Northern Lights Cedar Tubs
Wood Heater Plumbing Instructions
Basic Configuration

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Rev 1b

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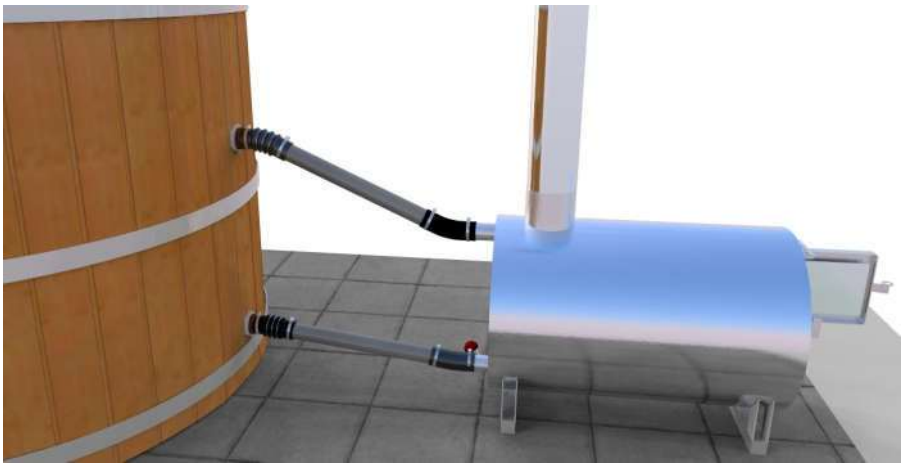


Timberline Heater Plumbing Instructions

Introduction

This manual covers the plumbing connections for the basic Timberline wood heater configuration. Different instructions are required if the configuration also involves a forced circulation system (pump and filter), or is augmented with an electric heater or has jets.

Required Tools

When a tub is ordered with a standard Timberline heater option, one stave will be supplied with two predrilled 2-3/8" holes. When a Timberline wood heater is added after the fact, then the customer must drill these holes himself. In this case the following tools are required:

- 2-3/8" hole saw
- ½" electric drill

To connect various hoses and tubes the following tools are needed:

- Hack saw
- Utility knife
- #100 Sand Paper

Holes for Wall Fittings

Holes for the supply and suction wall fittings come predrilled in one stave, which we will call stave #1. These holes are based on the Timberline heater's size and how close to the tub the heater is placed. The standard basic configuration for a small Timberline stove places the heater 24" from the tub. If you wish it further away, to reduce possibility of accidentally touching the hot chimney while in the tub, read page 7.

The arrangement of the staves with holes is illustrated in Figure 1and 2. If you will use the extended piping, to get the heater further away from the tub, then the supplied stave should have the holes as per Figure 2 that has the top hole 20" from the top of this stave.

Table 1- Hole-drilling Information

Hole Description	Diameter	Hole Centreline
Hot Inlet Fitting Stave #1	2-3/8"	-18 inches (46 cm) from bottom of stave if using a small Timberline unit with close piping arrangement -20 inches from top of stave if a medium Timberline heater or if using extended piping arrangement for either heater
Cold Return Fitting Stave #1	2-3/8"	6-3/16" from bottom of stave

