

OWNER'S MANUAL



EarthTM

Psalm 12:6

Outdoor Wood Furnaces

Bear Cub 305 Series

7627 Cherokee Road
Norwood, MO 65717

417-746-0043

www.EarthWoodFurnace.com

LETTER FROM EARTH OUTDOOR WOOD FURNACES:

Thank You for purchasing an Earth Outdoor Wood Furnace!

We know how exciting this moment is. You may have looked forward to having an outdoor furnace for days, weeks or years. Our staff has worked hard to provide you with a quality product that you should enjoy for many years. Please take time to read over the information in this manual and follow the recommendations contained in it to have the joy of operating your furnace for years to come. **Improper use and/or installation** may void warranties. Always follow local code requirements and seek the help of qualified craftsmen when installing the furnace or systems associated with your furnace.

We take pride in providing a quality product and friendly service.

Thank you for your business!!!



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FURNACE SPECIFICATIONS

BEAR CUB 305
OUTSIDE DIMENSIONS AND WEIGHT
<ul style="list-style-type: none">· 48" in length· 40 1/2" in width· 75 1/2" in height· 1200 lbs – dry weight
WATER TANK SPECIFICATIONS
<ul style="list-style-type: none">· 36" w. x 40" h. x 34" l· Gallons, approx 120· 10 ga. plate metal & 1/4" plate· Water surrounds the entire fire cylinder except the front part where the doors are
CYLINDER FIRE BOX SPECIFICATIONS
<ul style="list-style-type: none">· 30" in diameter· 3/8" thick cylinder firewall· 30" in length· 30" x 30" wood area· NO ash pan· Auto damper
AREA TO HEAT
<ul style="list-style-type: none">· Up to 1500 Sq ft· Approx BTU – 140,000
CHIMNEY
<ul style="list-style-type: none">· 3/16" heavy wall steel· 5 1/8" round chimney· Sets near the back of the firebox, causing burn off of rising gases before air exits the fire area· Easy straight up/down cleaning· No "elbows" or angle areas to clean or collect condensation or rust out
INCLUDED WITH FURNACE
<ul style="list-style-type: none">· Automatic Damper system· Ranco digital thermostat· Handy front panel water level check and fill system· Light switch on the front· Completely wired, plumbed· Unit MUST BE grounded
DOORS – ALWAYS KEEP DOORS AND HINGES ORDERED
<ul style="list-style-type: none">· Wood Door – 20" x 20", easy open, double latch safety, heat plate· Rear door to service area
INSULATION – R-23 TO R-29
<ul style="list-style-type: none">· High heat & batting insulation on sides and bottom; batting with Solar Guard™ on top· Wrapped in Solar Guard™ all around, top, bottom· Cold pack available
COLORS – ANY COLOR COMBINATION AVAILABLE
<ul style="list-style-type: none">· We can custom color furnaces per order.· Log Siding available
PORTS – 1 SET OF 1" PORTS

