

Cut, split and stack the wood in the early spring and let it stand in the sun and wind all summer.



The Wood Heat Organization:  
Answers to your questions  
about burning wood for heat  
and enjoyment.

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## How to prepare your firewood supply

Burning wet wood is one of the two top barriers to pleasurable, efficient woodburning (the other is bad [chimneys](#)). Your wood heater can only operate with high efficiency and low emissions if your fuel wood has about the right moisture content. Properly seasoned firewood has moisture content of less than 20 per cent and is a pleasure to use.

The symptoms of poor performance related to wet firewood include:

- difficulty getting a fire going and keeping it burning well,
- smoky fires with little flame,
- dirty glass,
- rapid creosote buildup in the chimney,
- low heat output,
- the smell of smoke in the house,
- short burn times,
- excessive fuel consumption and
- blue-gray smoke from the chimney.

In short, trying to burn wet wood is annoying and wasteful. Many of these problems can be eliminated by burning properly seasoned firewood.

Seasoning wood is not just a matter of cutting your wood and throwing it into a pile. Dry wood is the result of specific actions you take. A commercial wood supplier may claim to have wood "cut last summer", or "two years old" and so on, but, if the wood has been heaped in a field or just recently split, it will prevent your heater from performing to its potential. This is particularly true of modern EPA certified stoves which perform extremely well when given the right fuel.

Properly seasoned wood has another important but less obvious benefit. If you cut and pile firewood right away, molds will not have time to grow. Mold, if it allowed to develop, will escape into your home's environment when you bring the wood inside. Mold is an undesirable (although almost inevitable) component in modern homes and comes from many sources in addition to firewood, but minimizing its growth and circulation improves comfort and reduces allergic reactions. Stacking and air drying firewood before mold has a chance to grow is a good plan.

To help you achieve a great fuel supply, here are five simple guidelines to follow:

## **1. Cut the wood to length**

The wood you have purchased or cut yourself should be the right length for your stove, fireplace or furnace. This is usually about three inches shorter than the firebox width or length, depending on how you load the wood. In general it is better to have wood a little shorter than perfect rather than longer, first because it is no fun trying to jam too-long pieces into the stove in January and second because shorter pieces are easier to handle and quicker to dry.

## **2. Split it to the right size**

Next, split the wood to the proper size for your burner. For most efficient wood stoves, this is usually no more than six inches measured at the largest cross sectional dimension. Furnaces can use wood that is slightly larger in cross section. Even for furnaces, though, big unsplit pieces make lousy firewood. A range of piece sizes is best so that when kindling a fire or reloading on a coal bed you have some smallish pieces that will help you achieve the desirable instant ignition. A selection of sizes from three to six inches in diameter for wood stoves and an inch or so larger for furnaces will probably serve you well.

Keep in mind that firewood only begins to dry seriously once it is cut and split to the right size because in log form the moisture is held in by the bark. So, when buying wood, ask when the wood was cut split and properly stacked to get an idea of how ready it is for burning. For this reason, experienced woodburners like to get their wood in the early spring so they can manage the drying process themselves.

## **3. Pile in a single row exposed to the sun and wind.**

If wood is to be below 20% moisture content when you burn it in the winter, it must have the moisture removed. The only practical way homeowners can do this is to allow the sun and wind to dry the wood for them.

With this in mind, the wood should be piled in a place where the sun can warm it and the wind can blow through it. As the sun heats and evaporates the water from the wood pile the wind whisks it away. Here is a picture of my wood pile up against the back fence curving over the hill with plenty of exposure to the prevailing winds.



I pile my wood in a single row about four feet high. It extends about 100 feet long and contains the four cords I usually like to have for the winter. Here's how I figure it:

- 1 cord is four feet wide, four feet high and eight feet long.
- 1 of my 'face' cords (or stove cord) is 16 inches wide.
- 3 of my face cords equals one full cord.
- 3 of my face cords is a pile four feet high and 24 feet long.
- 4 full cords, or 12 face cords is a pile 96 feet long.

I usually use a little over three cords per year so that I have a bit left over, just in case.

If you don't have enough space to dry your wood along a fence row, you may be tempted to stack a few rows together, but be sure to give some space between rows for the sun and wind to penetrate the stacks. This photo shows some very nice rows but they are stacked a little too close together for good exposure to wind and sun.