Figure 1 - Hole Locations for Small Timberline Heater Located Close

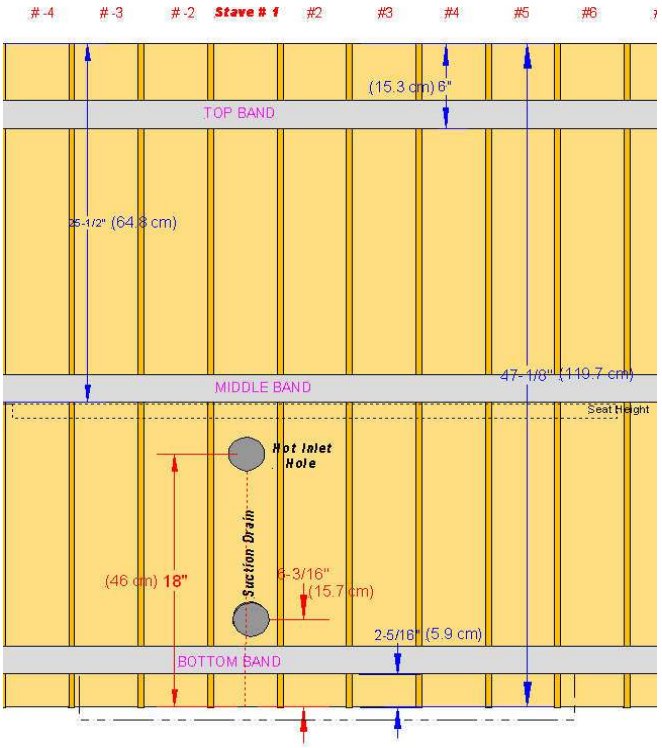
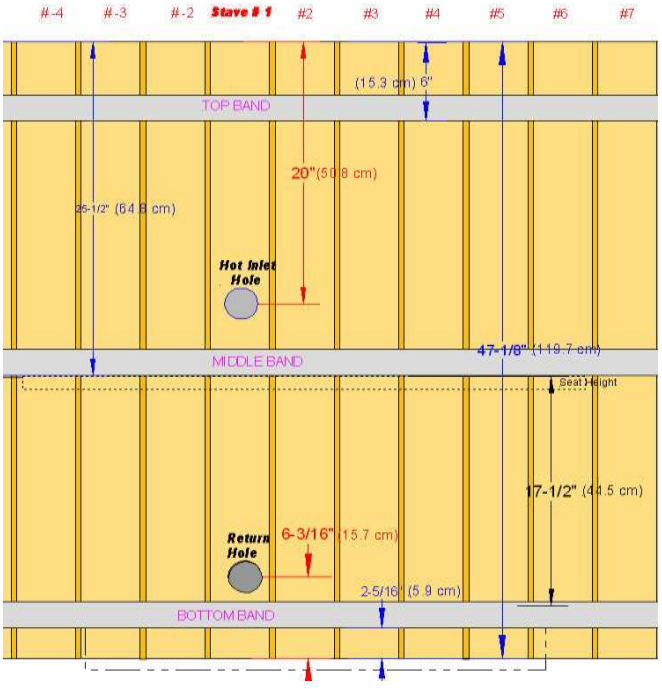


Figure 2 - Hole Locations for Medium Timberline or Tub Located Further Away



Wood-fired Heating System

If electricity is not readily available, as may be the case when a hot tub is used at a cottage or cabin, that has no access to grid power, a common heating option is to use the *Timberline Wood Burning Heater* operated in thermo-siphoning mode. This is the most basic option and is not equipped with a filter. Therefore, the water will get dirty quickly and needs to be drained often. Water treatment products provided in the optional water treatment kit can control bacteria and keep the water from being non-corrosive, but without a filter, which requires a pump, the water cannot be kept clear.

The small Timberline is rated at 35,000 BTU/hr output while the medium Timberline is rated 55,000 BTU/hr output. These ratings are with a reasonably fire burning, although with a very hot fire it can produce some 50% more. On the other hand, if the fire isn't well maintained it will produce less than this heating power. 35,000 BTU/hr is thus roughly equivalent to an electric heater producing 10 kW of power and 55,000BTU/hr represents 16kW. These heaters have a high hot water outlet port and the supply wall fitting at the tub must be at a higher elevation for thermo-siphoning to work.

If this option is purchased, then the tub will come delivered (in addition to the drain pipe, clamps and screws) with:

- Small or medium Timberline Heater
- 2- Hydro Air 10-3320 wall fittings
- 2- 18" pieces of 1-1/2" CPVC pipe
- 2 – corrugated silicone rubber couplers
- 2 – 90-degree silicone rubber extended elbow*
- 8 hose clamps
- Two screw-in plugs for the wall fittings.
- Stainless steel Chimney & Chimney Cap
- Drain valve and adapter Coupler
- Plugs for top ½" fpt gauge holes
- Optional temperature gauge and 0.75 bar relief valve are available for the Timberline heater

