



Cedar Hot Tub Owner's Manual

A Complete Guide to Assembly, System Installation, Use, and Maintenance

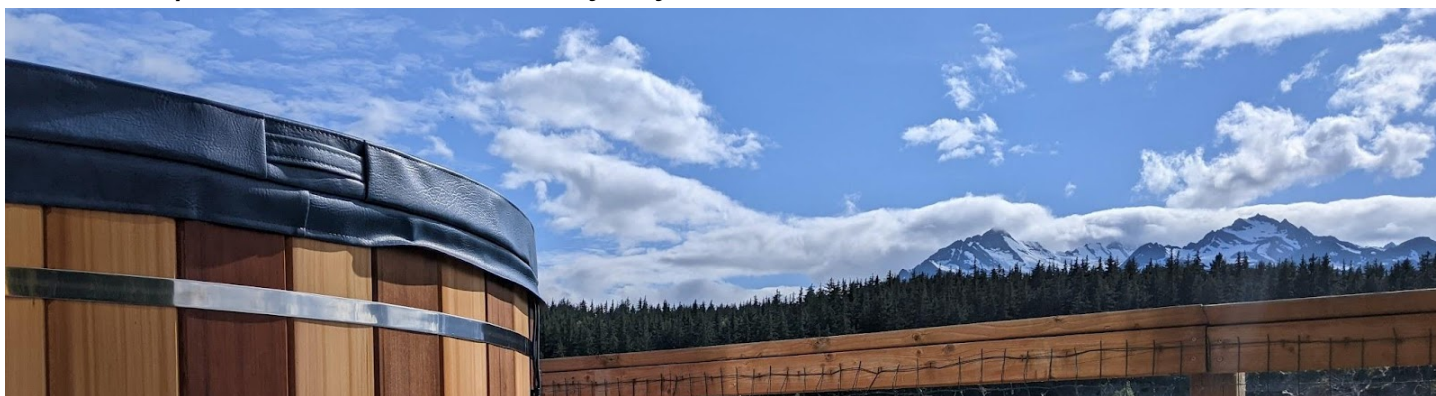


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Introduction

Thank you for selecting a Zen Bathworks tub! Your hot tub will provide many years of soaking enjoyment.

Even if you purchased your tub factory pre-assembled, or are hiring someone else to assemble it for you, please read and understand the assembly portions of these instructions, as they contain important information that will increase your ability to maintain your hot tub properly.

If you are assembling your tub from a kit, assembly will be easier if you follow the correct sequence of steps and use the proper tools. Please take the time to read the instructions completely and carefully. Assembling a coopered hot tub is not particularly difficult, but it is a unique process that is often unfamiliar for even experienced contractors and DIY-ers. Time spent studying the instructions will pay off with a speedy and smooth installation experience.

Cedar hot tubs do not use any glue or sealant. The tubs hold water because the wood swells when wet and compresses the wood-to-wood joints tightly. Therefore, careful assembly is very important and makes the difference between a tub that seals up within days, or one that continually struggles with persistent leaks.

Assessing your Site

Ease of Use Considerations

Using your hot tub should be convenient. The whole point of any hot tub is to relax!

The most convenient location for a hot tub is close to a door, and close to a shower. If the showers in your home are not conveniently located, you may wish to install an outdoor shower right next to the tub.

Is there somewhere nearby this location that you can store spa care products, fresh towels, and anything else you will need every time? You will also need enough space to install your selected heating system, and access it for periodic maintenance.

How will you enter the hot tub? For shorter tubs, stepping over the side from the ground is adequate for most. We offer cedar steps for taller tubs, or for improved access for those who need it. Building a deck beside or around the tub is a common way to provide very easy entry.

Aesthetic Considerations

With proper planning, a cedar tub can add a lot of beauty to your home and landscaping. Indeed, the beauty of cedar is one of the top reasons people choose wood over fiberglass or acrylic alternatives. Without proper planning however, a poorly considered cedar tub installation can turn into an unattractive sprawl of spa components and white PVC pipe.

Wood fired tubs are attractive in any setting, as there is very little plumbing and the polished stainless steel stove looks handsome in its own right.

One common method of hiding gas or electric systems and plumbing is to fully or partially surround the tub with a deck. The deck provides easy access, and hides all the plumbing. With a fully surrounding deck the

handsome exterior of the tub cannot be seen and appreciated; however, for installations with massage jets and the associated plumbing wrapping the full perimeter of the tub, hiding the outside is a good thing.

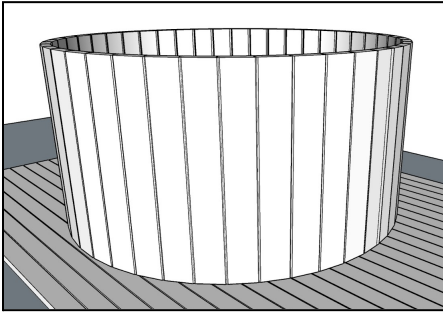


Figure 3.4.1 Tub on top of deck, where the beauty of the tub can be fully appreciated. The plumbing for the skimmer and any jets will be visible, but most of the system can be placed below the deck, out of sight.

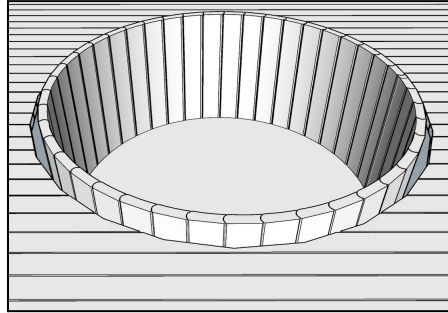


Figure 3.4.2 Tub fully recessed into deck. This hides all the plumbing, even if massage jets are spaced around the entire tub, and makes getting in and out easy. Note the gap around the tub; decking should have a 1"+ clearance and should not be tight against the tub.

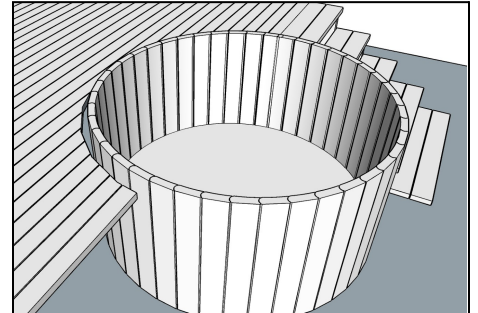


Figure 3.4.3 Tub with partial surround deck and stairs on one side. This allows for much of the tub's beauty to be appreciated while still hiding the plumbing. Note the gap around the tub; decking should have a 1"+ clearance and should not be tight against the tub.

If a deck doesn't fit into your plans or your budget, we offer a modular Surround Enclosure product made from matching cedar. While expensive, these surround options cost significantly less than the average cost to have a deck built on site.

The system can be installed up to 10 feet away from the tub with the components provided, or up to 50 feet away with longer cables that are available by request. Installing the system some distance away provides more options to hide plumbing and components, and also reduces the pump noise. The pumps are not particularly loud to begin with; the massage pumps on high speed are only about as loud as a normal conversation. All the same, a little distance reduces the sound considerably. Be aware though that the further the system is from the tub, the more water pressure will be lost to friction in the pipes. If peak massage power is your priority, you'll find better results with the pump as close to the tub as is practical. Also, the pipes should be well insulated to prevent heat loss.

System Access Considerations

When considering where to place your system, give consideration to existing utility hookups. Locating the system components as close as possible to existing hookups may save time and money. (See the Site Preparation section for electrical and gas requirements)

You will also need good maintenance access to the system. The filter will need to be cleaned every few weeks. For some climates, the system may need to be drained and winterized annually which involves accessing the drain plugs on the filter housing, spa pack, pump, and heater.

Good drainage and airflow around the tub are vital. Wood lasts longest either fully submerged, or fully dry. Prolonged dampness will encourage wood rot over time and should be avoided. This means that the ground should be sloped to carry water from splashing, filling, or occasionally overflowing the tub away from the chine joists. Plan enough access to occasionally clear out any fallen leaves or other debris that may have fallen against the tub, so the debris doesn't trap moisture against the wood.

