buyer's GUIDE

How to Purchase an OUTDOOR WOOD FURNACE

Hard facts that dealers don't want you to know

Outdoor wood furnaces are springing up everywhere. Each year there are more and more manufacturers, and each claims to have the best product available. But which one really is the best?

All outdoor wood furnaces work. There is no such thing as a cold fire. All outdoor wood furnaces produce heat and lots of it. However, all outdoor wood furnaces are not alike.

Outdoor wood furnaces are a major cost; even the "cheapies" are a significant investment. The key word here is investment. The key decision is whether to make an investment or merely a purchase. Before buying, consider performance, quality, safety and above all, longevity.

Check into the following BEFORE you make your investment:

- LENGTH OF CHIMNEY
- CHIMNEY LOCATION
- CHIMNEY CAPS
- FURNACE DOOR INSULATION
- DOOR ANTI-BLOWBACK CATCH
- TYPE OF DOOR GASKETS
- TYPE OF DOOR CONSTRUCTION
- SIZE OF DOOR
- INSULATED, CAST or WATER-JACKETED DOORS
- LEGS vs SKIRTING
- RUST CONTROL
- LONGEVITY OF STAINLESS STEEL
- ANTIFREEZE AS A RUST INHIBITOR
- FREEZE PREVENTION
- WEIGHT OF STEEL
- INSULATION TYPES
- WATER JACKET LOCATION
- OUTSIDE WATER JACKET
- SIZE OF WATER STORAGE
- HEATING CAPACITY
- EFFICIENCY
- FLOOR HEATING vs FORCED AIR or PASSIVE
- HOOKING INTO AN EXISTING PRESSURE SYSTEM
- TYPE OF WATER PIPE
- CREOSOTE
- DEPTH OF FIREBOX
- ASH REMOVAL
- SAFETY FEATURES
- COMPONENT REPLACEMENT
- WOOD CONSUMPTION
- WATER EXPANSION
- HOUSING
- DRAFT CONTROL–MANUAL, ELECTRIC, FORCED AIR
- STRENGTH
- CONTROLS
- TESTING

Things that you should examine before purchasing an outdoor furnace:

LENGTH OF CHIMNEY

If the furnace has an electric or manual damper, pipe length is important. In these furnaces a long chimney is needed to draw air over the fire in order to keep it burning. If the furnace has a forced air draft, then extra chimney length is a liability as it causes creosote.

CHIMNEY LOCATION

Furnaces with outside chimneys will have far more creosote than those that have chimneys going out the top. The answer is simple. Unburned gases when exiting into the chimney cool off, condense and form creosote. Outside chimneys run much cooler and may result in massive creosote buildup.

CHIMNEY CAPS

Most manufacturers don't supply chimney caps and yet they are needed. In the off season they are needed to keep out rain which could rust out the firebox. In season they are a good idea to prevent wayward sparks from exiting. There are some caps such as the clover leaf design that do all of the above but also prevent downdraft. Downdraft makes for a slower fire and causes creosote.

FURNACE DOOR INSULATION

The furnace door is the Achilles heal. It must be very well insulated to a minimum of 4". Some furnaces have an inner water jacketed door with a very thin outer door, others only have about 2" of insulation. Both of these doors will allow severe heat loss. Simply stated, this means more firewood is burned to get the heat you need. Look for a thick door of about 6" for best results. Watch out for hollow doors with little insulation.

DOOR ANTI-BLOWBACK CATCH

Does the door have an anti-blowback safety catch to avoid flash burns? This catch releases the door very slowly, allowing for the gases to escape which otherwise could result in severe burns. Don't consider a furnace without this feature.

TYPE OF DOOR GASKETS

The best doors are made from cast or mild steel and have a recessed lip around the outer edge. Inside this recess is a door gasket covered by a silicone seal. This resilient seal has a memory and each time the door is closed it forms an airtight seal. If the door gasket is not covered by a silicone seal it will become hard with creosote and eventually break down. Leaky doors cause creosote and runaway fires.