SAFETY PRECAUTIONS **WARNING!**

- Make sure you read this manual and follow the recommendations contained in it to have the joy of operating your furnace for years to come. **Improper use and/or installation may void warranties.** Always follow local code requirements and seek the help of qualified craftsmen when installing the furnace or systems associated with your furnace.
- Do not operate this equipment for other than its intended purpose nor other than in accordance with the instructions contained in this manual and all other instructions accompanying the furnace. **Do not modify the furnace in any manner! Any modification without express written consent of manufacturer will void warranty.**
- **Failure to treat water properly will void your warranty.** Earth Manufacturing pays for the water test for the 1st 3 years.
- For furnaces covered by this instruction book, it is important to observe safety precautions to protect yourself from possible injury. Among the many considerations, you are advised to:
 - Observe all safety stickers on the furnace.
 - This furnace must be wired by a qualified electrician in accordance with local and/or National Electric Codes and must have a power ground.
 - Never use any type of petroleum product, petroleum based product, charcoal starter, lighter fluid, lantern fuel, kerosene or any other flammable accelerant to start your furnace.
- **KEEP ALL SUCH LIQUIDS WELL AWAY FROM FURNACE WHEN IN USE**
 - Keep antifreeze, which is flammable, well away from the furnace. Use only non-toxic antifreeze in the unit. Test antifreeze and other chemicals annually.
 - The use of treated wood (painted, treated, etc) and any other salvaged material that can emit toxic gases into the environment and may be corrosive toward the components of the appliance is NOT ALLOWED and eliminates the rights of the warranty.
- **DO NOT BURN GARBAGE, HOUSEHOLD WASTE OR YARD WASTE IN THE FURNACE.** In most areas, this is illegal. The furnace is designed to burn seasoned cordwood and coal. **Burning non-approved materials can reduce the life of the furnace and will void your warranty.**
- Open-loading door – when opening the door, pause momentarily between the first latch and the safety latch to allow any combustion gases to burn off.
- Earth Manufacturing strongly recommends using a spark arrestor with your furnace.
- **DO NOT OPERATE THE FURNACE WITH THE DOOR OR ASH RECEPTACLE DOOR OPEN.** Always latch the doors securely. If the ash door is open for any extended period of time, it will cause over-firing of the fire and boiling. Always remember to keep your hinges oiled.
- Always use proper care when installing, operating and maintaining the furnace.

- Always wear protective gloves and glasses and be aware that loose or hanging clothing can catch fire!
- Be careful when loading wood into the furnace. Surface areas inside the furnace are hot. Creosote build up in the furnace can ignite suddenly or cause burns if dripped onto the skin.
- Do not modify the furnace. Do not substitute repairs that can be provided by your dealer, distributor or manufacturing company. **Any such action will void your warranty.**
- **Do not operate under pressure. This is a non-pressurized system. Addition of valves or plugs to the system that would cause pressure will void your warranty.**
- Keep the overflow tube clean and free of debris, bugs, etc. DO NOT close it off! The tube is meant to steam if necessary and allow for pressure release.
- **Failure to heed these warnings or any additional warnings on the furnace may result in an accident causing personal injury and damage.**
- !! CALL LOCAL UTILITIES BEFORE YOU DIG THE TRENCH !!
- Disposal of ashes:
OPEN THE ASH DOOR AND REMOVE TRAY FOR THE DISPOSAL OF ASHES.
ASHES SHOULD BE PLACED IN A METAL CONTAINER WITH A TIGHT-FITTING LID.
THE CLOSED CONTAINER OF ASHES SHOULD BE PLACED ON A NON-COMPUSTIBLE FLOOR OR ON THE GROUND. ALL COMBUSTIBLE MATERIALS SHOULD BE DISPOSED OF BY BURIAL IN SOIL OR OTHERWISE DISPERSED.
ASHES SHOULD BE RETAINED IN THE CLOSED CONTAINER UNTIL ALL CINDERS HAVE THOROUGHLY COOLED.
- Installation, to include wiring and plumbing, and operation must follow Federal, Provincial, State and Local Codes, electrical, plumbing, fire and building codes.
- The Earth furnace is intended to be the primary source of heat. However, a back-up system should always be in place and ready for use.
- A back-up generator is HIGHLY recommended so that you can have heat during power outages! The standard pump and fan draw 120 watts together. The furnace can draw 1350 watts or more on start-up. A small 2000 watt generator will power it all and give you extra power for lights.
- The manufacturer is not liable for damages or property in the case of misuse, improper installation of equipment or for knowing local installation codes. Product owner assumes all responsibility for this. **This document is a general manual to aid in installation. We cannot know all applicable codes in your area!**
- Remember to give the furnace a “Once Over” regularly.
 - “Once” a day check the water level
 - “Once” a week clean the ashes out (or often if needed)
 - “Once” a month clean the chimney

GETTING TO KNOW YOUR FURNACE

COMMON QUESTIONS

IS IT SAFE?