Every time you drain and refill your tub, you will need somewhere to go with anywhere from a few hundred to over a thousand gallons of water. Our default drain fitting assembly can be used by itself to empty the water onto the ground, which can be a viable option if you have plenty of space on your own property with good drainage sloping away from the tub, such as a very large lawn to water. Other installation sites may need the water routed to a storm drain or other suitable location. In this case, you can:

1. Install a garden hose adapter fitting to the end of the included drain pipe so that a standard garden hose can be used to direct the drained water to the desired location, OR;
2. Install permanent plumbing onto the end of the included drain pipe with a 1" PVC coupler and 1" pipe (either flexible or rigid). Use schedule 40 PVC.

If you follow the Zen Bathworks sanitation regimen, water from your tub is safe for occasionally watering lawns, landscape plants, or trees. (If you want to be certain, use a test strip to verify that the chlorine levels are 1ppm or lower, and the pH is between 7 and 8.) It is not generally recommended to use hot tub water on vegetables or fruit trees, and some ornamental plants (roses, azaleas, etc) are more sensitive to pH than others.

Safety Considerations

Electrocution Hazard: National Electric Code requires that electronic spa equipment be at least 5 feet away from the tub OR behind a physical barrier that prevents a bather from reaching it from the tub. This is an important safety requirement! In the spirit of the law - which is to eliminate any possibility of electrocution - we recommend erring to the side of caution and using a combination of extra distance and/or barriers to make sure that this requirement is more than met.

Drowning Hazard: Will fencing or removable steps be needed to keep children or pets away from the hot tub when not in use? Our provided vinyl covers feature locking plastic buckles that provide a small degree of childproofing, but we strongly recommend considering the safety needs of your environment, and providing additional security if required.

Assembling Your Tub

Site Preparation

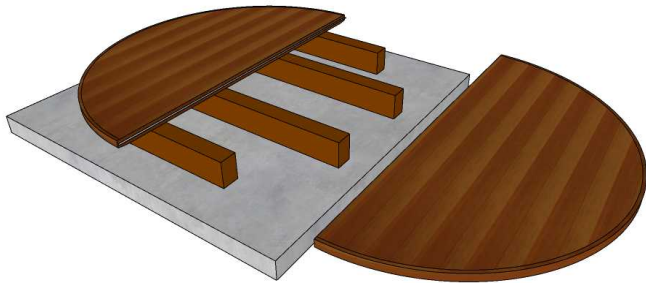
Utility Hookups

There is no need to wait for the tub to arrive before having the utilities installed. For our standard systems, you will either need to install a 220V GFCI electrical circuit (electric heat), or a 120V GFCI electrical circuit and a gas line (gas heat). Final hookup will still be required after the tub and system are in place, but this usually takes less than a day if the utilities have been roughed-in already. See the [Heat and Filtration System](#) section for further information.

Foundation

Before assembling your tub, it is extremely important to properly prepare a foundation for it. Depending on size, hot tubs will weigh from 1,500 to 13,000 lbs. when full of water - so a stable foundation is essential. For a frame of reference, our smallest tub is heavier than an electric golf cart, and our largest tub weighs more than a Type-A1 mini school bus.

Remember, your finished foundation must allow water from splashing, overflow, cleaning, or draining to flow away from the tub, and away from anything else nearby that could be compromised.



3.1 A concrete pad is an excellent foundation for your hot tub, and is our recommended choice. A properly poured 4" reinforced pad will be stable and resistant to frost heave. The minimum size for a concrete pad is the diameter of the tub (6' x 6' for a 6'R tub), but if you have the space and the budget we recommend oversizing the pad by 2' or more. Installing the heating system or entry steps is much simpler with a flat, level surface to work on.

If you have the option of pouring a concrete pad, we highly recommend that you choose this option.

3.2 A gravel pad can be a simple foundation for a smaller tub in some cases. If the ground on the site is compact and stable soil, sand, gravel or rock; a layer of pea gravel (or coarse sand) on top can be used to establish a level foundation for your tub. However, if the soil is unstable, soft, or marshy, a gravel pad will settle unevenly under the weight of the tub and is not

a good choice. If you choose a gravel pad, make it larger than the diameter of the tub by about 3 feet. Example: For a 6' tub, make the pad 9' in diameter. The thickness can vary depending on how much gravel is needed to level the site. Typically, 2 to 4 inches is sufficient. Smooth with a rake and check with a carpenter's level. Compacting in layers with a plate compactor is recommended.

3.3 Another alternative is to use adjustable concrete pier blocks as a foundation. This type of pier block is available at most home improvement stores and allows you to adjust the level of the tub after it is in place. This type of foundation may shift and settle over time, especially in climates with cold winters, and will likely need to be releveled periodically. Alternatively, concrete pilings can be dug in below the frost line to prevent movement.

We recommend supporting each chine joist with two pier blocks. Refer to section 4 for more info on chine joists. The bottom of the piers must rest on stable soil as discussed in 3.2 above. See Figure 3.3.

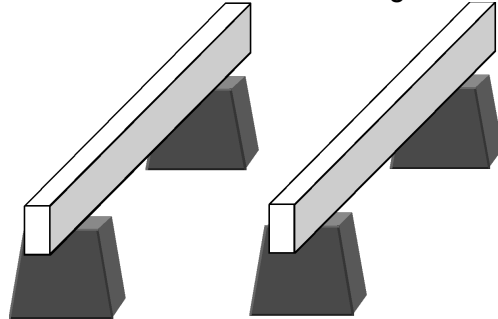


Figure 3.3 Pier block foundation

3.4 Another option is to install the tub on top of a deck. Be sure that your deck is rated to support the weight of a full tub. Most existing decks will not be built to handle this load, and will need to be reinforced. Have the deck inspected by a qualified architect or building engineer prior to proceeding. *Note that the deck itself will need to have a very firm foundation, typically pier blocks or pilings.*

Tub Assembly

Packing List

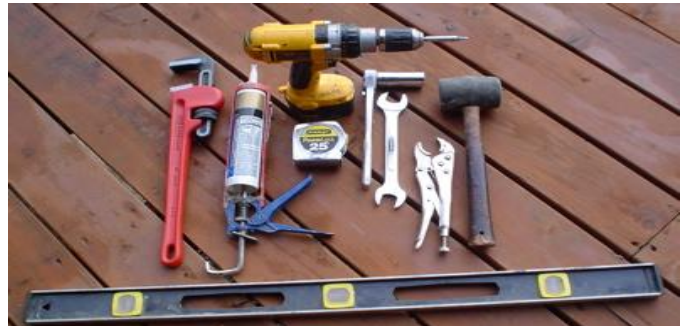
Locate the enclosed packing list to identify and confirm that all items are included. A copy of the packing list is inside the packaging.



Left to Right: Cover, floor sections, staves, retention bands, bench segments.

Tools Required

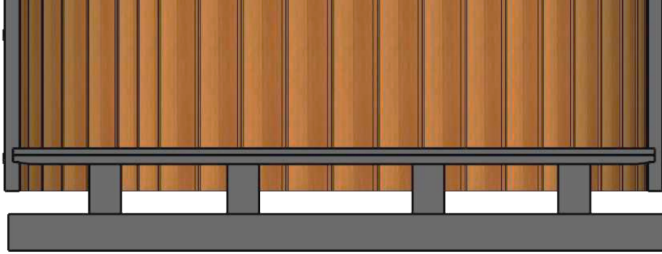
You will need a few basic tools that are not provided.



