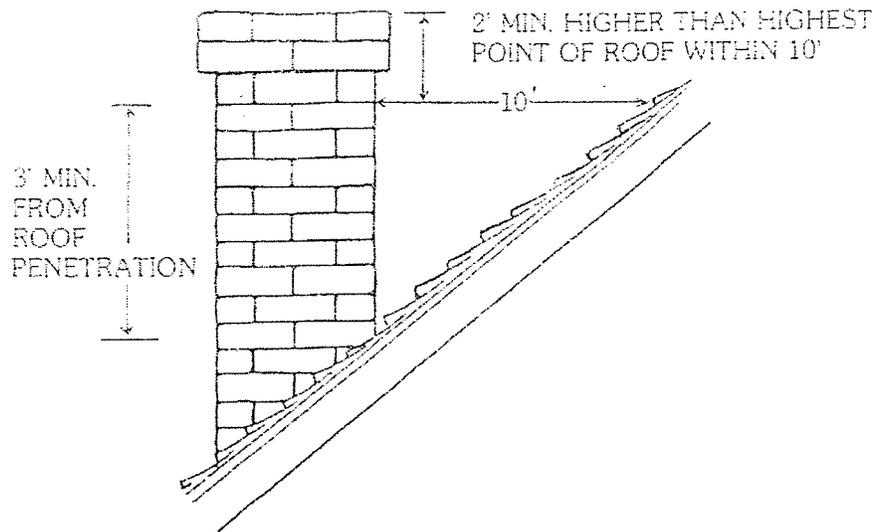


Listed solid fuel pre-fabricated metal chimneys can also be used to pass through a combustible wall when installed according to manufacturers' recommendations.

b. Connector Pipe Installation

- * Keep the connector pipe as short as possible. It should be no longer than 75% of the vertical chimney height above the thimble where the connector pipe enters the chimney.
- * The stovepipe should be straight as well as short. Use no more than two right-angle bends in the stovepipe installation. Additional bends cause soot and creosote to collect in the stovepipe or chimney, block flue gas flow, and increase the danger of fire.
- * The connector pipe's horizontal runs should rise $\frac{1}{4}$ " for each foot of pipe, with the highest point being at the thimble.
- * When joining the pipe, overlap the joints at least two inches, with the crimped end pointing down to prevent creosote drips or leaks. Secure each joint with three sheet metal screws. A fireproof sealant may be used in addition.
- * All connector pipe joints should fit snugly, including connections with the stove and thimble. The connector pipe must not stick into the chimney flue itself because this would hamper the draft.
- * Connector pipe should not pass through ceilings. Factory built, listed, all-flue chimneys should be utilized when passing through ceilings. Follow manufacturers' installation instructions for these chimneys.
- * Connector pipe should not pass through closets. A closet fire could smolder and spread undiscovered.

FIGURE 5



III. CHIMNEYS

The condition of a chimney should always be carefully evaluated before considering the installation of a wood-burning appliance. Beware of cracks, deteriorated mortar, and unsealed openings in any chimney before attaching a wood burning unit to it.

a. Chimney Draft

For sufficient draft a chimney should extend at least two feet higher than any portion of the building within ten feet horizontally from it (See Figure 5). The flue area should not be smaller than the largest connector pipe plus 50% of the additional area of a second connector entering the same flue.

b. Multiple Connections

More than one wood burning appliance should not be connected to a common flue. A chimney connector should not be connected to a flue serving a fireplace or an oil furnace. They should have their own individual flues.

One reason for this is that the sparks can enter the house through a fireplace opening serving a woodstove elsewhere along the line. Both a fireplace opening and an oil furnace's barometric damper will furnish large quantities of air to their flues. In the event of a chimney fire, this will hamper any attempts to extinguish the fire by restricting airflow to the flue. Using a wood-burning stove on a flue serving an oil furnace may also reduce the efficiency of the oil furnace, due to the change in draft characteristics of the flue. Multiple connections sometimes result in insufficient draft. If two or more stoves are connected to the same chimney flue, despite the recommendations against doing so, the connectors must enter the chimney at different elevations.

c. **Listed Solid Fuel Pre-Fabricated Metal Chimneys**

The use of pre-fabricated metal chimneys listed for installation with solid fuel heaters (not furnaces) are within the guidelines of the State Standard. Care should be taken, however, with the use of such chimneys to avoid creosote accumulation and the associated potential danger of a chimney fire. Air-controlled wood burning appliances should be operated in accordance with manufacturers' instructions to reduce the potential for creosote build up. Pre-fabricated metal chimneys can break down under the intense heat of a chimney fire, resulting in possible structural fire damage. They should always be installed in accordance with the manufacturers' recommendations.

IV. **ORGANIZATIONS GOVERNING THE INSTALLATION OF WOOD BURNING APPLIANCES**

The City of Westbrook has ordinances governing the installation of wood burning appliances. A permit must be obtained prior to installing any new wood burning appliance; this permit can be obtained from the Code Enforcement Office at City Hall. It is also important to consult with your insurance company regarding any restrictions they may have on wood burning appliance installation. All installations in public buildings must meet standards set by the Office of State Fire Marshal.

The wood burning appliances listed below are not covered by this recommended standard. For information on their installation, refer to the appropriate agency.

When Installing:	Consult With:
Site Built Masonry Flues and Fireplaces	City Fire Inspector or Code Enforcement Officer
Wood Fueled Furnaces or Boilers	Oil and Solid Fuel Burner Technicians Licensing Board
Wood Burning Units with Water Jackets or Coils	Plumbing Code Enforcement Officer
Listed Wood Fueled Mobile Home Heaters	State Manufactured Housing Board or Office of State Fire Marshal
Listed Wood Burning Stoves	The manufacturers' installation recommendations