Having the furnace outside eliminates the possibility of causing a fire in your home. The furnace is a non-pressurized system which eliminates any chance of explosion associated with pressurized furnaces. Also the oversize door makes loading easier.

WHAT CAN I SIT THE FURNACE ON?

A 4 to 6 inch concrete pad is recommended, whether preformed or poured.

HOW FAR AWAY CAN IT BE?

Earth Outdoor Wood Furnaces can be set from 30 to 300 feet away from your home. There are a few things to keep in mind: 1. The ease of access for digging lines to your house from the furnace 2. How you will get wood to your furnace 3. how far you want to go when needing to fill the furnace with wood. 4. Check with your insurance company to make sure you are in compliance with your policy. Normally you should visit your wood furnace twice a day to check the fire and fill with wood. You will want to have easy access to this location with a truck or tractor to replenish the wood when needed.

HOW MUCH WOOD WILL I USE?

That depends on your home, insulation and the quality of wood you're burning. This might help: heating a 2,500 sq ft well-insulated home and a 60 gallon water tank with good wood could take about 5 to 7 cords per cold season (6 months). The cost of a cord of wood these days is about \$120. You can see the savings of owning an Earth Furnace. That is \$600 to \$840 a year to heat your home naturally with renewable energy. What did you spend last year?

WHAT DO I DO WHEN I GO AWAY FOR A COUPLE DAYS?

This is a common question. You have several options depending on your situation.

If your wood furnace is hooked up correctly, leave your pump on, your existing indoor furnace will back heat the wood furnace preventing it from freezing. The cost of your indoor furnace back heating your outdoor is very minimum cost if everything is very well insulated.

Here are a few more options for you:

1. You can set up your unit with a bypass to not heat the home and circulate the water within itself and the burn time will be much longer--4 to 5 days.
2. If the weather isn't really cold the circulation pump is moving the water quite quickly. Moving water is hard to freeze.
3. Maybe a friend or family member could help and feed the unit while your away.
4. You could look into special anti freeze. Keep in mind most anti freeze is terrible to our environment and costly.
5. You can let the fire die down and drain the furnace. It only takes about 10-20 minutes to drain the unit. When you return simply refill the unit and relight the fire.
6. "If there is a will there is away!"

WHAT IF THE ELECTRICITY GOES OUT?

The Earth Outdoor Wood Furnace uses very little electricity which can be supported by a small generator. You can run a regular inexpensive extension cord to the unit and unplug the furnace from the outlet on the back of the furnace and plug into a small generator. Problem solved. However, when most homes lose electricity they have no way to power the indoor blower for their duct work. Either way you will need something to back up your existing home as well as the wood furnace. Another option would be to use an extension cord on a box style fan and place the fan so that it would blow into the return vent of your duct work. Then close off the vents to rooms you can afford to let go cold.