- ☐ A large rubber mallet (handle the length of a normal hammer, head the size of a soup can)
- ☐ Tape Measure (12'-25' as needed depending on distance to system)
- ☐ Drill with following screw bits:
 - ☐ Torx® T20 and T25 bits
 - ☐ #2 Square drive bit
 - ☐ #1 and #2 Phillips bits
- ☐ Carpenters' level (2' or longer)
- ☐ 15/16" and 1-1/16" wrenches and/or deep-well sockets - handle should be at least 12"
- ☐ Optional: 25-45 ft-lb torque wrench with 1-1/16" socket or crow-foot
- ☐ Medium sized pipe wrench
- ☐ 4" x 6" lumber for chine joists (see following section for details)
- ☐ End sealer for treated lumber
- ☐ Disposable paintbrush (for end sealer)
- ☐ Disposable gloves
- ☐ Rags (for oiling tub and plumbing cleanup)

Chine Joists

Properly installed chine joists are critical for transferring the weight of the tub from the floor to the foundation. The staves must not bear the filled weight of the tub. The chine joists are not optional. **The warranty is void if the tub is filled without being properly supported.**



The chine joists are not included, but are made from 4" x 6" pressure treated lumber (3-1/2" x 5-1/2" true dimensions) that can be purchased from any home improvement store. As shown above, they are installed with the 5-1/2" side vertical. This lifts the bottoms of the staves about 2-3/8" above the foundation for plumbing and ventilation clearance, and ensures no weight is borne by any stave.

Refer to Figure 4.1 for the number and lengths.

Tub size, shape	# of joists	Joist max. lengths (inches)
4' Round	3	30, 43, 30
5' Round	4	33, 48, 48, 33
6' Round	4	34, 62, 62, 34
7' Round	5	48, 72, 78, 72, 48
8' Round	5	52, 78, 90, 78, 52
4' Ellipse	3	20, 40, 20
5' Ellipse	3	30, 52, 30
6' Ellipse	4	34, 62, 62, 34
7' Ellipse	4	42, 72, 72, 42
8' Ellipse	4	48, 80, 80, 48

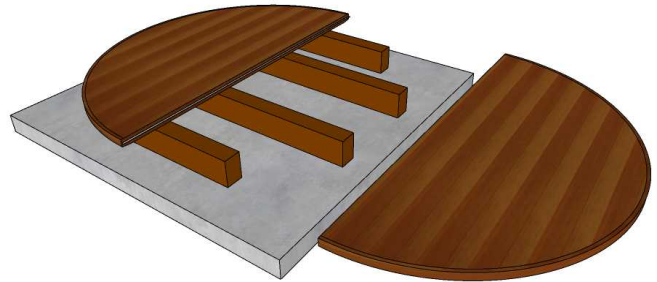
Chine joist specifications

You will also need a treated lumber end sealer product, such as Woodlife Coppercoat, to protect the cut ends of the chine joists.

If you are installing on a concrete pad, you may optionally consider purchasing and using a foam moisture barrier product known as 'sill plate gasket' between the chine joists and the concrete. This inexpensive gasket reduces moisture in the wood and may extend the life of your chine joists and tub.



Once you have your chine joists cut to length and the ends treated, lay them out and use your level to get the joists level in all directions (Figure 4.2.) Chine joists must run perpendicular (at right angle to) the floor seam, +/- 45°.



Chine joists should be evenly spaced about 16" - 24" apart depending on tub size. Spacing does not need to be exact, and can be adjusted as necessary. Make sure the joists will not interfere with the drain or other plumbing. It is not necessary to glue or nail the chine joists in place. Note: the optional angled end cuts allow for maximum surface contact.

Once again: **The warranty is void if the tub is filled without being properly supported.** DO NOT allow the bottoms of the staves to make contact with anything. Make sure the chine joists are on edge such that the floor is 5-1/2" above the foundation, and oriented so that the floor seam will cross the chine joists within 45° of perpendicular.

Preparing and Setting the Floor

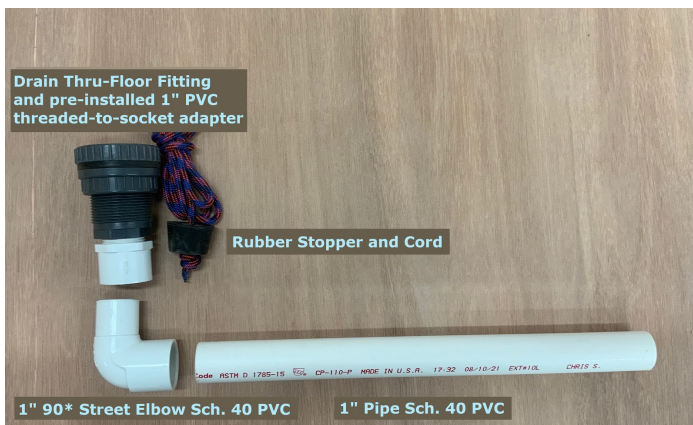
IMPORTANT: The whole process from setting the floor in place to installing the first band needs to be done in one, dry day. If the wood gets wet and begins to swell while partially assembled, it will be very difficult to finish assembly without persistent leaks.

Locate your floor. Depending on the size of your tub, it is in 1, 2, or 3 sections. The side with the bevel is the underside, and the smoothly sanded side with the recesses around the hole(s) is the inside.

We have installed a .044" x 1-1/4" inch stainless steel spline and two wooden dowels into one side of each floor seam. The purpose of the spline and dowels is to keep the floor sections aligned with each other.

Installing Floor Plumbing

Chofu: Locate the gray thru-floor drain fitting and pre assembled PVC threaded-to-socket adapter. Press the drain fitting sub-assembly into the recessed drain hole with the rubber gasket on the top side (inside the tub) and tighten the large nut underneath hand tight. You may need to tap the drain down into place with a mallet. It is a tight fit. Finish with 1/4 turn past hand tight with a pipe wrench - do not over tighten! The floor will swell thicker when filled. Install the rubber stopper - press down by hand to achieve a tight fit.



Next, consider where and how you'll want to route your drain line. If you have a determined drain area, add whatever pipe is necessary (if any) to route the water to that location. Alternately, you can install a threaded garden hose adapter so you can divert the water wherever you wish.

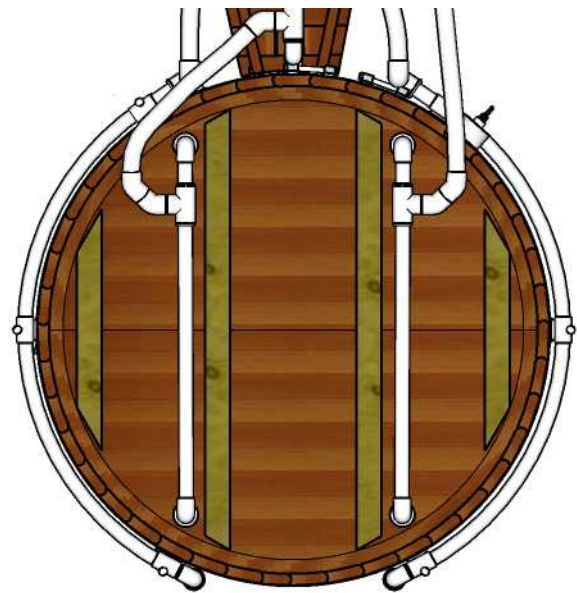
Spa System with Floor Suctions:

Refer to the [Parts and Supplies](#) list in the following section. You will need:

- ☐ (2) thru-fittings with suction screens,
- ☐ (2) 90° threaded elbow nuts,
- ☐ (1) plastic fitting wrench
- ☐ (1) 2" Tee,
- ☐ (2) 2" to 1-1/2" reducing bushings, and
- ☐ a length of 1-1/2" PVC pipe.

(If you have the dual-pump option, you will need twice as many of each except the fitting wrench.)

Lay some of the packaging foam over the chine joists, and carefully set the floor sections in place **UPSIDE DOWN** (bevel side up, smooth side down) for access to the underside. Refer to Figure 4.3 and observe the floor suction assemblies.



Typical placement and orientation of chine joists, floor suction, and floor seam. 6' Round tub, as seen from below. Shown with both optional massage jet upgrades installed.