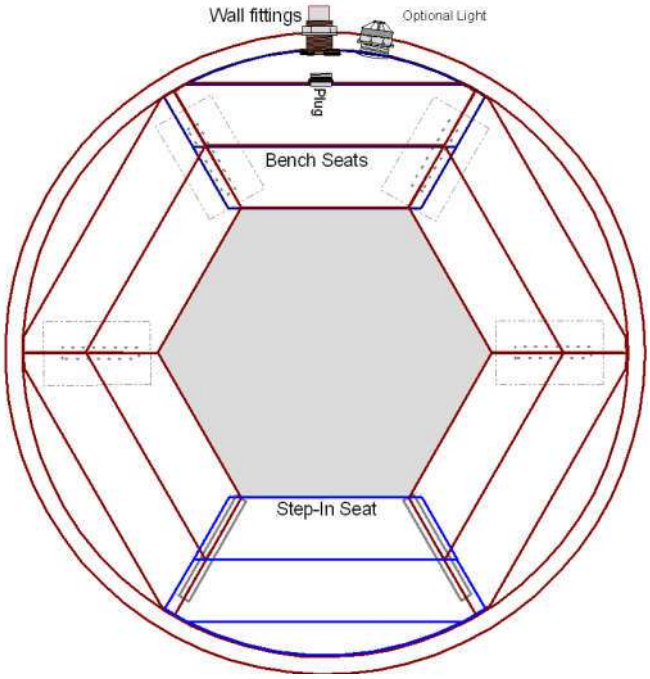
*Note** - *See note in last paragraph this page.*

Not provided standard, but optionally available for purchase include:

- 2 x 54" pieces of 1-1/2" CPVC pipe (to located the heater further out)
- 1-1/2" gate valve (to close bottom wall fitting without having to dive into cold hot tub water)
- Filter/Circulation option (to circulate, mix and filter the water)
  - Optional Heat EFX -1500W 120 volt inline heater (installs in above)
- Light Kit

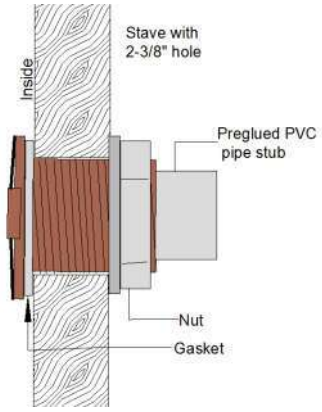
Note: items in blue require 120 VAC

Figure 3 - Hot Tub with Wall Fittings Installed



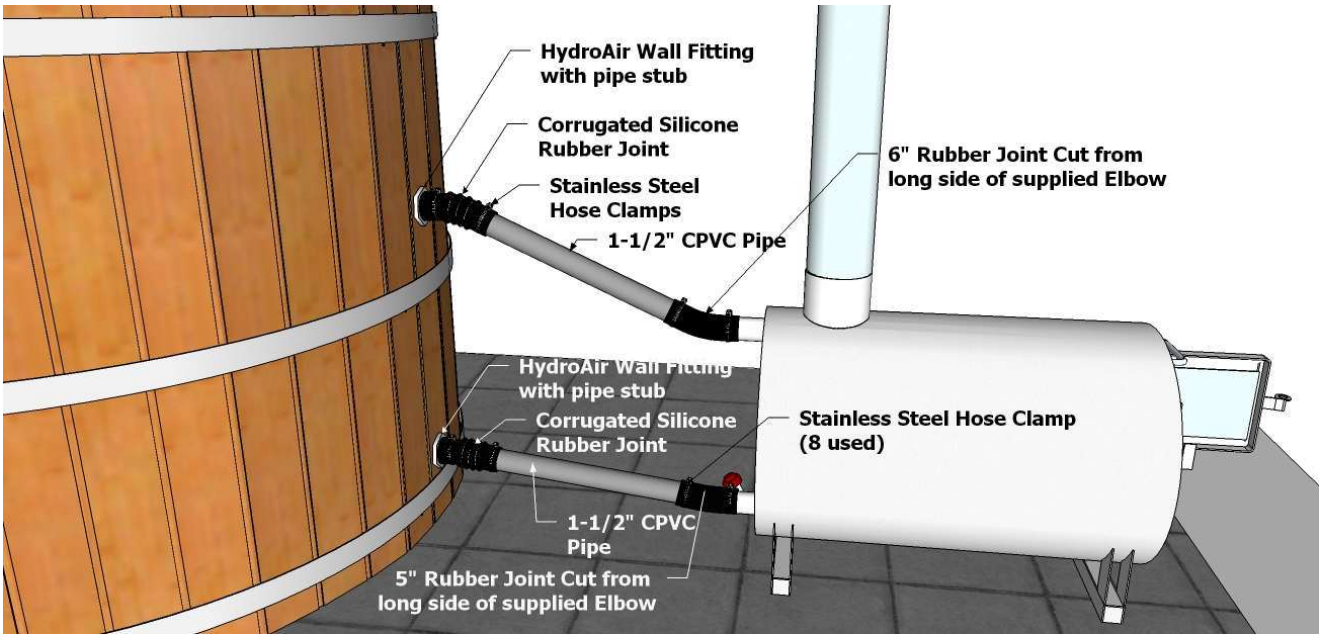
Each of the two wall fittings is attached as is shown in the next Figure.