TYPE OF DOOR CONSTRUCTION

Doors need to be adjustable in four directions - in, out, up and down - to compensate for any warpage. However, if you don't have a silicone seal in the door recess then adjusting the door won't make any difference to stop air leaks. Water jacketed doors are more prone to corrosion and then there are the hoses that can leak. Double doors don't do anything unless both are well insulated. A single well- insulated, lockable

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door with an anti-blowback safety catch makes the best sense.

SIZE OF DOOR

The correct door is large and should run from 20" to 30" in each direction. The bottom of the door needs to be high off the ground to make for ease of filling; 30" is ideal. Lifting heavy logs into the firebox is not easy and small, low doors add to the problem.

INSULATED, CAST OR WATER-JACKETED DOORS

There are two reasons for wanting the best door available. The first is airtightness and the second is increased heating surface. Poorly designed insulated doors may warp and allow air to penetrate. Outdoor furnaces must be airtight or overheating and boiling result, which can wipe out poorly made stoves. The BTU's of a furnace are determined by the volume of water contact surface. Water-cooled doors, while more expensive, are the most efficient; however, they are extremely prone to corrosion. Broken hoses are also a problem. Water-jacketed doors must have at least 6" of insulation on the outside to be effective. Expensive cast iron doors with good insulation and door seals work well as does a well- designed and insulated steel door.

LEGS vs. SKIRTING

Neither one will affect the furnace performance; however, the models with legs have several advantages over the skirted-to-ground models. Some (not all) of the leg models can be lifted from underneath when loading and the legs are excellent for securing tie down.

When it comes to installing, leg models save on money and time since you can see the piping coming up from the ground when placing the furnace in position, and you do not require a full concrete base, only four sidewalk blocks. The skirting and frames on all furnaces, including stainless models, are made from mild steel and are subject to corrosion when sitting directly on the ground. On leg models you will be required to build a simple foam box around the pipes above ground level. Check to see that the sheeting underneath is a solid sheet and does not have large openings for critters to enter.

RUST CONTROL

If you don't take time to learn about rust control, it is not a question of if you will replace your outdoor furnace because of rust, but when. Prevention need not be expensive. The basic control needed is a well-designed steel or stainless steel furnace. If the furnace has many welded seams in the firebox, uses several steel thicknesses or has dead spots that prevent water from flowing all around the firebox, then corrosion may occur quickly. Anode rods work but only in the immediate vicinity of the rod. A single rod is useless and is a sales gimmick. The furnace would have to look like a porcupine to be completely protected by anode rods.

Furnaces with round water jackets such as the old time boilers have a longer life expectancy. One of the major causes of corrosion is ashes. Shop for a high heat model that reduces ashes. Cover the stove pipe in the off season and empty out the ashes. Statistics show that the area most prone to corrosion is the firebox and not the water jacket. Most of this corrosion is from the ashes.

LONGEVITY OF STAINLESS STEEL

Stainless steel may last longer than mild steel in an outdoor furnace, but not all stainless is a "forever" product. There are many grades and some of them are subject to rusting and corrosion. Automobile exhaust systems are made from one of the lower grades; they resist high temperatures but totally corrode. Most outdoor furnace manufacturers went to stainless steel to get in on the stainless quality image, but since it's expensive many of them went to a low-cost, cheap-grade stainless - which is still subject to rust and corrosion! During the manufacturing and welding process for stainless steel, if the proper quantity and blend of corrosion-resistant and stabilizing elements are used, then it does indeed become a "forever" product. These elements optimize weldability without the need for post-weld annealing to restore ductility, formability, toughness and corrosion resistance.

If you do purchase one of the lower grade stainless steel furnaces, be sure that the same model made in steel has a proven track record of corrosion resistance. The furnace design is every bit as important as the material that it's made from.