Temporarily install the thru-fittings and 90° nuts. Glue the reducing bushings into the opposite ends of the Tee, and the shorter section of 1-1/2" pipe into one of the bushings. Glue the other end of the short section of pipe into one of the 90° nuts temporarily installed to the floor, then determine how long the other pipe needs to be to reach from the other 90° nut to the remaining reducing bushing. **Do not glue this yet.**

Remove the thru-fittings so that the floor can be turned right-side-up one section at a time to avoid breaking anything.

Setting the Floor in Place

Place the floor sections on the chine joists with the BEVEL SIDE DOWN, nicely sanded side up, so the floor seam runs across the chine joists. Check that the drain is placed properly and that the joists do not interfere with it.

Be sure that the mating edges of the floor are clean and free of debris. Align the floor panels and use a mallet to tap them together so spline and dowels line up and the seam is as tight as possible. A hairline gap between the panels is acceptable and will swell shut when water is introduced.

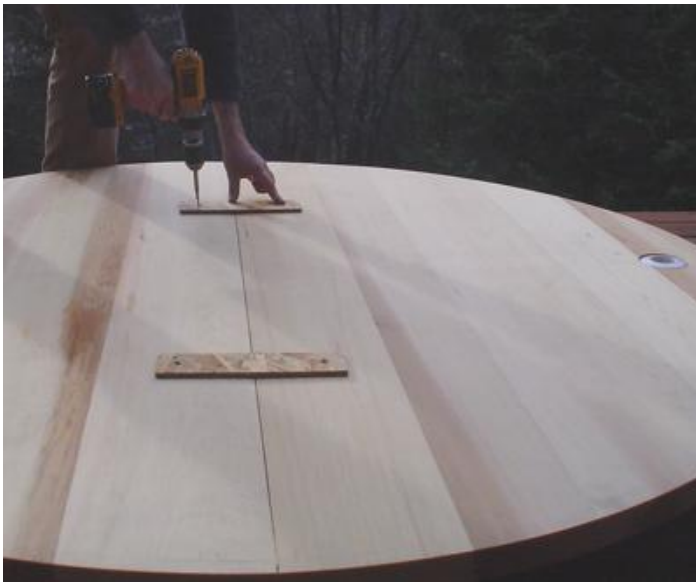


Figure 5.3 Temporary floor braces

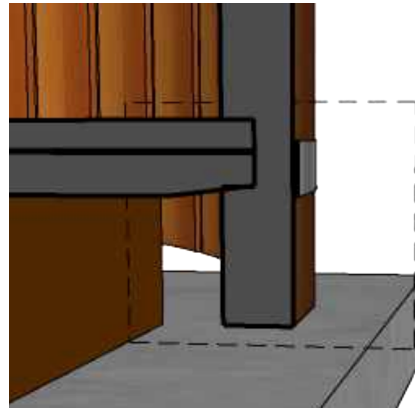
Use the two small pieces of scrap plywood provided as temporary floor braces and lay them across the floor seam several inches from each side of the tub. Temporarily screw them directly to the top of the floor with the four short screws provided. (Figure 5.3) This will keep the center seam from opening up during assembly. They will be removed in a later step after the tub is assembled. Failure to use these braces will cause problems during assembly. The small holes caused by the screws will swell closed later, once the wood is wet.

Now check that the floor is level and oriented as you want it. Also check that the ends of the chine joists are about 2 inches inside the edge of the tub floor (inside of the bevel) so that they will not interfere with the placement of staves. Adjust the chine joist placement as needed.

If you have floor suction, finish installing them at this time. Working quickly, apply glue to the remaining joints, slide the assembly under the floor, and install the thru-fittings into the 90° fitting nuts. Tighten 1/2 turn past hand-tight. Don't overtighten - the fittings will tighten significantly as the wood swells. Next, use one or two 45° fittings and a length of 2" flex hose to route the suction line(s) out from under the floor. The flex hose must be running flat on the ground at the edge of the tub to provide enough clearance once the staves are installed.

Installing Staves

Stave installation takes patience to do correctly, but needs to be done right the first time. Before we even grab the first stave, let's get an overview of the steps and why they need to be done in order.



The beveled edge of the floor forms a wedge. The staves have a slot cut across them called a 'dado'. As the staves are assembled, the dados are tapped onto the beveled floor. When all the staves are correctly positioned, the staves are then carefully driven tight, a little at a time, in several laps around the tub. As they become wedged tight onto the floor, they also form a smaller and smaller circle, causing the staves to press tightly against each other. The metal retention bands then keep all the staves tightly pressed together. If every single step goes perfectly, sometimes the tub will be watertight at this point from

friction alone; however, having a few minor leaks is common and is no cause for concern.

When water is added, the wood swells and the joints become tighter still. After a few days of swelling, the joints are so tight that the soft cedar has form-fit to the adjacent pieces, and any leaks close up and disappear. (Sometimes, stubborn leaks may persist for a week or two, but the wood does continue to swell during this time. If you experience this, wait a few weeks then refer to our Leak Troubleshooting Guide for further steps.)

These are the key factors for a tub that seals up quickly and stays leak-free:

- Floor is flat, level, and well-supported by chine joists perpendicular to the seam. Seam is tight.
- No weight whatsoever is supported by the bottoms of the staves.
- Staves are properly spaced, driven evenly onto the floor with the mallet, and bands are tightened correctly.
- No lateral pressure on the staves; recessed decks or any other adjacent structures should have 1" clearance so the staves are free to move as they swell, and to account for any shifting or settling that may occur.
- Unmodified stave bottoms. Cutting or otherwise modifying the bottom of the stave results in loss of strength, which could cause the stave to split when tightened.
- Long term: Good drainage and ventilation provided. Debris such as soil or leaves collecting against the tub will trap moisture and encourage wood decay that will eventually cause the tub to fail.

Our woodworkers have already test assembled each tub in our production shop. As each tub is disassembled for shipment, we trace each stave's position onto the floor, and number the bottoms of the stave and the corresponding location on the floor. We also mark a perimeter guideline 9/16" from the edge. Carefully using these traced locations and guide lines will take a lot of the guesswork out of assembly.

Note: if you wish to place the jets differently, it is possible to do so but you will have to space the staves evenly without the benefit of the guidelines. You must also verify that your modified layout will not cause the plumbing to interfere with the benches or bench supports, or cause the jet or suction bodies to be too close to connect.

Here's a quick description of what we're about to do:

- Put the first stave in the #1 spot marked on the floor, using the rubber mallet to tap it on just enough that it stays put. Add the second stave by hinging the bead into the cove of the first stave and tapping it to the line.
- Continue adding the staves in order, as shown by the pencil marks, tapping them in place just enough that they stay put.
- Check for obvious gaps with the mirror and adjust staves to distribute.
- Tap staves just over the perimeter pencil line.
- Check for gaps again. If present, temporarily install the bottom band and tap staves outward against the band to allow the staves to move sideways and equalize the gaps.
- **When all gaps are gone**, proceed to the Installing and Tightening Retention Bands section; after installing the bands, you will make successive laps around the tub hitting a little harder each time with the mallet, while tightening the bottom band. Tap tap tap, TAP TAP TAP, **SMACK SMACK SMACK**.

It is very important to NEVER smack the staves until all the gaps have been distributed. Once staves have been driven home, it is very difficult to get them to move which causes persistent leaks. Fully driven staves are liable to break if you try to remove them.

The process of distributing all your gaps can be tedious, but it is well worth the patience to have your tub come together and seal up without a fuss.

Note: do not use silicone or any other sealant between the staves, or in the dado. Sealant will interfere with the swelling of the wood. Check the edges of each stave and remove any dirt or wood particles that could interfere with the seal.

Ready to start?

Check your packing list for the number of staves we supplied. Locate your staves, and make sure they are all present.