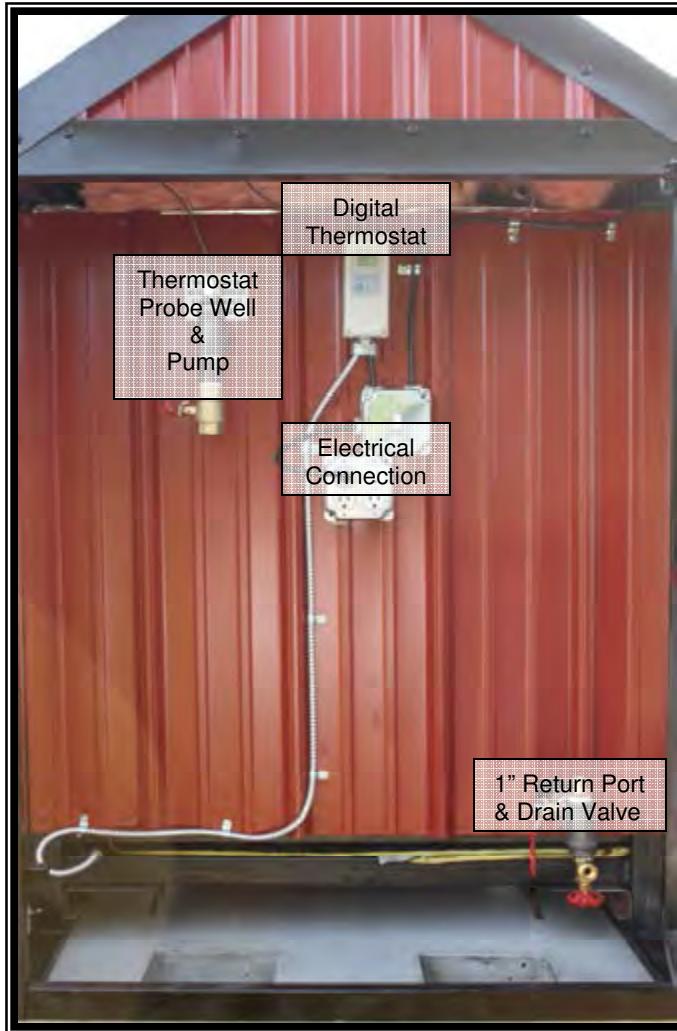
Otherwise you will need to look into a system that will power your indoor blower. Consult electrical contractors for most of that type of work.

FURNACE OVERVIEW - FRONT



1. The overflow port is where you will see water standing when the furnace is full. Note that cold water expands when heated, therefore water will come out of the overflow from heat expansion when firing it up.
2. The manual fill valve: A quarter turn valve used to fill the water tank of the furnace.
3. The light switch and light are all pre-wired at the factory. The light is a weather guard switch that can be used in all weather conditions. The light is a 150 watt halogen light for illuminating the area around the front of the furnace.
4. The wood fill door: Model 305 has a 20" x 20" door with double latch safety and heat shield.
5. The automatic forced air fan/damper system is on the wood door on all models. It is activated by the digital read out thermostat to kick on and off at the factory pre-set temperature. Your thermostat can be adjusted to various temperature settings. The damper unit is actually a double damper system, in that the inside damper drops shut when the fan is off.

FURNACE OVERVIEW – BACK



Furnace Back with Work Station Door Closed

- 1) The digital thermostat is pre-programmed at the factory.
- 2) The factory hooks up all electrical connections to the switch box located on the rear of the furnace. You will need a certified installer to bring power from the house or other power source and wire into the electrical outlet next to the switch box. Then simply plug the cord from the switch box into the outlet and turn the switch on to get power to the furnace. In the event that you need to run the furnace off generator power, just unplug it from the furnace and plug into a power cord from the generator to power the furnace. The loose wire coming from the switch box in the picture is for power to the pump. **Remember to ground your furnace!!**
- *Note* This picture shows the pump already installed. If you ordered the furnace with a pump from the factory, the pump will be installed and wired. If you did not order a pump with your furnace then you will need a qualified installer to install all fittings and wire the pump.
- 3) Shown is a Wasser 3 speed pump pulling water out of the upper port. Based on the needs of the home owner, we offer several different pumps and yours may be different from the one pictured.
- 4) Return port with drain valve. The bottom two ports are for return lines.

It is recommended to have a water shut-off either at the house where the fill water is taken from or at the back of the furnace between the fill line from the house and the connection to the furnace fill line.

HOW DOES IT WORK?

The fire chamber is completely immersed in a jacket of water (except for the front of the furnace at the fill door and ash door). When a fire is built it heats the water and a pump takes the hot water to the house. Inside the house you have some kind of heat transfer appliance; this can be a heat exchanger that fits into your duct work, baseboard style heaters, or a radiant floor heating system. The water can then be returned to the furnace for reheating. The hot water from the furnace can also be sent to a special heat exchanger to heat your domestic hot water or copper coils of some type may have been installed in your furnace depending on what options you had ordered with your furnace.