ANTIFREEZE AS A RUST INHIBITOR

Antifreeze is an excellent rust inhibitor but it does have a disadvantage. It is designed to keep engines cooler. When used in an outdoor furnace, it has been stated that it takes 18 percent more firewood to heat the system water/antifreeze mixture than to just heat water. However, if the furnace does not have built-in rust prevention features and complete water circulation, the unit may rust away. Water and steel hate each other; if you don't take this into consideration when choosing your furnace then you may have no choice but to use antifreeze or lose your investment.

Do not use regular automobile antifreeze. The best glycol additive is Dowfrost from the Dow Chemical company. It is environmentally friendly, allows higher operating temperatures, has excellent anti-corrosion features and has a longer life expectancy than other glycols.

FREEZE PREVENTION

Unscrupulous dealers will tell you that the sole purpose of antifreeze is to keep the furnace from freezing up. Not true; the main reason is rust prevention. Rust is the no/no word in the outdoor furnace business. There are several other alternatives to prevent freezing and at far less cost. When the fire goes out in an outdoor furnace the alternative heating system kicks in; the continuously moving water now picks up the heat from the house. This alone should prevent freezing. An in-line electric heater can be installed on the return line and set at just above the freezing mark as an extra safeguard.

New oil-fired water heaters are available that will protect your furnace when used as a backup. These units can also be used as total heat systems when the outdoor furnace is not in use. If, however, the system is going to be shut down then antifreeze is a must.

WEIGHT OF STEEL

The weight of the steel is very important in keeping the unit from warping or being damaged by heavy logs thrown into the firebox. On units with no rust prevention, built-in heavy plate takes longer to corrode. Don't be misled by the total weight of the unit – the location of heavy steel plate is important too, not just its total weight. Some unscrupulous manufacturers

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use heavy plate on the bottom and then very light on the sides and top to reduce cost.

Life expectancy of light steel plates is very short. Tapping on the plates will help you to determine, by sound, if the manufacturer is cutting corners - 1/4" plate is the minimum thickness recommended for fireboxes.

INSULATION TYPES

There are two basic types of insulation – glass and spray foam. Spray foam has a better R-value per inch; however, when subjected to great heat it tends to crystallize and break down. Furnaces sweat and foam insulation does not breathe. This makes a good formula for corrosion. The long term winner is regular fiberglass batting. The use of aluminum foil insulation with air bubbles has not proven up and should be looked upon as a liability. Definitely avoid this insulation.

WATER JACKET LOCATION

Some furnaces have water jackets not only on the sides and top but underneath the firebox as well. Heat only rises; it does not go down. However those with no circulation underneath are very prone to corrosion. A barrel design with a very small space at the bottom between barrels is an excellent design with little chance for corrosion. Avoid furnaces with ash-pans and no water under-neath, since the heat loss into the ground is tremendous.

OUTSIDE WATER JACKET

The outside water jacket is simply a container and structural strength is not usually a factor. Little corrosion occurs here. If it is made from high-grade stainless then it can be relatively thin. If it is made from low-grade stainless or mild steel the water jacket should be made from 3/16" material to give many years of service.

SIZE OF WATER STORAGE

On furnaces without forced air draft this is a major consider-ation. Heating of the water takes a long time and it is important that a steady supply is always present. Small tanks in units without forced air draft just don't hold enough hot water between burn cycles. Extra in-house storage tanks can be added. In forced air models the replacement of hot water is very quick and efficient.

Unburned wood in a forced air system will instantly produce heat when the draft fan kicks on. These systems are more efficient and burn less wood. However there still needs to be sufficient water around the firebox to reduce the number of burn cycles. Even on small furnaces having forced air systems the absolute minimum for efficiency is 125 gallons capacity, increasing to 300 gallons on large furnaces.

HEATING CAPACITY

The standard way to judge a heating appliance is to state the BTU's and match this against your needs. In outdoor furnaces this doesn't work very well. There are simply too many variables; green wood vs dry, hardwood vs softwood, filling variables, etc. Some manufacturers state an inflated BTU number based on the larger the lie, the higher the sales. If the manufacturer is stating BTU's then get a copy of the CSA test report to prove it. The most common way to rate a furnace is by the square foot heating capability based on an 8' ceiling. There are many variables: perimeter size, geographic location, insulation value, floor heat or forced air, exposure and heat demand.