Locate the stave and the location on the floor marked '1'. Fit the dado over the edge of the floor, and use the mallet to *gently* tap the stave onto the floor until it meets the perimeter guideline. Tap the stave about 4" from the bottom, directly opposite the dado and the floor. The stave should be just tight enough to stand on its own from the friction of the tapered joint.

Locate the stave and location marked '2'. Use the bead edge of Stave 1 to 'hinge' Stave 2 into place. *Tip: try using your non-dominant hand to hold the top of Stave 2, resting your wrist on Stave 1, while your dominant hand taps Stave 2 into place.*

Continue your way around the tub in order. With each stave, pay attention to the guidelines, and make sure each stave lines up with the traced marks.

When you get to the last stave, tap the first stave from the inside to loosen it. Hinge it out until the last stave pops in the cove, and tap the two staves inward together to meet the line.

Locate the plastic mirror we provide. Use it to inspect the bottoms of the staves. You should have a hairline gap between each stave. A few may be slightly larger at this point, but none of them should be more than 1/16". That's about the thickness of a US penny; you can hold a penny beside the gap to estimate how wide the gap is at its narrowest point. If you have any gaps wider than the thickness of a penny, tap outwards to loosen the surrounding staves and nudge them over to close the gap.

Once all gaps are smaller than a penny and evenly distributed, tap each stave inward with moderate pressure until the staves are just beyond the 9/16" guideline. *Tip: look in the notches between staves to see how far over the line the stave has gone.*

Take your mirror and check again for gaps. This time, you want all gaps to be less than 1/32", or the

thickness of a credit card. If all gaps are smaller than 1/32" at the narrowest point, you can proceed to tightening. If any gaps need to be closed, install only the bottom band as described in the Band Installation section. (If you have a long ratchet strap, you can use that instead for convenience). Tighten or loosen the band until you can still slide it on the stave, but barely. Now go around the entire tub tapping the staves outwards. This will unseat the stave from the floor and allow it to move, but the band will prevent the stave from moving very far. The side-to-side pressure from the other staves will equalize your gaps. Repeat as needed until the mirror shows all your gaps are even, then tap the staves inward again. Check that the gaps are small enough.

If you have the time, we recommend applying at least one coat of oil and allowing it to dry for about two hours before installing the bands. Otherwise, skip to the Installing and Tightening Retention Bands section for now, and come back to Oiling your Tub later.

Oiling your Tub

Locate the Teak Oil finish we provide. Put on some disposable gloves. Fold up one of your rags into a square about the size of your hand. Dip the folded edge about an inch into the Teak Oil, and then use the rag like a paintbrush to apply it to the sides of the tub. We recommend oiling 1 to 3 staves at a time, from bottom to top, and working your way around the tub. Apply the oil as heavily as you can without dripping everywhere: you want this first coat to really soak in and seal the wood.

Once all the sides are done, oil the rim of the tub, being careful not to spill over the inside edge. The end grain will soak in a lot of oil, and you will need to oil the top 3-4 times before it stops absorbing more.

Finally, oil the bottoms of the staves by using the rag like a sponge and soaking the oil into the wood.

While you have the oil out, you may wish to oil the Topside Controller Shelf and the Entry Steps (if purchased) at the same time.

After the first coat of oil, it is your choice whether to wait to install the bands until you have applied another coat, whether you wish to oil around the bands, or whether you just want to oil right over the bands and not worry about keeping them shiny. *Tip: if you want shiny bands and accidentally get a little oil on them, the oil wipes right off with acetone. Be careful not to get acetone on the wood.*

Apply another coat after 24 hours, and a third coat within a few weeks. After these first three coats, add a coat of oil whenever the surface starts to look dull and dry. This could be every few months or every few years depending on your climate and how exposed the tub is to the elements.

Installing / Tightening Retention Bands

Once all the staves are in place then you are ready for the bottom retention band.

But first, let us stress once again, if you aren't comfortable with your stave gaps, DO NOT force it and just try it to see if it works. If you have any gaps, return to the earlier sections and work them out.

Locate the stainless steel retention bands and bolts. You will also need your 15/16" and 1-1/16" wrenches and/or sockets. The bands provide inward pressure to hold the tub together and contain the weight of the water. As the wood swells, the bands do not allow the staves to move outward, and the pressure generated forces the staves and floor together to close up all the seams. The table below shows the correct number and placement of bands for each tub height.

Tub Height	Band Placement			
29	4.75,	25		
36	4.75,	17.75,	31	
42	4.75,	15.25,	26.25,	37
48	4.75,	17.25,	29.75,	43

Note: All measurements are from the bottom of the stave to the top of the band.

Remove the nuts from the large 8" x 5/8" stainless steel bolts. We recommend putting a little anti-seize, grease, etc. on the nut threads to help prevent them from seizing in the future.

With a helper, fit the first band around the tub at 4.75 inches measured from the bottom of the staves to the top of the retention band. This measurement is crucial so that pressure is applied directly over the floor's edge. Position the band so that the bolt is over a seam between staves. The fit may be tight, but you will be able to pull the ends close enough to slip the bolt in place and get the nut started. Use your 1-1/16" wrench to take up a little slack so the band will stay in place - only a few turns.



Proper placements of bands and bolts. Note how the bolts straddle seams and are staggered.

Now install the other bands at the placement heights shown. Stagger the bolts such that each bolt straddles a different seam, as shown above. Use your wrench to slightly tighten each band enough so they hold their position. Go around the tub with a tape measure and check the height of each band in several places all around to make sure they are level, moving them up or down as needed.

VERY VERY Important: Before tightening, look under the tub rim (with mirror) and confirm again that you do not have any significant gaps between staves. If in doubt, return to the Installing Staves section.

You will alternate tightening the bands and tapping the staves several times. If you still have a helper, one person will be tightening the bottom bolt clamp as the other person drives the staves. Tighten all the bands until they are snug and do not slide. Starting opposite the bottom bolt, tap each stave inward, hitting right over the bottom band with moderate

force. Tap tap tap. Continue until you reach the bolt. Double-check the band heights, and tighten all the bands to take up the slack. Go back to the stave opposite the bottom bolt and repeat in the other direction. Tighten the bands again, then use the mirror to check your gaps. If they are closing evenly, repeat the process hitting the staves just a little harder. TAP TAP TAP. The 9/16" perimeter guideline should be barely visible in the notch between staves.

Your gaps should be practically gone by now. If there are any gaps that concern you, STOP! This is the last easy chance to fix it! If you need to call us for customer support, it is much easier to help you now than it is after the final tightening.

Turn your attention to the tops of the staves for a moment. They should be lined up nicely giving a smooth interior. If any need alignment, use your hands to wiggle them inward or outward. You'll likely hear them pop into place.

If your gaps are closed up, repeat the tightening process, this time with a hearty SMACK SMACK SMACK right on the bottom band. The 9/16" guideline should no longer be visible anywhere.



Figure 8.1 Hitting staves directly on the band.

By now, you should be hitting the staves with a sizable wallop. You may notice a change in sound when the staves fully seat against the floor, SMACK SMACK **THUD**, but it can be hard to recognize. Once you are hitting the staves hard, and hitting the staves doesn't produce much or any slack in the bands, your

staves are fully driven and it is time to fully tighten the bands.

Start with the bottom band. Your wrench should be about 12" long; a shorter wrench will not give you enough leverage to fully tighten the bolt. Use a wrench or pliers to prevent the aluminum block that the bolt passes through from twisting as you do the final tightening. The bottom band is pressing against the floor on the inside, so it will reach a point where you can tell it quickly becomes very tight - don't force it beyond that. Stop when further tightening becomes significantly more difficult and you see noticeable deflection of the aluminum blocks. This indicates the bottom band is tight enough.

As you tighten the upper bands check the staves from the top end and make sure their bead to cove interfaces are all well aligned. Lightly bumping it with your hand can release tension if they aren't. The upper bands don't need to be quite as tight as the bottom, but still quite snug. If they feel tight, they are. The seams will tighten substantially once the tub is filled and the wood swells.