Figure 4 - Attaching Wall fittings

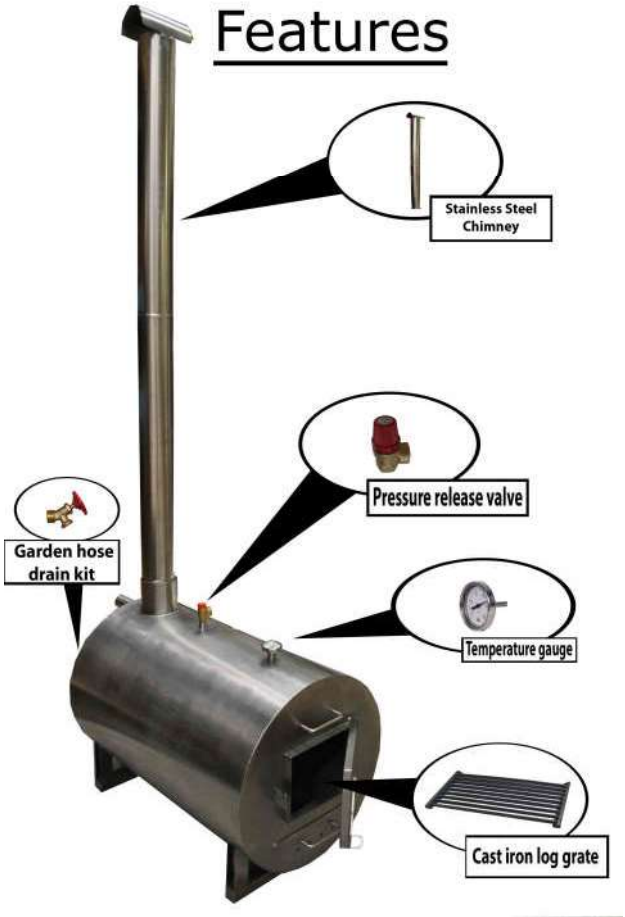


The wood-fired Timberline Unit is then attached to the two wall fittings using the parts provided as per the next illustration, overleaf. ***Note** in some of the illustrations, such as Figure 7, we show a rubber elbows couplers (joints) being used. These rubber elbows we cannot always obtain and, in that case, we will supply straight rubber couplers instead plus two 1-1/2" CPVC street elbows. When the 90-degree rubber elbows are provided, but you only need straight couplers, cut the elbow to obtain the straight section.

Figure 5 – Timberline Heater Plumbing – Close Connection



The following photos shows the attachment of the Pressure Relief Valve (PRV), the temperature gauge and drain hose bib Valve. The PRV valve can be used to also vent air out of the top of the water jacket.



WARNINGS:
The Timberline heater unit must not be started until the water is above the top wall fitting.

Never operate the heater with the screw-in plugs still attached to the wall fittings. These plugs are supplied for maintenance purposes only.

This arrangement is not meant to be used when there is frost. If ever used in below freezing temperatures, be sure the tub and the Timberline heater is completely drained after each use.

When in use, be sure you avoid touching the chimney or the hot heater parts, since this will result in severe burns. A chimney guard should be used if you are concerned about this.

Extended Piping Connections

In this the previous Figure, we have shown the Timberline heaters close to the tub using the standard 18" long pieces of CPVC pipe provided. If you prefer the heater to be further away, then you can replace the short pipes shown in Figure 5 with longer pieces of 1-1/2" CPVC pipe. Optionally, two 54-inch-long pieces of 1-1/2" PVC pipe can be purchased. CPVC pipe is many times more expensive than standard white PVC pipe.

The reasons you may wish to use the extended arrangement are:
1) You want the wood heater's chimney out of reach from the hot tub or
2) You want the wood heater further away so smoke is less bothersome.