The best consideration in buying is to cut the manufacturer's maximum square footage in half and then, if necessary, move up to the next model. Even if you don't need a larger unit there are benefits. On those cold January nights you won't have to go outside as often. Going away for a few days? Simply load the furnace to the maximum and reduce the thermostat setting. You can't do that with a small furnace.

EFFICIENCY

The drier the wood the more seasoned it is, and the more seasoned it is the more efficient the burn is; in other words, it produces more useful heat. Burning wet wood produces moisture, which in turn creates creosote in addition to rusting the firebox. But to select, split and season quality wood that will give you optimum burning efficiency takes time and money. There is a trade-off here that should be considered: purchase a furnace that will give you a choice of type and quality of wood to burn. That choice only comes with a forced air draft unit. A forced air draft furnace will burn almost any quality of wood – wet, green or dry. The amount of useful heat will vary with wood quality, but it will burn. A short chimney with the forced air draft will reduce the possibility of creosote.

FLOOR HEATING vs FORCED AIR or PASSIVE

The winner, without question, is floor heat - a more uniform heat with less consumption. The secret to success is to install a vapor barrier over the ground and cover with 2" foam insulation. Use _" pipe in runs no longer than 250' and space about 9" apart.

HOOKING INTO AN EXISTING PRESSURE SYSTEM

To hook into an existing high pressure system, the new furnace must be tested to high pressure standards and it must be rust-proof. Most outdoor furnaces are not. Outdoor furnaces will contaminate your existing water unit. If you want to tie into an existing pressure system use a large stainless steel water-to-water exchanger. Do not pressurize an outdoor furnace.

TYPES OF WATER PIPE

The choices are polybutylene or Kitec piping. Both cost about the same, however Kitec is far easier to install. The main difference, though, is that Kitec will not allow oxygen to enter the system and therefore cause rust. There is some controversy about the breaking down of polybutylene in continuously circulating hot water systems and manufacturers are placarding the product with warnings. Underground pipes must be well insulated in foam and the feed and return pipes cannot be allowed to touch each other. Don't place the pipe in the ground deeper than 18" to avoid ground water and seal against water entry where possible.

CREOSOTE

Creosote is formed when the moisture in wood vaporizes. As the gas cools it condenses into a smelly, sticky, tar-like substance called creosote. Creosote causes several problems, the main ones being chimney fires, plugging up chimneys, and coating metal parts. There are ways to reduce or eliminate creosote: burn dry or seasoned wood; use as short a chimney as possible; run the furnace at a hotter temperature, such as in a forced air draft model; add wood twice a day rather than once and put in only what you need. Rake the ashes at each loading time.

DEPTH OF FIREBOX

The depth of the firebox below the door surface is very impor-

tant. This space is needed to allow the ashes to build up. Yes, it is harder to empty ashes from a recessed floor, but if the furnace does not have this dropped area then the space for wood will quickly run out. The time frame between emptying ashes is in direct proportion to the depth under the door - the less the distance, the greater the frequency of ash emptying. If the emptying of ashes is a chore to be avoided then purchase a forced air draft furnace.

ASH REMOVAL

Ash removal is an ongoing job in an outdoor furnace without forced air draft. If you choose not to buy a furnace with forced air draft, then try to minimize the ash removal chore by looking at furnaces with large doors, and easy access to the firebox. Some of the supposed high-technology furnaces have grates with ash auger removal systems. In theory these work well, in reality they don't. Ashes have a high moisture content and the auger simply drills a hole through the center without removing large amounts of ashes. The ash-pan never completely empties and ash removal becomes almost a daily routine. The annual time spent cleaning with an auger will be many times that of removing ashes through the door with a shovel. Failure to remove ashes allows the airflow to get blocked and the furnace will not function properly. Stay away from ash augers. Grates will not hold up to high heat in air injection furnaces and they tend to warp. Important point - it takes just as long to shovel ashes from an ash-pan as it does directly from the furnace. Most ash-pans are not insulated underneath and heat loss is tremendous. Unremoved ashes cause corrosion.

