Heating Your Home in Vermont with a Wood Stove

A publication of the **Northeastern Vermont Development Association**

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Table of Contents

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Comments and suggestions on this guide are welcome: Please send email to ben.luce@lyndonstate.edu.

About the NVDA: Formed in 1950, at the same meeting where U.S. Senator George D. Aiken coined the term "Northeast Kingdom" to describe Caledonia, Essex and Orleans counties, the Northeastern Vermont Development Association has served the people, municipalities and businesses of this region as both the Regional Planning Commission and Regional Development Corporation.

As the Regional Planning Commission, NVDA assists municipalities, organizations, committees and individuals with a wide variety of planning and technical services. From assisting municipalities with regulatory options, to administering grants, creating maps, and implementing transportation and natural resource plans, NVDA is actively working with land use issues in the region.

As the Regional Development Corporation, NVDA works on infrastructure improvements, assists companies relocating to the area, helps existing businesses to grow, and administers revolving loan funds. NVDA also fosters key partnerships with the Small Business Development Center, the Northeast Kingdom Collaborative, the Northeast Kingdom Travel and Tourism Association, and the various Chambers of Commerce in the region.

Please visit www.nvda.net for more information.

Introduction

Human beings have been using renewable biomass for heating in Vermont for thousands of years. Today, several tens of thousands of homes and businesses are heated by wood (about 10% of homes), and the state also boasts two wood fired power plants, 44 biomass heated public schools, biomass heating systems at several college campuses, and at least one pellet production facilities. Numerous proposals for additional pellet production facilities, district heating systems, and school systems exist, and homeowners and businesses are increasing turning to wood heat.

This guide provides essential information in a step-by-step format for utilizing wood stoves in the Northeast Kingdom of Vermont. There are separate guides for pellet stoves and geothermal heating systems in this series, as well as guides for obtaining power from photovoltaic and wind energy systems, and hot water from solar hot water systems. Please visit www.nvda.net to obtain these.

Air pollution from wood stoves in Vermont

The best wood stoves today create far less air pollution than older stoves, and large biomass systems are often even cleaner. Wood stoves can therefore be a clean and affordable means to achieve renewable energy heating. There is a much more serious issue with air pollution from wood boilers, which is still not fully resolved (this guide does not recommend these for this reason). For information on pollution impacts of wood stoves in Vermont, see the Agency of Natural Resources website at: http://www.anr.state.vt.us/air/htm/woodfacts.htm.

How much additional biomass can be sustainably harvested in Vermont?

Quite a lot: A 2010 report by the **Biomass Energy Resource Center (BERC)**[1] estimates that there is roughly **one million tons per year** of "Net Available Low-grade Growth (NALG) wood" available in Vermont. This would be enough to heat over 200,000 homes in Vermont. (Today, as mentioned above, only 10% of homes in Vermont are presently heated by wood – most are heated with heating one and propane). NALG wood is wood that would be appropriate for use as biomass fuel above and beyond current levels of harvesting. To determine this, the report states that "the total forestland area was filtered using GIS data and software to remove inaccessible and ecologically sensitive areas of forestland that would not be harvested. Forest inventory and composition data were applied to this filtered forested footprint and averaged rates of forest growth were applied to the portion of the inventory deemed low-grade. Averaged current demand for low-grade wood was subtracted from this growth, giving the amount of NALG wood.

[1] Vermont Wood Fuel Supply Study: 2010 Update: http://www.biomasscenter.org/images/stories/VTWFSSUpdate2010_.pdf

Step 1: Determine if a wood stove is the right form of wood heat for you

There are many ways to heat homes and businesses with wood today – wood stoves are only one way. But according to woodheat.org, "Surveys show that between 60 and 80 percent of householders who heat at least partly with wood do so with a wood stove. That is because wood stoves are usually the least expensive, most flexible and most efficient way to heat a house. This is not to say that the other options are bad, but they tend to be used for specific purposes, like installing a central furnace to heat a large, rambling house, or a wood-fired boiler to heat a radiant floor, or an outdoor boiler to heat more than one building."