Here is a more detailed discussion of [firewood stacking technique](#).

#### **4. Let the wood dry at least six months**

Most folks who split their wood and stack it in well-spaced rows find that they can dry their wood in about six months. If you have your wood stacked in early spring it should be ready to put away for winter's use by October. However, it may need longer than that if you live in a damp maritime climate and/or use very dense wood like oak, which is notorious for taking a long time to dry. If you burn hardwood, it is wise to process or buy it in the fall for use the following fall. That way you'll be sure of having properly seasoned wood.



A wood moisture meter. Ideal moisture is 15 to 20%.

#### **5. To cover or not?**

Some people like to cover the drying wood pile. I do not. I'm basically a lazy guy and putting old steel roofing, plastic sheets or tarps over the pile means that I would have to chase them when the wind blew them off.

The theory behind covering the wood is that it will dry faster because rain will not soak the pieces as they dry. My experience is that the wood is dry enough by the time I want to bring it to my wood shed. Of course I may have to delay my wood shed filling if my dry wood gets rained on. I may have to wait a day or two after a rain to continue stocking my shed; it's a great excuse to put off a chore!

If it makes you feel better to cover your wood, do it. If not, just make sure you pile it in the shed after a couple of days of sun.

The most important rules for preparing good firewood are:

***Cut, split and stack the wood in the early spring and let it stand in the sun and wind all summer.***

Do that and you can't go wrong.

CW



To perform well, a chimney must be installed inside the heated part of the house, not out and up a wall outside.



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## All about chimneys

[How chimneys work](#)

[Selecting and Locating a Chimney](#)

A good primer on how to ensure good chimney performance

[How wind affects chimney performance](#)

**NEW**

Be amazed at the mysteries of wind pressure effects

[The evil outside chimney](#)

A fireside chat about chimneys for architects and builders.

[Advice on chimney liners](#)

### ***The chimney is the engine that drives a wood heat system***

No woodburning stove, fireplace or furnace can function properly without a good chimney. A good chimney is:

- the correct type for the appliance because there are a lot of options, some unsuitable;
- the correct size for the appliance, which is usually the size of the appliance outlet collar;
- properly located, meaning up through the heated space of the house; and
- properly installed following building code or manufacturer's instructions exactly.

A good chimney and system design produces desirable performance characteristics:

- Fires are easy to light and draft builds quickly
- Smoke does not fill the room when you try to light a fire
- No smoke spillage when you open the door to tend the fire
- No foul odors or cold air from the hearth when it is not in use

When planning a woodburning system, the first thing you need is reliable advice on matching the appliance to the right type and size of chimney. Most wood heat retailers and chimney sweeps can guide you and there may be government agencies and publications you could get locally. Also, unless you have done it before, we strongly recommend having your chimney professionally installed by someone whose references you have checked. You never want to lie awake at night wondering if an incompetent chimney installation is putting your house and family at risk.

***This is good wood stove performance:  
(hint: it's really the chimney that's doing the performing!)***

- When no fire is burning and you open the stove door, air flows into the

stove, not out.

- When you light a kindling fire, the smoke immediately flows up the chimney, not into the room.
- A properly built kindling fire burns bright and hot very quickly.
- When you open the stove door to add more wood, smoke does not spill out.
- If you are careful, you can run the stove so that you never smell wood smoke in the house.

## ***Understanding how chimneys work***

Think of the chimney as the engine that drives the wood heating system. Think of its fuel as heat. Think of the power it puts out as draft. The more fuel (heat) you give this engine (chimney), the more power (draft) it will deliver. So, the hotter the exhaust gases, the more draft is produced. Draft, by the way, is good. It's the suction that keeps the smoke from coming into the room. Insulation in the chimney is important because it helps to keep the exhaust hot until it is expelled outside, and so, increases draft.

The chimney works with the stove or fireplace in a kind of feedback loop. Heat in chimney makes draft, which pulls in more combustion air, which makes the fire burn hotter, which delivers more heat to the chimney which makes more draft and so on. An insulated chimney makes more draft with less heat.