Note: there are often small gaps between the peak of the bead and cove; these will take care of themselves as the wood swells, softens, and tightens after filling.



Figure 8.2 Using a wrench or pliers to hold the blocks straight as you tighten the bolt.

TIP: If you have a torque wrench – the bottom band should be tightened to about 40 foot lbs. of torque, the next band up should be at about 30 foot lbs. the upper ones to a lesser amount - about 25 foot lbs. of torque. However sometimes the bolt is too long for

even a deep socket. Don't sweat it. A torque wrench is optional. Use the preceding explanations to understand how tight to make things.

Install Topside Shelf (if using)

If you will be mounting your topside controller on the included cedar shelf, now is a good time to install it. One end of each support leg is labeled to match the corresponding pre-drilled screw hole on the shelf. Loosely install the screws.

If you have a vinyl tub cover, mount the shelf at least 2-½" below the rim of the tub so that it does not interfere with the cover.

Hold the shelf in place, and make sure that none of the screws will drive into the seams between staves. This will cause a leak. When you are happy with the location, drive the two screws under the shelf first. Next, make sure the shelf is level, and secure the bottom ends of the support legs. Finally, tighten up the screws at the top of the support legs.

Installing Benches

Tub Diameter (feet)	Number of benches	Bench arrangement
4 Round	1	One end
5 - 6 Round	3	Full circle
7 - 8 Round	4	Full circle
4 Ellipse	1	One end
5 Ellipse	2	Opposite ends
6 Ellipse	2	Semi-circle
7 & 8 Ellipse	4	Full circle

Number and Style of Benches

Before installing benches, take a look to see if there are any plumbing or system installation steps that would be easier to accomplish without benches in the way.

Each bench section is supported with four blocks, which act as legs, screwed directly to the inside of

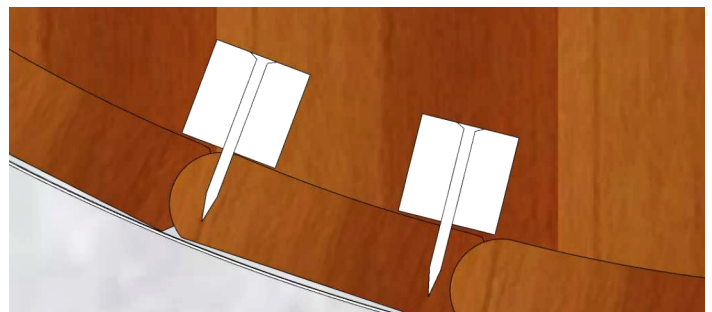
the staves with the included 3" stainless screws. The bench is then screwed down to the top of those four blocks with more 3" screws.

As shown on the following page, the bench blocks must be positioned underneath the gaps between the bench boards. The bench blocks must also be installed such that the screws do NOT drive into the seams between staves. Also, the bench blocks must not interfere with any fittings (lights, plumbing, etc).

The easiest way to position the bench blocks is to place one bench segment in the tub, in the desired location. Use the gaps between bench boards to see where the bench blocks will go, and adjust as needed to get good bench block placement. Mark where the bench blocks will go with a pencil, then repeat with the following section(s).

Tips: in each gap, the tip of the shorter board is almost exactly the ideal spot for the bench block. A screw placed in the center of the gap will drive into about the middle of the block.

As seen below, the center of the bench block can be installed quite close to the seam on the bead side (rounded), but must not be installed too close on the cove side (cupped).



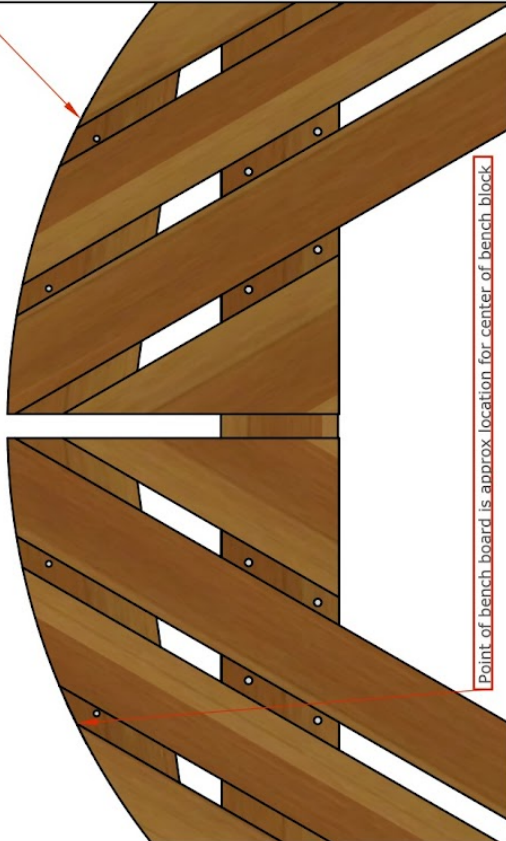
End benches install straight across the tub. Circle or semi-circle benches are connected to each other with sister braces to eliminate twisting. Assembly details are shown on the following page.

per bench segment intersection:

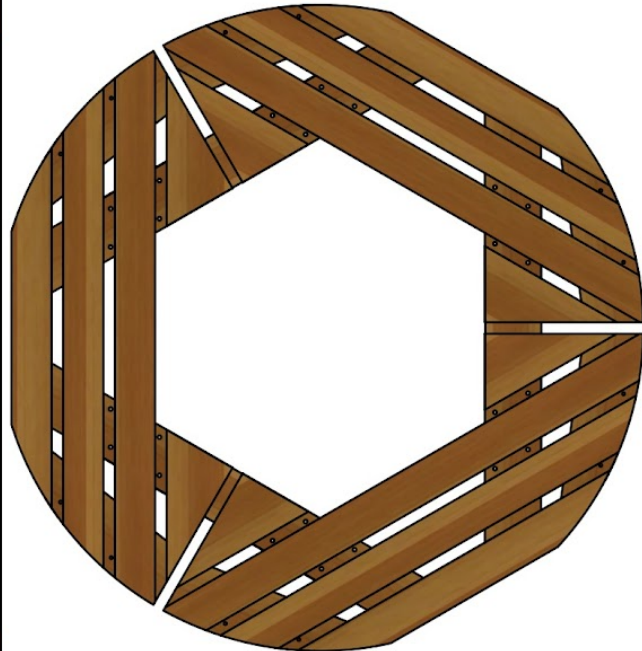
qty. 8 sister board screws, 1_5/8" long (24 per full bench set)
 qty. 4 each block screws, 3" long (12 per full bench set)

When installing 3" bench block screws be sure to follow these tips:

1. Put your weight on the bench to keep it from lifting off the bench block while the screws are being driven.
2. Aim the screws to enter the center of the top of the bench blocks. You may have to angle the screws slightly.
3. Place the screws far enough away from the edge of the bench brace to prevent splitting or tear out.