Wood stoves directly heat the space they are in. They are not generally an effective means to heat a large, badly insulated structure completely. As woodheat.org says "If your house is divided up into small rooms you will probably not be able to heat it entirely with a single space heater. A stove too large for the room it is in will overheat the space quickly".

Wood stoves should therefore be placed in the room where people actually spend most of their time, and not for example, in a basement, unless people really spend time there. Although heat will diffuse from a basement (particularly a finished basement), this process is slow, and will deprive occupants of the pleasure of experiencing the radiant field of the stove directly. Wood stoves can also not be located in spaces where combustible fuels are stored, such as garages.

Fireplaces versus wood stoves

Traditional masonry fireplaces are quite inefficient – often less than 15%. Without diligent use of a damper and/or a door, they can actually be energy negative on the whole. Wood stoves and pellet stoves are much more sensible options.

If you do use a fireplace, a glass or metal door that can completely cover the fireplace opening is recommended. Unlike a damper, a door can be closed as soon as the fire dies down to prevent a large loss of inside warm air up the chimney.

Most wood stoves today have glass windows, often substantial inside, so that the fire can easily be scene. Some stoves are also specifically designed to operate with the doors open, which can enhance the fire viewing experience.

Fireplace inserts versus free-standing wood stoves

These are wood stoves that can be built into or partly into a fireplace. They can improve the efficiency of a fireplace, although generally as not as much as a free-standing wood stove.

A wood stove can also be installed in front of the fireplace, and utilize the existing chimney (with a liner inserted) as the exhaust. Wood stoves can also be installed without a fireplace of course.

Wood stoves versus pellet stoves

Pellet stoves have some definite advantages over wood stoves: Very steady, predictable burn rate, easy operation, commercial supply of fuel, less demanding installation requirements, etc. They also have some disadvantages: Less aesthetically pleasing fire, dependence on a commercial, manufactured fuel

source (which has pros and cons), use of plastic bags, and not insignificant electricity use (and also dependence on the very presence of electricity). All in all, both wood stoves and pellet stoves are good home heating options, and the advantages and disadvantages should be carefully weighed first. Outdoor pellet boilers are also subject to strict emission and installation regulations in Vermont. If you are considering a pellet stove, see the separate guide on pellet stoves in this series.

Wood boilers versus wood stoves

Outside wood boilers are certainly attractive in some ways for those with boiler fed hydronic (water-based) heating systems. But these boilers tend to be intrinsically smoky, especially the earlier models, or if these are fired with green wood. If you do choose a wood boiler, definitely choose only an EPA listed model: See http://www.epa.gov/burnwise/owhhlist.html. Vermont in fact has strict rules governing particulate emission rates and installation of wood fired boilers, including setback requirements, and may be banned by your town. See http://www.anr.state.vt.us/dec/air/owb/index.html.

Step 2: Choose a wood stove

Summary

- Know your stove types and basic installation issues
- Decide (think carefully) about what you want your stove to do for you.
    - Which rooms, and how many square feet precisely should it be able to heat?
    - Where should it be located?
    - What color should the stove be?
    - Do you want to operate the stove with the doors open?
    - Do you want a large (strong) radiant field, or less of a radiant field but smaller clearances to combustible surfaces around the stove?
    - Do you like technology? Or do you want the simplest operation possible?
    - Do you care about maximizing efficiency to the greatest possible degree?
- Think about how much you want to spend. Keep in mind that modern, higher end stoves are not cheap, but they also use much less wood, which also requires much less loading on your part.
- Determine your heating needs as well as reasonably possible, so you can properly size your stove. An energy audit is highly recommended. You may want to pursue thermal energy efficiency improvements first.
- Investigate your chimney and hearth, if relevant, and other possible locations in your building. Have a chimney professional check your chimney. Take photos of your chimney and hearth, and other possible locations for the stove, along to the stove shop.
- Choose a stove and heat protection strategy that will fit properly in an appropriate location in your home or business.
- Purchase an EPA listed stove: Avoid unlisted stoves and old style stoves.

Air pollution and stove efficiency

Air pollution and stove efficiency are closely linked. The best way to minimize air pollution, and also maximize your return on investment by choosing a stove that produces an efficient and long burn, is to purchase a highly efficient, clean burning "modern" stove, and to operate it properly.