INSTALLATION

It is important that you have the furnace installed by a qualified installer. Earth Outdoor Wood Furnaces will not be held responsible for complications due to improper installation and in some cases the warranty may be voided due to improper installation and start up.

There can be many variations in proper installation. Here are some general guidelines to follow.

Setting the Furnace

Depending on your application and site conditions, you may choose a pre-poured pad or you may choose to pour a concrete pad. Pad size will depend on customer preference. It should be no smaller than 4 foot by 5 foot. You may choose to pour a larger one based on your own situation and preference.

Underground Line

When digging the trench, it is best to dig below the frost line. You will normally need two 1" lines for the supply and return of the furnace water, one 1/2" line for the furnace fill line, and an electrical line to power the furnace. Some installations may require more lines check with a qualified installer or ask our customer service department to help.

Setting up the system

It is best if this system is set up in a continuous loop going from one appliance to another. Parallel systems with tees will rarely work or will be inefficient in their movement of water. There are a number of options and ideas on the set up of the whole furnace system. Consult some one with experience to design a system that will work for you.

STARTING UP THE FURNACE

Make sure all the valves on the back of the furnace are closed and that the power is off.

Begin filling the furnace with water. Turn the manual fill valve on the front of the furnace to allow water to flow into the furnace tank. You can work on other things while it is filling. Once the water starts to flow out of the over flow, shut off the water with the manual fill valve.

Double check that all the fittings and connections throughout the system have been tightened or secured. Then open the valve going to the pump and from the furnace. If you have a way to bleed the air out of the system then open the bleed valve and turn the power on. (*With a normal set up, the pump coming out of an upper port and returning to a lower port, all you have to do is open the ball valve on the top side of the pump and then open the drain valve on the lower port. The pump has enough pressure to push air out of the lines, however, if you get water in the return lines prior to pumping water from the furnace your line will become air locked and that will require special help from another water source to fix.*)

Once the pump has started pushing water through the lines, check the various connections throughout the system to verify they are all good and you have no leaks. After the system has been purged of air, close the bleeder valve and open the ball valve to the furnace on the return port.

Now it is time to start a fire. It is recommended that you check all the lines prior to starting a fire in case you have a problem that needs to be repaired. It is easier to repair the lines while they are cold than when you have hot water flowing through them. When first starting up the furnace, build a manageable fire to get the water up to temperature. Once the water has gotten to your desired temperature setting then you can fill it full of wood and start a normal operation. Water will come out of the overflow as it expands.

MAINTENANCE

The front wood door has two "U" bolts that are adjustable. If you feel the door is not closing tightly or may be too tight, loosen the bolts with the door open and tighten or loosen the bolts as necessary.

It is important that the water is checked daily, especially after the first start up. We also require that you have your water tested to maintain proper ph and necessary chemicals for your water conditions. At the end of the season it is important to have all necessary chemical in the water if you will be leaving the furnace full of water over the summer. Earth will pay for the water test for the 1st 3 years of ownership.

You should clean your ashes out at least once a week. A flat shovel works well for this job. We recommend using a metal container of some kind to put the ashes in when removing them. At the end of the season, be sure to completely clean the ash box. Ashes combined with moisture are very corrosive and can eat through metal. Ash or coal corrosion is NOT covered under warranty.

The ash grate inside the furnace is removable for cleaning purposes however it is very heavy. Use caution when taking it out.

Your chimney is a 5" heavy wall rolled steel that sticks straight down into the fire box. Do not worry about hitting it with wood. It should be cleaned about once a month. A 5" round chimney brush will work for this job. You may use a chimney cap with the furnace to keep

rain out. It is recommended that you at least cover the chimney during the summer months when the furnace is not in use to keep rain, birds and other insects from getting in the furnace.