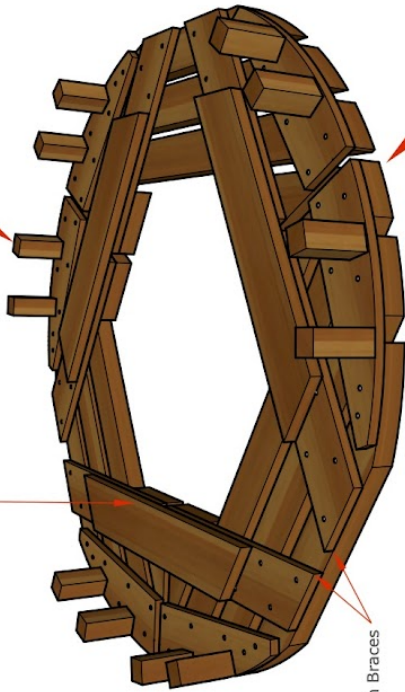
Point of bench board is approx location for center of bench block



Bench Blocks (12x)

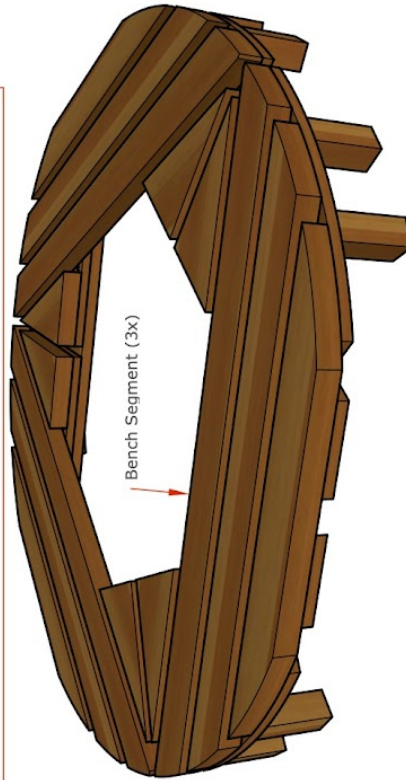
Sister Boards (3x)

Bench Braces



- Recommended assembly sequence:
1. Set benches in place on bench blocks, but do not screw down.
 2. Adjust benches for even spacing between benches, and flush edges at the triangles.
 3. Screw the Sister Boards to the benches with 1-5/8" screws. Clamps are recommended for tight joints.
 4. Once all the benches are connected by the Sister Boards, move the bench assembly as needed for equal spacing around the perimeter of the tub, and for access between bench boards to drive the 3" screws through the Bench Braces and into the Bench Blocks.

Bench Segment (3x)



Installing Hot Tub Cover

Installing your hot tub cover is very simple. Place the cover on the tub, and rotate it until the seam is aligned with the direction you wish to open it. Attach the buckles to the straps, and use the included #1 Phillips screws to secure the lower portion of the buckle to the tub.

Assembling Cedar Hot Tub Steps (optional accessory)



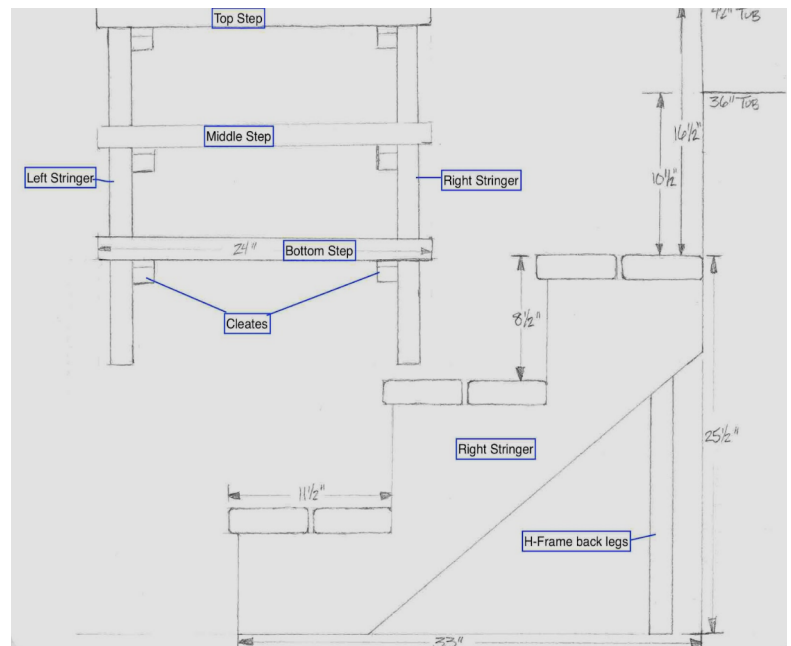
The hot tub steps are marked with letters to make assembly easier.

Stair Pieces:

- (1) - Left Stringer
- (1) - Right Stringer
- (1) - H-frame, back legs
- (2) - lower steps (bottom & middle are the same)
- (1) - Top Step (scribed to fit against the tub)
- (22) - 2 1/2" screws

Using the included screws, fasten the H-Frame to the left and right stringers, matching the letters and lining up the pre-drilled pilot holes.

Next fasten the bottom step to the stringers. Continue with the top step, then middle step.



Heat and Filtration System Installation

Electric or Gas Heat

General System Installation Considerations:

This section provides a general concept overview of how the system is set up. There are a few important rules to follow for safety and for best system performance. Otherwise, there is a lot of flexibility in the placement of the equipment and the routing of the pipes. The included plumbing diagrams are useful for getting the big picture. We have made every effort to include the parts you will need; however, your site may require some modifications or additional fittings. With the exception of the jet, suction and skimmer assemblies, the parts needed are standard sized Schedule 40 PVC plumbing fittings widely available at hardware and plumbing supply stores. You can contact us for additional parts if necessary.

The water in the tub is circulated in a closed loop by means of a pump through a heater and a filter and returned to the tub. If you have massage jets, you also have a two-speed pump with a low speed for heating and filtration, and a high speed for the massage jets. If you do not have massage jets, your pump is an efficient single-speed circulation pump. The tub control system unit manages the temperature, sanitizer cycles, and pump. The user interface is through the topside control touchpad that can be installed next to the tub.

Important: National Electric Code requires that electronic spa equipment be at least 5 feet away from the tub and/or behind a physical barrier that prevents a bather from reaching it. This is an important safety requirement! If your tub and system are over 5 feet apart then your installation meets code. If your tub and system are less than 5 feet apart, you must separate them with a barrier that prevents anyone in the tub from touching the electrical equipment.

VERY IMPORTANT! Electrical devices used with hot tubs need to be wired into a GFCI protected circuit. The tub control system unit must be wired to a GFCI circuit breaker – have your electrician provide and install this type of breaker. This is a required safety item.

Important: Qualified professionals familiar with local code must install the electrical connections. They should review the manufacturer's installation instructions included with the heater equipment.

We provide flexible spa pipe and rigid Schedule 40 PVC pipe for connecting the system to your tub. If you place the equipment more than ten feet away you may need additional spa pipe and/or rigid pipe to complete the installation. The flexible spa pipe is best for curves and places where flexibility is helpful. Everywhere you have straight runs, rigid PVC is more ideal.

Note: the default ACC controller cable is only 10' long. We can provide a longer controller cable if required.

Wherever it is practical, using the flex hose to make wide bends instead of using 90° Elbows will improve flow, resulting in more power at the jets and less water noise in the system. Using two 45° Elbows is another option. Most tub control systems come with a flooded suction pump. These pumps must be installed below the waterline of the tub. Optionally, self-priming pumps are available for installations requiring the pump to be above the waterline of the tub. These pumps come with an integrated leaf trap which has the second function of helping a pump to self-prime between automatic cycles. The maximum self-priming pumps can typically be

above the waterline is about 5', though this is dependent on several factors. Any installations outside of these parameters may require the use of a check valve (not included), and/or a different pump. Improper installation may cause the system to malfunction.

The tub control system is UL listed as weatherproof. Place equipment where it is not exposed to flooding, pooling of water, or snow accumulation.

Place all the equipment where it can be easily accessed for adjustments and service. The filter, ball valves and heater should be conveniently located. By placing unions or drain fittings at low points in the system, you can drain it completely if necessary (winter vacation, extended shutdown, service, etc.) Refer to [Assessing Your Site](#) for information about hiding the plumbing.

Please carefully read all the included manufacturer's instructions for the tub control system heater, sanitizer (ozonator, ionizer, etc.), and filter.

The flex pipe can be cut with a utility knife or hacksaw. Clean off any rough edges or fuzz with sandpaper. Complete the installation as a "dry fit" without glue before gluing any of the connections.

Tip: the fittings will not fully seat onto the pipe without primer and glue; however, the dry fitting process is still valuable for making sure all required fittings are present and pipes are cut, as well as helping think through the order of assembly. Only a few joints can be glued at a time, or the glue will begin to set before all the parts are assembled. Mocking up which joints should be glued together is time well spent.