Older stoves such as Franklin fireplaces, potbellied stoves, older non-air-tight stoves, and even older air-tight stoves, although they may be aesthetically appealing or nostalgic, or simply cheaper, should be avoided. All of these are highly inefficient, closer in most cases to fireplaces than to modern woodstoves. Woodheat.org estimates new stoves are one third (~33%) more efficient than these older style stoves. Specifically, EPA listed stoves have efficiencies ranging from 60-80% while older stoves range from 40-65%. The Hearth, Patio, and Barbecue Association has developed a fuel efficiency calculator to show how various cleaner-burning stoves can save money: http://www.hpba.org/fuel-efficiency-calculator/fuel-efficiency-calculator/?searchterm=calculator

Older "air-tight" stoves might sound like a good idea, for example, and can produce long burns, but usually not clean burns, whereas older non-air-tight stoves burn more cleanly but are faster burning. And both types have relatively low efficiencies.

Modern stoves have other advantages as well: For example, most modern stoves have an "air wash" system to keep the glass window clean. And much less (~90%) smoke means much less creosote build-up in the chimney as well.
See more information about stove efficiency and air pollution below in the section on stove types.

Cost and payback time of wood stoves

Wood stoves tend to have prices in the range of $800 - $3,000. Installation can vary from several hundred to several thousand dollars, depending on the installation details. Even the more expensive stoves can pay themselves back quickly. For example, suppose the total cost an installation costs $5000. This investment will be fully paid back in four years if the stove saves $1500/year, which is a reasonable estimate for a stove which provides the majority if not the totality of heat to a home during the winter.

Types of woodstoves

There are two basic categories of modern stoves: Catalytic, and non-catalytic. Most stoves on the market are non-catalytic. These emit somewhat more than catalytic stoves but are still fairly clean.

In catalytic stoves the exhaust is passed through a honeycomb-like ceramic that is coated with a catalyst, typically palladium or platinum. The catalyst lowers the temperature of ignition of the smoke, so unburned particles in the smoke ignite and burn. The catalyst can last from about two to six years, depending on usage (burning non-wood materials in these stoves will degrade the catalyst more quickly). Overall, catalytic stoves generally offer a long, clean, burn, with proper maintenance.

Catalytic stoves come with a "bypass damper", which when open allows the exhaust to initially bypass the catalyst combustor while the stove is being started. When the temperature reaches a high level, the user closes the damper, forcing the exhaust through the catalyst. This of course requires more involvement by the user than a non-catalytic stove.

Non-catalytic stoves achieve clean burns using a combination of strategic firebox insulation, a large "baffle" of some kind to produce a longer and a hotter gas flow path, and a system to introduce pre-heated combustion air. The latter is usually introduced through small holes above the firebox to provide

a widely dispersed air flow to the proper locations in the firebox. The baffle and other internal parts of non-catalytic stoves will need replacement from time to time as they slowly deteriorate with the high heat of efficient combustion. Non-catalytic stoves are also usually somewhat easier to operate (no bypass damper), and typically result in a slightly more active and brighter fire that many people like with a somewhat shorter burn than catalytic stoves.

In general "EPA-approved Phase II stoves", which include all wood stoves retailed after 1990, burn more efficiently and completely than most older stoves, and are recommended generally. EPA's page on wood stoves can be found at: http://www.epa.gov/burnwise/woodstoves.html. Older uncertified stoves release 15-30 grams of smoke per hour, while newer EPA-certified stoves must produce less than 7.5 grams per hour, and typically produce only 2 to 7 grams of smoke per hour. Manufacturer's have continued to improve their stoves, and many newer stoves even have emission ratings under 4 grams per hour range, with some as low as 1 gram/hour.

EPA certification labels can be found on all new stoves (a temporary label on the front, a permanent metal label on the back). These labels generally provide:

- Clearance and installation information
- Smoke emission rate
- The efficiency of the stove
- The rated heat output rate

A list of EPA certified stoves can be found at: http://www.epa.gov/Compliance/resources/publications/monitoring/caa/woodstoves/certifiedwood.pdf. These stoves emit less than 7.5 grams per hour for noncatalytic wood stoves and 4.1 grams per hour for catalytic wood stoves.