In winter, a well-designed and properly installed chimney makes some draft and flows some air upwards, even when no fire is burning. When you build a fire in a stove connected to such a chimney, the kindling ignites easily, draft increases rapidly and you have a nice bright, hot fire right away—and no smoking. This is the kind of system you want in your house.

## ***Understanding how houses work***

When it is cold outside, the warm air inside the house wants to rise, producing a pressure difference: low pressure low in the house and high pressure high in the house. The pressure difference is called stack effect. The colder it is outside, the greater is the temperature difference, so the stronger is the stack effect. A chimney installed in the middle of a house naturally overcomes stack effect by being as warm, but taller than the house.

Houses are being built more tightly sealed for increased comfort and lower energy costs. This is done by using doors and windows with gaskets and walls with a continuous air barrier (usually plastic film). If you turned on a powerful

Observations on the Causes and Cure of Smoky Chimneys  
Benjamin Franklin  
1787

*“Many are apt to think that smoke is in its nature and of itself specifically lighter than air, and rises for the same reason that cork rises in water.”* But Franklin clarifies authoritatively, *“... smoke is really heavier than air; and that it is carried upwards only when attached to, or acted upon, by air*

*that is heated, and thereby rarefied and rendered specifically lighter than the air in its neighborhood.”*

range hood or downdraft kitchen exhaust in a relatively small, tightly sealed house, it might suck so much air out of the house that the pressure inside would fall enough to overcome chimney draft and suck the smoke out of the stove. It's not that common yet, but it can happen.

### **Typical problems and ways to avoid them**

1. Cold hearths and odors: when no fire is burning, cold air and/or odors seep from the stove.
  - The air in a chimney that runs up the outside of the house gets chilled, so the draft in the chimney is less than the stack effect of the house, and the chimney backdrafts, making the hearth cold and causing unpleasant odors
  - Install the chimney inside the building, keep it as warm and as tall as the building and it will make draft, even when no fire burns
2. Open door smoke spillage: when you go to reload, smoke rolls out the door.
  - When you open the stove door, a lot of dilution air must flow through the opening to keep the smoke inside; if the exhaust flow is restricted, smoke will roll out into the room
  - Go straight up, if possible; avoid 90 degree turns in the flue pipe and offsets in the chimney
3. Sluggish performance: smokey fire, hard to get a hot fire burning.
  - Large, cold chimneys, like old brick ones, suck up the heat from the exhaust, causing slow draft build up.
  - Size the flue to match the stove and use an insulated chimney to keep exhaust hot and moving quickly; never use an air-cooled chimney

### **Summary of design guidelines**

1. Put the chimney inside the warm building environment
2. Go straight up, no elbows or offsets
3. Insulation around the flue liner
4. Flue sized to match stove

### **A word about climate and altitude**

If you live in an area that has a real winter – the ground freezes and you get some

snow – or if you live at high altitude – say more than 4,000 feet – you'll need to follow these design guidelines exactly in order to get perfect performance. You people at low altitude with mild winters may not need to be quite so fussy, but, then again, good design always pays off in better performance.



Freestanding firewood stacks season better, but they fall over and the ends collapse if they are not piled carefully.



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## Some thoughts on stacking firewood

### ***Straight, stable, efficient rows***

Not being a professional firewood producer, I just blunder along on my own, learning by my mistakes, and there have been plenty of them. I've stacked wood piles that have fallen over just after they were completed. And I've had the ends of stacks collapse because they had been built with bad technique and wishful thinking. I'm getting better at it, though, and have enough confidence now to share some ideas and invite others to contribute theirs.

### **A solid base off the ground**

Firewood should be kept up off the ground for seasoning to promote drying and prevent mould growth. Because I cut and split my wood in the bush and stack it in an opening there, then move it to the house in fall, I have to use materials that are handy. So I use poles cut in the bush as rails on which to build my stacks. There are many smallish spruce trees where I cut my firewood and inevitably some have to be removed. I find a reasonably level spot and lay down two six inch diameter spruce poles that are about the same length. I say reasonably level because there is no perfectly flat ground in the rough and rocky area where I live. But I've found that reasonably level is good enough, especially when other techniques are used to compensate. I place the poles about 12 inches apart because I cut my firewood short, only 14 inches.