The light, pump, and blower can all be visually inspected and should only need replacing when they quit working. They should last for several years however conditions are different at every site and longevity may vary based on your climate and maintenance.

TROUBLE SHOOTING

SQUEALING PUMP

On initial start up if the pump is not primed with water it may squeal and can burn your pump out. Make sure the ball valve to the pump is open and the water tank is full.

On occasion the pump may get a piece of debris in the impellers from the installation process. Shut the ball valves off and remove the pump. Take a clean garden hose and spray water through the impeller housing to wash out any debris. Then replace the pump and start it back up.

CAN I OPERATE THE FURNACE WITH ASH DOOR OPEN

It is not recommended that you operate the furnace for very long with the ash door open. This will cause your furnace to over heat.

WATER IS NOT GETTING HOT

Several things may contribute to this problem.

Check that the fire is getting enough air. You can open the ash door for a short period of time with everything on and see if the water temperature rises. Make sure there is not obstruction in the chimney or in front of the blower hole.

The fire may be getting too much air. This is a trial and error situation, adjust the tear drop damper.

Ashes may be built up too much in the fire chamber. Before you stoke the fire make sure you take a shovel or some device and rake the coals towards the middle of the furnace. Ash build up around the edges work to insulate the fire box from the fire and do not let it heat like it was designed to.

You may be burning too much green wood. It takes a large amount of Btu's to burn/boil off the water in a green log. This makes the fire burn cooler than when you use seasoned wood. Try getting a mix of wood in the furnace, some green and some dry.

Your water lines may not be insulated enough. If you have exposed lines, or lines that run through uncontrolled environments you may look into insulating them or putting more insulation on them. Insulation is key to your performance.

Your blower in the house will drop the water temperature as much as 20 degrees. If the temperature of the furnace water is not above 150, it makes it real hard to recover temperature loss when the blower is on. Try turning the blower off and work with the fire to recover heat in the water.

LINES NOT GETTING HOT BUT WATER IS HOT

The water is not moving to the house or through the house.

Make sure the return ball valve is open at the furnace and that all valves are open through the house.

If you have a multi-speed pump try increasing the speed.

It could be that you have an air bubble stuck in the lines somewhere. Turn the pump off and loosen the bottom flange bolts until water will run out. Shut off the ball valves to the

pump and on the return into the furnace. Take a garden hose from a house faucet to the furnace. Steal a washing machine hose from inside the house and use it to hook to the furnace drain and the garden hose. Turn the water on at the house and open the drain. This will allow water from the hose to move the entire system and purge any air bubbles. It will also cause the water to spray from the bottom flange of the pump and you get wet if not careful. Allow this to run for approx two minutes (time can be based on length of run to the house and back). Shut the water off and close the drain. Tighten the flange and open all valves.

LINES NOT GETTING HOT THROUGHOUT ENTIRE SYSTEM

If you have put a tee into the system then water may not be flowing through one of the appliances. You may have to re-plumb the system so that there is a continuous loop from the furnace to the house and back.

The pump may have reached its operating capacity. Try increasing the speed of a multi-speed pump or getting a bigger pump.

HOT WATER HEATER SIDEARM NOT HEATING

The sidearm could be air locked or not plumbed properly. Find a way to bleed any air out of the domestic side of the system at the highest point.