Modern wood stoves also be classified with respect to the way in which the deliver heat: Circulating and Radiant stoves. Circulating stoves have external panels which are designed to increase air circulation around the stove. Fans can often be added to these stoves to help circulate air by the stove. The circulation results in lower surface temperatures on the stove relative to radiant stoves, and generally smaller clearances to combustible materials.

Radiant stoves look more like older wood stoves, which some people prefer, because they lack the external panels that circulating stoves have, and they l deliver heat primarily by infrared radiation, which results in a hotter surface temperature and hence larger clearances. If you prefer small clearances, a circulating stove may be best, and if you prefer a long-range radiant effect and can accommodate the larger clearances.

Sizing a wood stove

It is important to choose a stove with an appropriate level of heat output. Oversized stoves tend to get shut down pre-maturely, which can lead to creosote and moisture buildup. Creosote buildup can restrict the exhaust flow, degrade the exhaust pipe or liner (creosote is acidic), and create a chimney fire hazard. Many new homes today are so efficient that even a small, high quality woodstove can heat much or all of the structure. The specifications for a given stove, such as to be found in the owner's manual, often gives an estimated square footage the stove will heat. This estimate should be increased substantially if your building is super-insulated. Many heating professionals can estimate the heat load from heating bills and/or through an energy audit of your building. An **energy audit** can also provide a

great deal of other useful information for improving the thermal efficiency of your building, including information such as the actual air leakage rate, and probably should be conducted any way prior to installing a wood stove.

Which stove you choose will not only depend on the level of heat output required, but also very precisely on where you plan to locate the stove. Wood stoves must be installed according to very specific rules, and these can strongly impact where in a building a stove can be installed. For example, stoves must have floor protection extending out certain distances, and be certain distances (clearances) from combustible materials in the walls. There are four things that determine the clearances you will need:

- The model stove you choose
- Whether or not you utilize "stove shields", which are extra panels added to the stove itself, and/or double-walled stove pipe (chimney connectors) and/or wall protection, which are metal plates affixed 1" from the wall or other listed wall protection materials.
- The location of the stove, for example, whether it's in a corner, or in front of a hearth, etc.

These issues are discussed further below in the section on installing a wood stove.

The **owner's manuals** for newer stoves can usually be found online, and are gold mines of information: The manuals are generally extensive, covering many different installation situations. They can be particularly useful for determining quickly whether a given stove can be accommodated properly in a given location. Discussing these questions with a knowledgeable dealer and/or installer is also recommended.

Use of an existing chimney with a woodstove or fireplace insert

If you have an existing fireplace, you may want to purchase a **fireplace insert**, which is a wood stove that is installed partway or all the way in the fireplace. Note that these are generally not as efficient as free-standing stoves, and that free-standing stoves can often be installed in front of an existing hearth. In any case, before choosing this type of system you need to make absolutely sure that the existing chimney is compatible with such an insert. Here is list of things you will likely need to know about the chimney and hearth:

- Dimensions of the hearth: Length, width, etc. Make a detailed diagram and label it.
- If the stove pipe will connect through an existing hole in an existing chimney, the diameter of the hole (called the "thimble").
- Height of the thimble from the floor (and/or the hearth, if it's over a hearth).
- If the thimble is near a corner, the distance from the corner to the thimble's center.
- Width and depth of the flue.
- Whatever else is connected to that chimney (water heater, furnace, etc).
- Locations of combustible materials, including furniture, so that the distances to them can be easily determined for various possible installation configurations.

Where to purchase a wood stove

Some sources of lists of wood stove dealers can be found at:

- http://www.stovedealersusa.com/
- http://www.anr.state.vt.us/air/docs/ParticipatingRetailers042409.pdf
- http://hearth.com/shops.html

Some Vermont manufacturers of wood stoves are:

- Hearth Stone Stoves: http://www.hearthstonestoves.com
- Vermont Castings: http://www.vermontcastings.com
- Vermont Iron Stone: http://www.vermontironstove.com/about.html

Financial incentives for wood stoves

Federal Tax Credit: The Federal Government currently offers a 10% consumer tax credit, (up to $300) on the purchase of a 75% efficient biomass burning stove. This legislation is retroactive to any eligible stove purchased since January 1, 2009. The credit is available through 2011. Note that this is a credit, not a deduction, so that the entire eligible amount is credited to your tax bill.