Just this morning we received an email on this very subject from Ken, one of our visitors. Here is what he had to say:

"I've found that a few used pallets make a good place to stack wood as a lot of drying is lost due to contact with moisture from the ground. I also treat the pallets and the ground area around them with a termite spray to fend off the little nasties migrating to my house. I only carry in enough for a day or two burn and I keep the area near my stove treated also for termites. You can always find a few pallets hanging out near stores and usually a quick question allows you to haul them off."

Seems like good advice, particularly if you stack your wood near the house to dry and you have a bug infestation problem. I don't seem to have much of a bug problem, so it must be a regional or climate issue.

### **Vertically straight stacks**

Freestanding firewood stacks need to have straight sides if they are to stay upright for the minimum of four months and maximum of two years needed for seasoning. The shorter the individual pieces, the narrower is the stack and the more wobbly it is likely to be. I like my wood short because it is easier to handle and split and it can be loaded into my stove in either direction and I like that flexibility. But short pieces make for unstable piles, which is why I need to take care to pile it fairly well.

Stacks are usually built from one side and I find that my piles begin to lean towards me as they rise. So I now check

the end of the pile and other side frequently as the pile gets higher to make sure it is not leaning. If it is, I adjust it by tapping the ends of pieces with the back of a splitting maul to push the pile vertical. The trick is not to leave straightening until the stack is more than waist high because it gets harder to straighten the higher it gets.

Also, most pieces of firewood are slightly bigger at one end than the other because of the grain direction, knots and other imperfections (especially in the junk wood I tend to burn). So, to keep the top of the pile level, I put the larger end of each piece on the low side of the stack. That way, the top of the pile is always nearly level.

### **A solution to falling piles**

Despite using good technique and taking care, freestanding stacks are still not very stable. So now I swallow my pride and wedge sticks against the piles to give them some stability and resistance to rocking in side winds. The sticks also compensate for movement over time caused by the settling of the rails into uneven ground.

Also, I've found that four feet seems to be the best height for a stack. Any higher and stability becomes a problem. Plus, by pacing off the length of the stacks a rough cord count can be made.



Narrow stacks built of short pieces are inherently unstable. Sticks wedged against the sides solves the problem. Note also that this stack has a crisscrossed end treatment.

### **Building vertical ends**

The mark of a good firewood piler is the way he or she treats the ends of the stacks. A common method is to crisscross the pieces in alternate layers to form a pillar at the end that is (theoretically) stable in both directions (photo above right).

To make this technique work, though, you have to be careful in selecting the pieces used and placing them deliberately. There is little point hurrying or being sloppy in using the crisscross technique because the end of the pile will fall out and much work will have been wasted.

The pieces used for the crisscross structure need to be straight grained with even sides and little or no taper. In the firewood I process, there aren't many of those, so I always have to pick through the rough pile to find them.

One criticism of the crisscross end treatment is that the ends are less densely packed than the core of the stack. If a firewood supplier piles the wood four feet high and eight feet long to form face cords or stove cords and uses the crisscross end treatment, the purchaser could complain of being shorted because of all the air space on the ends. Obviously this is of little consequence if you process your own wood.

Another option for end treatment is to use twine to tie every third or so piece on the end back into the pile. While this may seem fussy, it really doesn't take any more time than fussing with crisscrossed pieces and it does produce a

stack that is evenly dense.



A vertical end can be built by tying a piece in every third layer back into the pile. This produces a stable end with density equal to the rest of the stack.

Here is a finished four foot stack with tied end treatment.

But I think the quickest and most effective end treatment is to drive a stake into the ground and tie it back into the pile with twine (recycled hay binder twine is an excellent choice). I cut twine into six foot lengths and tie a loop in one end to make a slip knot. I put the loop around the stake and lay the rest of the twine on the pile with the other end looped around a piece. Once two or three firewood pieces are piled on the twine, the stake is held tightly to the pile for a perfect vertical end.



A post driven into the ground and tied into the pile makes a good end treatment.

Maybe there is no 'correct' way to stack firewood for seasoning, and I suppose there might be those who say all this attention to something so apparently simple suggests a lack of anything better to do. But I enjoy visiting my stacks in mid-summer to see how the drying is coming, and finding them still standing is always a pleasure.

If you have comments or suggestions on this subject, we'd be glad to hear from you.

JG

