

## Choosing the Right Firewood

### The Simple Answer

Always burn well-seasoned wood. The species makes a difference, but it is not as important as properly seasoned wood. Hardwood is preferable, but softwood is OK to burn also. Burning your appliance correctly is the first line of defense against chimney fire and the best way to enjoy the ambiance and heat from it.

### A More Complete Answer

When selecting firewood most folks are concerned with two things, how much heat they will get and how much creosote will result from burning that wood. Let's focus on the creosote first.

#### Creosote

When burning wood, it is undergoing a chemical reaction called pyrolysis. During this process some of the wood is being converted to gasses. In fact, the flames we see are nothing more than those gasses in a super-heated state. The problem is that not all those gasses are consumed during primary combustion. The unburnt gasses rise into the chimney where they cool and condense. Just like water droplet form on the surface of an icy glass of tea, the unburnt gasses form droplets on the sides of the flue. This is creosote. The creosote dries and becomes the powder we all know as soot. In the hearth industry we call this first stage creosote. Over time and through many cycles of heating, cooling and drying, the creosote will become granular, quite like salt crystal. This is called second stage creosote.

Along comes a time when the system gets quite hot, perhaps after many hours of burning like Super Bowl Sunday. The crystals of creosote melt and form a glaze. This glaze is called third stage creosote. Both first and second stage creosote is easily swept and removed from the system. Third stage, however, is not easily swept. It can be removed in only two ways; severe mechanical, or chemically. Severe mechanical methods run a risk of damaging the flue. Chemical treatments take time and require continued use of the system since they are heat activated. During treatment the risk of chimney fire continues to be present, albeit steadily reducing.

What influences the formation of creosote is **how** the wood is being burned. Pound for pound all species of wood produce about the same amount of creosote. Learning to build a good fire, adjusting how much wood you are burning at one time, and how seasoned the wood is the factors that influence how much creosote is produced.

#### Turbulence

The nature of your fire lay is important to good combustion. A neat, tightly stacked fire lay is the wrong idea. Keep the firewood loose and at all angles. This promotes turbulence which gets the oxygen mixing well with the fuel. As a side effect, those many angles spread the radiant energy we greatly desire.

#### Seasoning or Low Moisture Content

This makes choosing the right firewood is simple. The driving attribute is moisture content. If your firewood is properly seasoned it should have a moisture content of 15% to 20%. It is worthwhile to

obtain a moisture meter. The ways that moisture content is determined in the lab can also be done at home, but a meter makes the process very simple. Excessive moisture causes poor combustion. You waste energy boiling water so they can ignite when the wood isn't seasoned. Interestingly, wood that is too dry will also have poor combustion.

### Heat from Firewood

Let's move on to heat. Now we can be more concerned with species. Remembering that most of our heating appliances can deliver more heat than we realistically need, species may not make a huge difference. We can sense heat in three ways, conductive, convective, and radiant. If we were to hold the poker in the fire it would eventually conduct the heat to our hand. We generally do not want to experience conductive heat. The fire releases energy which is directly imparted to the air and flies up the flue. This convective energy is lost in open fireplaces. In certain appliances, however it is captured and delivered to the living space. All fireplaces and appliances yield infrared light. This radiant energy is what we enjoy when doing the human rotisserie! It is also the main way that energy is harvested for giving us heat.

Now there are three stages of combustion, ignition, pyrolysis, and charcoal. During ignition energy is actually consumed. During pyrolysis the ignition energy is used to start a chain reaction where the wood breaks down chemically yielding gasses. Those gasses are super-heated and emit light, we call them flames! Flames are where convective energy is released. Once the flames are gone, we are left with charcoal. Those redly glowing coals are where we get the radiant energy. We really want that charcoal to last.

### Softwood vs. Hardwood

There are basically two divisions of firewood: hardwood and softwood. Softwood burns quickly with a short charcoal stage. It makes us refuel our fire frequently. After a while we must attend to the children or sit down to dinner. Then we get tempted to put in a large charge of wood, so we have a little time away from the stove. The stove or fireplace then gets over fired producing a wild amount of heat. That excess heat ignites the creosote and then we are calling the fire company and leaving the house. The idea that softwoods have resin in them and therefor makes more creosote is a myth. That resin is another combustible material and burns the same as the wood does.

Hardwood, while having the same amount of BTUs per pound, burns very differently. It burns slower, giving us more control. Because of its density arising from having a great amount of lignins its charcoal holds together better. That yields a long charcoal stage. Which results in more radiant heat. In turn appliances like stoves can capture that radiant energy converting it to convective energy. Altogether, hardwood allows us to capture more heat for our homes.

If one is practicing good burning habits, using seasoned firewood only using moderate amounts of that wood and refueling as needed, and making sure the fire is loose with angles, then creosote production is minimized, and heat yield is maximized.

To learn more about BTU's download our Buyer's BTU Guide from our firewood page.