Also note that there are state and community programs that can help pay for firewood. See the section below on obtaining firewood.

Step 3: Install your wood stove

Summary

- Follow all applicable building and fire codes
- Follow the specific directions for your stove, if available, or rules for unlisted stoves, if not.
- Hire or at least consult with a qualified, vetted, professional
- Inform your insurance company
- Install the chimney so that it exits the structure at the highest possible point

Wood stoves must be installed according to the **Vermont Fire & Building Safety Code**, any applicable local building codes, and more specifically, in accordance with the ***particular instructions provided with the stove you have purchased***, if you've purchased a new stove. For example, the clearance (the minimum distances) for the stove from combustible materials are ***stove specific,*** and for newer stoves are often much smaller than the clearances that must be used for an older "unlisted" stove.

As mentioned in the section above on purchasing a wood stove, the **owner's manuals** for newer stoves can usually be found online, and are gold mines of information. They generally cover many different installation situations in detail.

Also, unless you are an expert, a professional installer should be used, or at least consulted, even if you have the manual for your stove, if only because detailed information on your particular state code is not easily available (generally only professionals have the guidebooks), and also to simply avoid beginner's mistakes. Wood stoves are particularly dangerous if not installed properly! **It is recommended that you hire or consult with a professional installer certified by the Wood Heat Education and Research Foundation (WHERF) or the Wood Energy Technical Training (WETT). You should also check references carefully.**

One way to find a qualified installer is by contacting professional associations or guilds such as the Masonry Heater Association (http://mha-net.org/html/links.htm) or the National Chimney Sweep Guild (http://www.ncsg.org/comm/state-guilds.htm).
For any unresolved installation issues that might arise, one should consult with the National Fire Protection Association's publication ANSI/NFPA 211 Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances.

You should inform your **insurance company** ahead of time of your intentions if your home is insured. They may have requirements which are more stringent than either the state or the manufacturer of the stove.

Finally, you should also check with local authorities to determine if any special permitting or installation requirements apply.

Some of the basic installation criteria are as follows. This information is not intended as a design guide, but only to convey an idea of what is involved.

The Chimney and the Chimney Connector:

A woodstove must have a chimney and "chimney connector" capable of removing all the exhaust gases. The chimney is the stove pipe that connects the stove to the chimney (which most people consider part of the "whole chimney"). This means the chimney and connector must have sufficient diameter and combined height so as to achieve adequate draw. The minimum height needed will actually depend on altitude: Higher altitudes require larger heights. Chimney manufacturer's product specifications and the owner's manual for some stoves give a recommended chimney height and/or a graph showing height versus altitude.

Chimneys should also exit the structure at the highest possible point: This is helps prevent the "stack effect" of air inside the structure from causing back drafts.

Chimneys should ideally extend high enough to minimize wind turbulence effects: For example, it is better to have a chimney exit at the roof peak, and not down further if possible. This is compatible with placing the stove towards the center of the building.

A key fact to know is that regular black stove pipe cannot be used to penetrate ceilings, roofs, walls, or windows: A properly constructed masonry chimney or a UL approved Stainless Steel Class "A" Insulated Chimney Piping must be used for those portions of the chimney. With these components, however, chimneys can penetrate the ceiling and the roof, or can come out the side and go up along the structure, depending on which approach bests suits your situation. In the US, chimneys must extend a minimum of 3 feet above the roof surface and 2 feet higher than any part of the building within 10 feet.

It should be noted that masonry chimneys are somewhat trickier to construct, and few in practice are actually built completely properly. Many are oversized, un-insulated, lack room for expansion of tiles or liners, or lack proper clearances from combustible materials. Utilizing an existing metal lined chimney can also often be problematic or impossible, as only a few inserts are tested for use in these fireplaces.