Figure 6 - Extended Piping Example

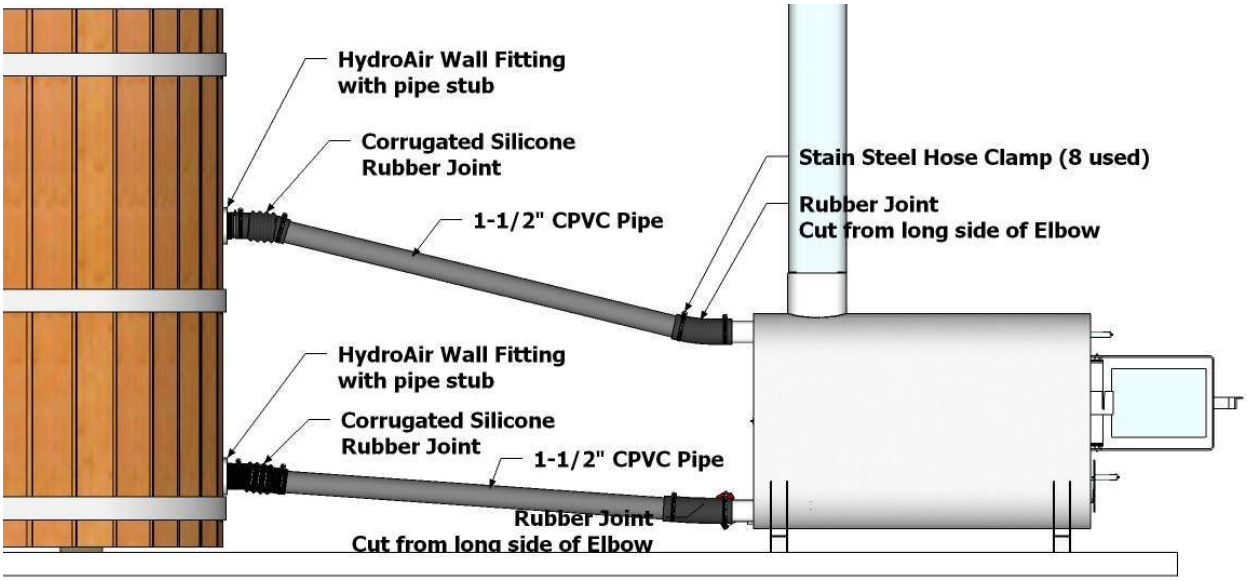
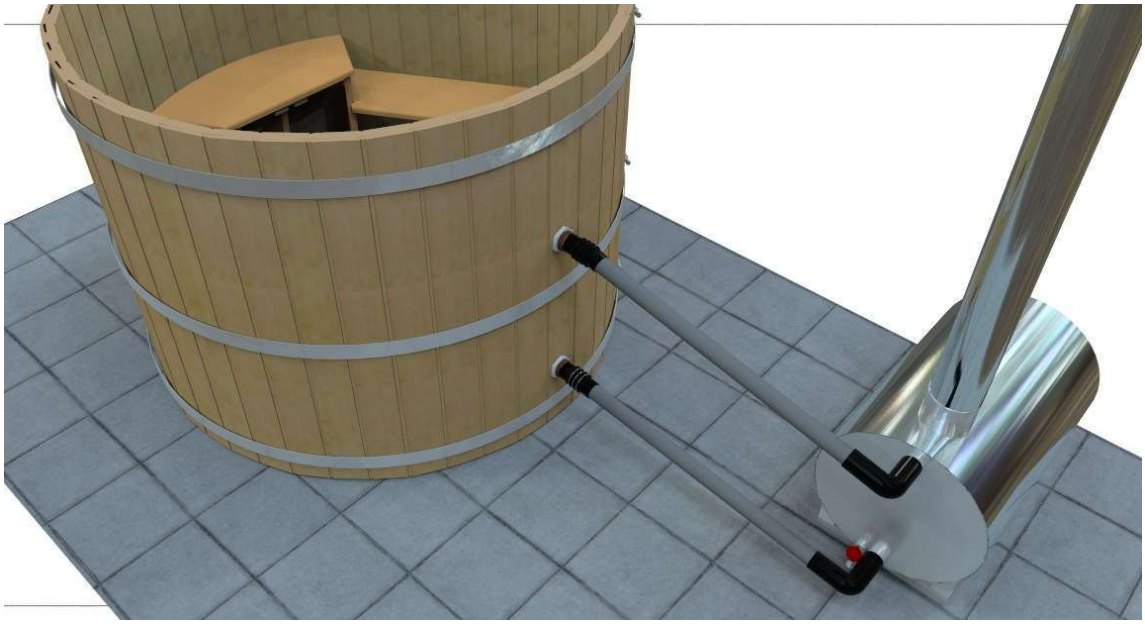