EARTH OUTDOOR WOOD FURNACES™

WARRANTY INFORMATION

1. "Earth" Furnaces have a 10 year limited warranty.
2. This warranty is on, and covers the furnace only, **NOT FANS, THERMOSTATS, PUMP, ETC. OR ANY PRODUCT OR WORK YOUR INSTALLER DOES OR SUPPLIES.**
3. The electrical components like the thermostat, fan, pump, have their manufacturer's warranty (usually 1 year).
4. Doors & damper have a one year warranty.
5. We have a 3 year warranty against any leaks which covers parts and labor. If we cannot repair the leak, we will send you a new furnace!
6. Years 4-10 are pro-rated as follows for coverage of parts & labor*:

Year 4 – 60%	* We will give you the percentage discount on the repair or off a replacement furnace. Furnace will be repaired or replaced, whichever is less expensive. Shipping not included. No cash or surrender value.
Year 5 – 50%	
Year 6 – 40%	
Year 7 – 35%	
Year 8 – 25%	
Year 9 – 15%	
Year 10 – 10%	
7. The cost of a service call is not covered after 3 years. (**Service calls for installation related problems and not problems with the furnace itself will be charged to the owner**)
8. The life of your furnace depends upon proper maintenance. You must submit a water sample to Wood Boiler Solutions, LLC for professional lab analysis. You must follow their recommendations for chemicals and brands. Earth Outdoor Wood Furnaces will provide the test kit for the 1st 3 years. You may purchase the "water sample analysis kit" from their store at www.diswebsites.com/woodboilersolutions/store.cfm or call them at 920-382-6498. **Failure to do so will void your warranty.**

When the kit arrives, take a sample according to the easy to follow directions, package it up and mail it back (postage not included). They will forward the test results to Earth Outdoor Wood Furnaces.
9. All furnaces must be treated with "Water Treatment 101" rust inhibitor. This can be purchased through Earth Outdoor Wood Furnaces.
10. You must Power Ground your furnace. **Failure to do so will void your warranty.**
11. Warranty is non transferable.

EARTH OUTDOOR WOOD FURNACES™

WARRANTY EXCLUSIONS

- 1) Burning any material of any kind other than regular non-treated wood.
- 2) Any modifications or changes to the unit
- 3) Lack of maintenance including:
 - i) Failure to clean out ashes, failure to clean the ash pan & fire box after season.
 - ii) Allowing moisture to remain in the fire box & ash area off-season.
- 4) Faulty installation or connection.
- 5) Not testing and treating your water for recommended chemical treatment, & rust inhibitor.
- 6) Disasters, such as wind storms, fires, etc.
- 7) Failure to properly power ground furnace.
- 8) Insufficient and/or excessive draft
- 9) Consumption that exceeds use limits
- 10) Transportation and/or packaging costs
- 11) Warped doors or grates
- 12) Damage to the thermostat due to over-heating from intensive and non-approved use (such as ash door left open, or the fan left off during high fires)
- 13) Failure of the water pump resulting in an over heating of the furnace
- 14) Misuse or incorrect use
- 15) Insufficient or inadequate relation between the nominal power of the equipment and the heat requirements of the premise
- 16) Failure to return the warranty sheet information form within 60 days
- 17) Consequential or incidental damage, such as loss of anti-freeze and/or water treatment
- 18) Transportation and installation.
- 19) Deterioration due to non-use of the unit.
- 20) All and any costs not previously agreed to and accepted by Earth Outdoor Wood Furnaces.
- 21) Warranty starts on date of delivery, and is contingent upon receipt of full payment, copy and verification of water sample directives within 60 days of purchase

WARRANTY DOCUMENTATION FORM

Fill in the following information and mail a copy within 60 days of purchase.

Earth Outdoor Wood Furnaces
P.O. Box 310
Mountain Grove, MO 65711
417-746-0043

Owner Name: _____

Address: _____

Phone Number: _____

E-mail: _____

Earth Model: _____

Serial Number: _____

Date of Purchase: _____

Date of Installation: _____

Installer: _____

Purchased from: _____

Please keep this manual with all other important papers. The information in this manual is necessary for the installation, operation and proper use of this furnace. If you should ever have a problem or question please refer to this manual or have it available when you call.

Note: Wood Boiler Solutions will forward the copy of your water analysis to Earth Outdoor Wood Furnaces.