Stove piping, which runs from the stove to the insulated sections, can be either of single or double walled ("close clearance") type. Double walled piping with insulation in between can also be obtained. Don't confuse double-walled stove pipe with the Stainless Steel Class "A" Insulated Chimney Piping mentioned above: Double-walled piping also cannot penetrate ceilings, roofs, walls, and windows, but can only be used for chimney connectors. Segments of stove piping should be secured with screws and sealed with black furnace cement. Stove piping with a gauge larger (thinner) than gauge 24 is not recommended. Gauge 22 is a widely available higher quality pipe, which often comes pre-welded.

Stovepipe clearances: Without additional protection, single wall piping must be at least 18" from combustible materials in the US. With a masonry wall, or with sheet metal spaced 1 inch out from the combustible wall, the distance can be shortened to 9 inches for single wall piping. Double walled piping, which has a stainless steel liner and an insulating air space, can be as close as 6".

Floor Protection

All woodstoves need to have a non-combustible base of some kind underneath. This can be:

- A concrete slab, bare or surfaced with tile or brick
- UL Approved Stove Boards or Mats
- Ceramic Tile, Marble or Slate installed on top of UL Listed cement underlayment board, such as "dura-rock" and "wonderboard".

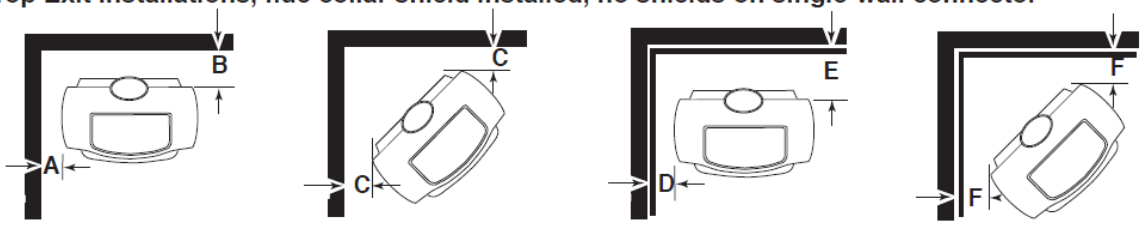
According to the National Fire Protection Code, floor protection for *unlisted* stoves shall extend to at least 18" from all sides of the stove. Floor protection clearances for listed stoves are stove specific, but may be substantially less, such as 6" on the sides and back, and 16" in front.

Wall and Furniture Clearances: For unlisted stoves, without additional protection from either raised sheet metal surfaces or protective masonry surfaces, the clearance around the stove to combustible walls should be at least 36", and 48" to any furniture. With protection, the minimum distance to walls can be generally lowered to 18". In addition, the floor protection should extend underneath the horizontal run of the stovepipe.

The following figures show some of the clearance information for a Vermont Casting's "Intrepid II" stove, which is a catalytic, radiant type wood stove. Note how the clearances decrease substantially when moving horizontally across to the right from unprotected to protective surfaces, or downwards from no stove heat shields to heat shields or to double walled chimney connectors.

	Unprotected Surfaces			Protected Surfaces		
	Stove Clearance					
	Stove Installed Parallel to Wall		Stove in Corner	Stove Installed Parallel to Wall		Stove in Corner
	Side	Rear	Corners	Side	Rear	Corners
No stove heat shields	(A) 24" (610 mm)	(B) 30" (762 mm)	(C) 20" (508 mm)	(D) 12" (305 mm)	(E) 16" (406 mm)	(F) 10" (254 mm)
Top exit, rear stove h.s., single-wall chimney connector with connector heat shields[1,2]	(G) 24" (610 mm)	(H) 16" (406 mm)	(I) 12" (305 mm)	(J) 12" (305 mm)	(K) 9" (229 mm)	(L) 10" (254 mm)
Rear exit, rear stove heat shield[3]	(M) 24" (610 mm)	(N) 14" (356 mm)	n/a	(P) 12" (305 mm)	(Q) 9" (229 mm)	n/a
Top exit, rear stove h.s., double-wall chimney connector[5]	(G) 24" (610 mm)	(H) 16" 406 mm)	(I) 12" (305 mm)		*	

Unprotected Surfaces		Protected Surfaces	
Stove Installed Parallel to Wall	Stove in Corner	Stove Installed Parallel to Wall	Stove in Corner
Top Exit Installations, flue collar shield installed, no shields on single-wall connector			



The next figure shows the sizing requirements if wall protection is used for an Intrepid II in “parallel” orientation in a corner.