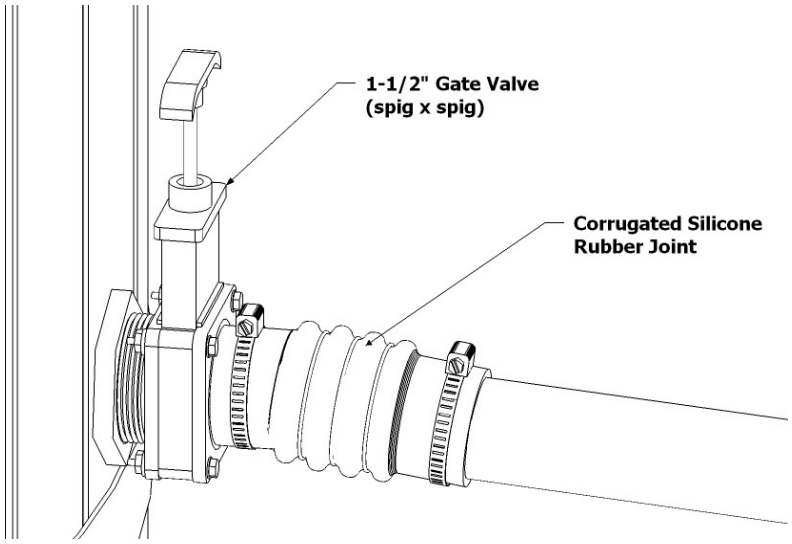
Figure 7 - Extended Piping with Wood Heater Rotated 90°



As noted before, if you intend to use this 90° rotation, but the elbow couplers could not be supplied, use the straight couplers and the 1-1/2" CPVC street elbows, that will then be substituted.

To drain the tub, you can attach a garden hose to the hose bib valve attached to the bottom of the heater. If you wish to drain only the wood heater you can screw the plugs, provided, into the bottom and top wall fittings. This is not however very convenient to do since you have to later get into cold water to remove the bottom plug. An alternative is to install a gate valve (optionally available) into the bottom wall fitting as shown in Figure 8. However, these must never be left closed if there is fire in the heater and there is no warranty against the damage that would occur is so left closed.

Figure 8 - Using Gate Valve at bottom Tub Connection



Operational & Cautionary Notes

The wood heater should never be fired up empty. This will cause excessive internal expansion and damage the unit. Nor should the heater be operated in a mode that prevents inadequate thermosiphon circulation that may cause the water to boil. This too will lead to excessive internal expansions that can cause warping and weld failures.

The heater should not be fired up if the water level does not cover the top wall fitting. If the water level is below this point but above the height of the heater, the thermosiphon action will not occur and instead the water can reach the boiling point and steam out. This would be extremely hazardous to persons and as mentioned can cause heater failure as well as drooping of the CPVC piping.

Vent out air from the top of the heater, using the PRV.

Always check the water temperature and stir the water before entering the tub. Although the thermosiphon action causes some circulation of the water, temperature layering will occur, making the top layer hotter than the bottom. To avoid constant stirring consider the forced circulation option.

If you will leave the hot tub filled after use, you need to consider a sanitization method and also keep the water balanced. Water balance implies proper pH and water hardness. If the water is out of balance the water will be corrosive to the metal in the wood heater. It may also cause skin irritation. If the water is not sanitized, bacteria and algae can grow rapidly. The starter water treatment kit that we offer has a 2-part bromine sanitization method that is recommended, which is gentle on the skin and on the wood. However, since this system has no filter, the water will not stay clear long and still must be exchanged frequently

Due to tannin leaching out of the wood, water will initially turn brown (if not drained after each use). The brown colour on its own is not a problem, as long as water is sanitized. After some use, the discolouring will stop.

For unattended situations, it is **not recommended** that the system remain filled in freezing conditions. Northern Lights Cedar Tubs does not provide warranty if a failure occurs during the winter or if failure is due to having kept a plug closed.