SAFETY FEATURES

Some of the safety features to look for in outdoor furnaces are: lockable doors, safety latches to prevent blowback, high-limit switch, low pressure system, low water indicator, insulated handles. Forced air drafts cause no more sparks than electric dampers. If in doubt, use a spark arrester on the chimney.

COMPONENT REPLACEMENT

What happens after the furnace warranty ends? If there is a major problem can the defective part, such as a water jacket, be replaced by itself or does the complete furnace need replacing? Don't get sold on the modular parts pitch. Usually modular parts means small parts and small parts mean more seams and more seams mean increased chances of corrosion. Water jackets are the main component of all furnaces. It is faster and cheaper to repair them on-site rather than exchange them. Modular parts furnaces are not a good investment and selling prices are excessive. As for any other parts, they can easily be replaced on-site.

WOOD CONSUMPTION

Outside wood furnaces burn more fuel than inside wood furnaces. The reasons are simple: heat loss at the furnace and at the underground pipes, domestic hot water requirements, and the cost of uniform heat on demand. The heating demand for all buildings is not the same and this makes evaluation of furnaces difficult. The longer the flue exit, combined with water tubes in key places, the more efficient the furnace will be. However, this also makes for more creosote. The answer here is to compromise the flue length and keep it all inside the housing and then exit quickly with a short chimney.

WATER EXPANSION

When water becomes warm it expands. On the average outdoor furnace the water simply pours out an overflow pipe while on others it goes into a rubber or steel expansion tank. Avoid the rubber bladder types due to their short life expectancy which may not be covered under warranty. On those having steel tanks the furnace must be slightly pressurized - avoid these units. On the overflow models simply add water once or twice a year and don't worry about pressure or bladder problems.

HOUSING

While all furnaces are housed in steel there are major differences in design and materials. Look for models with solid steel roof and not corrugated steel. Corner moldings should be steel and not tin for strength. Corrugation of metal siding should be vertical and not horizontal. If the housing comes in contact with the ground it will rust.

DRAFT CONTROL - MANUAL, ELECTRIC OR FORCED AIR

Manual draft controls work on outdoor furnaces but they are not efficient. All drafts other than forced air burn cooler, which means wet wood won't burn as well and creosote is harder to burn off. The best way to compare the difference between type of draft units available is to think of a blacksmith working with steel; without a bellows blowing air into the fire, the heat is not hot enough to bend or shape the metal. Hot fires give more choice of wood conditions, they burn creosote and above all they reach total combustion. If you don't like to empty ashes, buy a forced air unit. Forced air units heat approximately 40% more square footage, based on size of firebox and water contact square footage. Manual draft dealers will try to con you into believing that air injection furnaces simply blow out all the hot air and are inefficient. Watch the smoke exiting from both - the velocity is about the same.

STRENGTH

The strongest structural design is round and the weakest is square or rectangular. This pertains to boilers as well. For longevity and strength choose a round boiler design. Round designs have fewer welds and this is very important. Avoid designs with many welds and faceted corners.

CONTROLS

The best designs all include water level indicators, temperature gauges, outside lights, aquastats and high-limit temperature cut-off switches. These should be readily accessible and yet protected from door smoke and elements. A separate panel box makes sense. In the event of an electrical problem all connections should be easily found and not hidden under the housing. Adjustable fan air velocity is a nice feature to have to control burn rate and be able to adjust heat demand to wood and weather conditions.

TESTING

Has your furnace been tested to CSA or UL standards? Testing certification means safety only. It does not mean quality. At the present time accepted testing can be done by CSA, UL or Warnock Hersey. While CSA sets the standards the actual testing can be done at any of the above facilities and is accepted by all insurance companies. Do not purchase a furnace without proper certification. Look for the CSA, UL or Warnock Hersey label.

Source:
www.outdoorwoodfurnaces.org