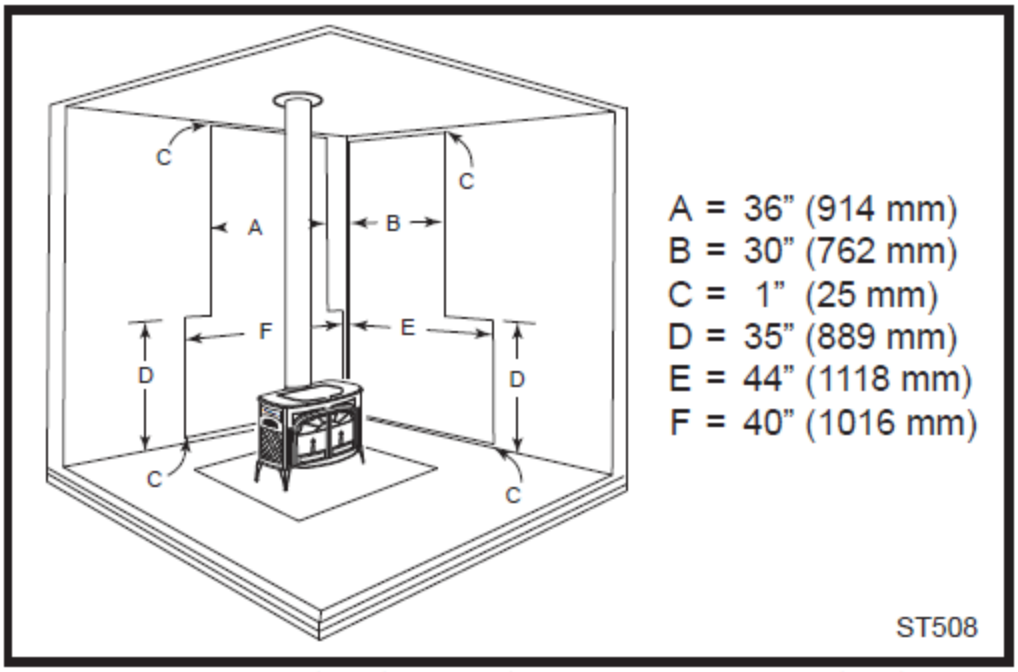


Fig. 21 Parallel installation, vertical chimney connector, two wall shields. Reduced clearances for both rear and side walls. Wall shields may meet at corner if desired. Shielding for connector is centered behind connector.

Air Supply

Many homes today have air leakage rates which are a sufficiently low to require that a woodstove be supplied with an outside air connection. Many stoves today have built-in air connection points, and codes in some areas require this. Even in a leaky home, it pays to have an outside air connection run directly to a stove: This prevents the stove from lowering the pressure in the home, and causing cold air to seep in more quickly through cracks and other openings, and thus will make the home more comfortable. If an outside air connection is not possible, and if the home is tight, then a window close to the stove should be opened slightly when the stove is in use.

Step 4: Obtain Firewood

Financial Assistance for purchasing firewood:

The State of Vermont and various community programs in Vermont can help pay for firewood for qualifying residents. For example, see http://dcf.vermont.gov/esd/fuel_assistance. You may be eligible if your gross household income is equal to or less than 185% of the federal poverty level, based on household size — regardless of the resources (e.g., savings, retirement accounts, or property) that you own. See the following link for the specific guidelines:

http://dcf.vermont.gov/sites/dcf/files/pdf/esd/fuel/INCOME_GUIDELINES_10-11.pdf

Sources of Firewood

Sources of firewood can be located from:

- Your local newspapers classified ads.
- Bulletin boards in grocery stores, churches, post office's, restaurants, etc. Bulletin boards.
- Signs posted around the neighborhood.
- Your neighbors

Firewood Terminology

Firewood is often sold by the **cord**, or some fraction of a cord. A cord has a well defined demensions: The dimensions of a "**standard cord**" is stacked wood pile that is 8 feet long, 4 feet wide and 4 feet high. A "**face cord**", also sometimes called a "**rick**" is 8 feet long and 4 feet tall but only as wide as one stack of wood. This is usually about half the size of a cord or less. Note that the width is up to the seller to decide (and for you to agree to).