Therefore, never leave the wood heater filled if you are going to be away and there is danger of frost. The tub comes with plugs that allow the heater to be drained, without draining the tub. This will protect the heater

and the piping from water freezing solid within these components. However, the water in the hot tub will eventually freeze also, if no source of heat is applied. If the water in the heater is not drained, it will turn to ice and there is a good chance that the heater will deform, and welds will fail. You must not fire up the Timberline heater, if you suspect it is frozen up or the pipes are frozen. Should such an ice build-up have occurred, you must first be assured that ice has melted by applying external heat. Then check damage by checking for leaks in the heater and the piping.

The use of the pump and filter option will inject about 100 Watts of "pump heat" and will give some protection if the temperature is around the freezing mark. The use of the auxiliary low-power electric heat control system will provide a total of about 1500 Watts of heat. It is installed into the long section of pipe between the pump and the filter. This will prevent freezing entirely, although in the most extreme artic conditions this may not be enough to keep the tub at the desired 102°F temperature using this heater alone. However even with these types of measures, you are risking freeze up, should there be a power failure.

If using any of the electric options, use of a ground fault current interrupter (GFCI) receptacle is required.

Warranty Information and Liability Disclaimer

Northern Lights Cedar Hot Tubs guarantees its cedar hot tub product from manufacture defects for the period of 3 years from the date of purchase. This warranty is limited to the wooden hot tub staves, steel straps, seats, floor, and floor joists. Damage caused by customer drilling holes in the cedar is not covered. Customers that choose to drill their own holes, do so at their own risk.

Should our product be found defective, we will replace the wood board(s) or other covered components free of charge. The customer will be responsible for providing the original invoice and digital photo showing damage. Labour costs are not covered by the warranty.

Northern Lights may, at their cost, send an independent contractor to access the damages, and report as to the probable cause.

Any additional components, other than the hot tub components listed above, are covered by the original manufacture warranty which is 2 years for the wood heater and 1 year for electrical components if any were optionally purchased. PVC components have a 2-year warranty under normal use. The warranty claim is made by Northern Lights Cedar Tubs Inc. directly with the manufacturer on behalf of the customer, and Northern Lights Cedar Tubs assumes no responsibility if the manufacturer rejects the warranty claim. Usually the manufacturer will require the defective component to be returned. The return shipping costs will be the responsibility of the customer, but Northern Lights will assume the shipping cost to deliver the replacement components. If the customer fails to return the defective parts, after specifically being requested to do so, all further warranty on any part whatsoever will be null and void.

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Northern Lights Cedar Tubs does not cover, under warranty, defects caused by:

- Minor leaks that may occur.
- Damage due to leaks in the plumbing resulting from poor gluing or clamping technique or improper settling of gaskets and O-rings, where these may apply
- Damage to the interior (such as wood deterioration) due to overuse or improper use of chemicals.
- Damage resulting from drying out the tub.
- Damage to the Timberline heater as a result of careless use or improper use such as but not limited to:
    - Failure as the result of over pressurizing the heater
    - Failure as a result of allowing water temperature in tub to get over 200°F (93C°)
    - Damage resulting from the discretionary use by the owner of the equipment during freezing weather.
    - Damage due to improper installation. For example: installation provides insufficient slope in piping to establish good thermo-siphon circulation; insufficient water levels in the tub and wood heater; operating the heater or pumps with plugs installed in the wall fittings or with valves closed.
    - Corrosion caused by improper water chemistry (example soft water or low pH water)
- Damage caused by animals or insects at the customer's site

We also cannot do anything about discolouring of heater, chimney components due to effects of heat or soot or internal condensation that drips out of the heater. To minimize condensation (water vapour produced by the combustion of the wood, that meets relative cold internal metal surfaces and then condenses), attempt to get the water in the heater to around 65°C.

Northern Lights Cedar Tubs Inc does not accept responsibility for personal or property damage including injury or death from the use of our product. The customer assumes all liabilities that are foreseen and unforeseen. In no event shall Northern Lights Cedar Tubs be liable for any direct, incidental, punitive, or consequential damage of any kind what so ever with respect to service, the materials and the products.

All products must be installed under the governing laws of the customer's municipal, state and national codes, including electrical hook up.

Any legal dispute regarding our product must be settled in the jurisdiction of the Province of Manitoba, Canada, under the governing Laws of this province.