A "**truck load**" is not a well defined measure, and depends on both the truck and whether the wood is stacked or thrown into the truck.

Orders for firewood should be placed well ahead of the heating season. Wood purchased during the peak periods tends to be more expensive, and firewood needs to be seasoned, that is, dried.

Storing and Seasoning Firewood

It is not advisable to store more than a day's supply of firewood in a building, due to insects, or to stack firewood against your building. Firewood should also be covered and supported above the ground (see below).

Firewood should be "seasoned" prior to use. Firewood is seasoned properly when the moisture content of the wood decreases to a moisture content of about 20% to 25%. Green wood is usually anywhere from about 35% to 70%.

Wood is usually seasoned by stacking it outdoors in a dry, sunny, spot with good air circulation for at least about six months. It should not be seasoned for more than about two years, as it will become two dry, which will cause it to burn too fast, reducing the efficiency of and more quickly degrading the stove. The pile should be covered, and also removed from contact with the ground by a supporting base such

as wood planks, pallets, cement blocks, etc, which assists drying and reduces insect infestations and dirt. Seasoned wood has a higher “heating value” than green wood, because less energy is lost to vaporizing water. Seasoned wood can weigh as little as 50% of its original unseasoned “green weight”.

Hard woods are recommended, though a mixture of hard and soft woods can also be used. Soft woods tend to ignite more easily, and can therefore be convenient for starting stoves, while hardwoods yield more energy per volume and produce longer lasting coals. Hard woods also burn more efficiently, in part because soft woods tend to become dryer with seasoning, and so burn very quickly, so quickly that they outstrip the air supply.

Step 5: Operate your wood stove properly

Read your stove’s owner manual carefully, especially sections on maintenance.

Keep in mind that wood stoves operate most efficiently when not overly loaded, so that the fire can receive an adequate supply of air (oxygen). Overheating a wood stove will also degrade components such as baffles and catalysts more quickly.

Also do NOT occasionally over-fire your stove to “clean out your flue”. Although this might remove some creosote, this will create an extreme fire hazard and very likely damage your stove.

Don’t forget to close the bypass damper after high temperatures are reached if you have a catalytic stove. Also don’t forget to replace the catalyst and/or other parts when needed. One sign of a worn out catalyst is a lot more smoke coming out the chimney (a well functioning modern stove produces little or no smoke).

Do not burn wood chips and wood from pallets or similar sources except as kindling. These will tend to burn too quickly, leading to effects such as “back-puffing”.

Avoid long, low burns: Burning long may seem convenient, but tends to be inefficient (less heat per lb of firewood) due to inadequate air flow. One way to check for an overly slow burn is to check to see if substantial smoke is exiting the chimney.

Clean out the stove every spring, including the baffles occasionally. Don’t use a vacuum cleaner – the filters are not fine enough – unless it’s a specially made vacuum for stoves (such an accessory exists). Inspect the inside of the stove carefully with a flashlight. Look for signs of damage. Some people spray some oil on the inner surfaces in Spring to reduce rusting through the humid months.

Observe your stove’s operation carefully. If it doesn’t seem to be working properly, it probably isn’t. Replace door gaskets, baffles, and other components when needed. Both baffles and door gaskets are crucial for a stove’s performance. If closing the doors on a dollar bill when the stove is cold doesn’t grip the bill well, the gasket’s need replacing.

Having your chimney checked regularly, as often as once a year if necessary, and cleaned when needed.

Resources

- Biomass Energy Resource Center (BERC): www.biomasscenter.org
- http://www.chimneys.com/
- http://www.hearth.com/
- http://www.woodheat.org/
- http://www.wiseheat.com/
- http://www.anr.state.vt.us/air/docs/Certified%20Chimney%20Sweepsdoc.pdf