Once you are satisfied with the whole system, begin gluing. Make sure the pipe and fittings are clean – wipe off any dirt or debris. Use the primer first on both surfaces, then glue on both surfaces. The glue is permanent. Provide good ventilation while gluing – the fumes are harmful. Avoid getting glue on your skin by wearing gloves. Hold each connection firmly for at least 10 seconds after gluing, otherwise they will partially separate.

Reference the other included manuals and diagrams for the following installation steps.

System Installation Instructions

In addition to the components, fittings, and tools provided, you will need the following:

- | | |
|---|---|
| <input type="checkbox"/> Hacksaw and/or Pipe Cutters | <input type="checkbox"/> Sharpie marker |
| <input type="checkbox"/> Tape Measure (12'-25' as needed) | <input type="checkbox"/> Disposable Gloves |
| <input type="checkbox"/> Screwdrivers: | <input type="checkbox"/> Rags |
| <input type="checkbox"/> Flathead | <input type="checkbox"/> Wire cutting, stripping, and crimping pliers |
| <input type="checkbox"/> #2 Phillips | |

- **Install Suction and Jet Fittings** Holes for these have been pre-cut. There are two gaskets, one for each side of the tub. The ribbed face of the gasket goes against the wood.
 - a. Suctions: Floor-mounted suction s are best installed prior to tub stave assembly. See Installing Floor Plumbing for installation instructions.
 - b. Return and/or Jets: Depending on your selected options, your tub may have one Return port, six Jet ports, or 12 Jet ports. All use the same Long Body Thru-Wall fitting with Eyeball on the inside of the tub. The Return port uses a 90° Elbow Nut on the outside. Massage Jets use a Hydro-Jet Body, which must be installed with the removable cap on top. Fittings should be installed 1/2 turn past hand tight. Do not overtighten; it will tighten further as the wood swells.
- **Install Skimmer Fittings** The Skimmer consists of a Long Body Thru-Wall fitting, the Skimmer Screen components, and a 90° Elbow Nut. Assemble the thru-wall fitting into the elbow nut 1/2 turn past hand tight. Do not overtighten; it will tighten further as the wood swells. Use the small threaded screen to install the large screen onto the thru-wall fitting, and secure with the small screw. Use the large screw to secure the top of the large screen to the stave.
- **Pump and Spa Pack** After reviewing the plumbing diagrams and the National Electric Code requirement for 5' or a barrier between the tub and electrical components, begin placing your system components in your selected location. The control unit needs to be accessible for electrical connections, and the drain plugs on the pump will need to be accessible. The pump should be the first component, and the spa pack should be the second.
- **Filter** Next position the filter. The housing should be installed as near to vertical as possible. The filter comes with both a base mounting pedestal as well as an optional mounting nut for mounting in a hole in a surface such as a deck in a drop-in manner.
 - a. We recommend placing the filter after the pump, on the 'pressure' side. While it may seem like placing the filter in front of the rest of the system would protect the system from contaminants, this is actually not entirely true. The filter element can only handle about 50 gallons of water per minute. Above this speed, a spring-loaded gate opens in the filter housing to allow the additional water to bypass the filter element. So not all of the water flows through the filter anyway. That may seem like a design flaw, but the filtration cycle runs at about 50 gallons per minute so the filter performs as intended. Also, it is much easier for the pump to push water through the filter than to try to pull it through. Placing the filter before the pump robs much more water flow than placing it on the pressure side.

- b. Take care to align the IN and OUT properly for the water flow direction. Be sure that the filter is in a convenient location because you will need to clean or change it regularly.
- **Gas Heater Plumbing Connections (if applicable)** Connect the output from the filter to the input on the Gas heater. The instructions and connection parts for the gas heater may be shipped inside the heater. Open the connection plate to locate them if necessary. Read these carefully to properly identify the inlet to the heater.
 - **Sanitizer (Ozonator, Ionizer, etc.)** The last major item before the water goes back to the tub should be the sanitizer. The included sanitizer system has a fitting that is installed after the heater and filter in the line returning to the tub. See the plumbing diagram and system component manual(s) for clarity, proper setup and adjustment procedures.
 - **Suction Connections** Connect the Skimmer down pipe to the Suction line coming out from under the tub. Utilize the fittings in the way that works best for your situation. Install one of the provided ball valves somewhere in the suction line in a convenient location after the suction and before any other components such as the heater or pump. This is so that the water can be shut off for filter cleaning and other service tasks. The ball valve includes a union fitting that allows for a hassle-free disconnect if needed. Use additional unions as needed. A low point on the suction line is also a good place to install a drain assembly consisting of a reducing tee, small ball valve, and PVC-to-garden-hose adapter.
 - **Jet Connections** The Circulation-Only Return fitting is easy: simply plumb the return line into the return fitting. If you have the Hydro-Jet upgrade, the fittings may look intimidating at first glance, but are not as complicated as they seem. Air from the Air Control Valve(s) is plumbed to the top side of the Hydro-Jet body (the side with the removable caps). The water is plumbed to the bottom side. There are many ways to supply the water and air, but one of the simplest options is illustrated in the plumbing diagrams. The plumbing should remain 2" until the Tee for maximum flow.
 - **Final Connection** Now complete the return line connection by using the spa flex pipe/rigid PVC to make the final connection between the system and the jet(s). Before the jets, install the second ball valve in a convenient location. Place ball valves so that by closing the two ball valves, you can stop the flow of water to the filter, pump and heater so they can be worked on without draining the tub!
 - **Plumbing drainage** To make draining the plumbing easy for winterizing, place a union, union/ball-valve or other appropriate style valve at the lowest spot(s) in the plumbing. By doing this the system can be easily drained if necessary for winter storage
 - **Tub Drainage** The tub drain is either a floor fitting (Chofu) or a reducing Tee and ball valve installed in the suction line (powered systems). The tub drain pipe is easily adapted to temporarily attach a garden hose when it is time to drain the tub. You can also attach flex or rigid PVC with a coupler to extend the drain line to a more desired location in a more permanent manner.
 - **Topside Control** The topside keypad control panel plugs into the tub control system controller unit (refer to tub control system user manual). This panel should ideally be placed close to the tub so you can adjust the temperature or turn on jets while using the tub. Use the included touchpad shelf mount to attach it to the tub or make your own cut out in a nearby location such as a deck or wall.

- Electrical Power to the Spa Pack** Contact a qualified professional electrician for these connections. The tub control system heater must be wired to a GFCI circuit breaker – have your electrician provide and install this type of breaker. This is a required safety item. Do not try to make these connections on your own. Refer to the tub control system installation instructions for proper wiring.
 - Power is supplied to the pump through the Spa Pack
 - Power for the gas heater (if applicable) can be supplied through the Spa Pack, or directly from the dedicated spa system GFCI circuit
- Fireman circuit connection to gas heater (if applicable)** The gas heater must be connected to the tub control system system by a low voltage signal wire called a “Fireman’s circuit”. Most of our systems include a prefabricated wire for this purpose. If not, use 18 AWG wire. This step is detailed in the tub control system AND the gas heater manuals. The gas heater will have a separate power supply (can either be 120V or 240V), but this signal wire is separate and must be non-powered. It runs from the spa control unit to the gas heater and allows the spa control unit to control when the gas heater turns on and off.
 - See following page for wiring example with RayPak 106A heater
- Gas Connection to the gas heater unit (if applicable)** Contact a qualified gas appliance installer to make the actual gas connection to the heater in accordance with the gas heater manufacturer’s manual.
- Bonding wire** Use the provided copper wire to connect the bonding lug(s) on the pump and gas heater (if applicable) to the bonding lug on the Spa Pack. The Spa Pack bonding lug is internally grounded.

Electrical Requirements:

5.5kW 6 Jet	11kW 6 Jet	Gas 6 Jet	5.5kW 12 Jet	5.5kW 12 Jet	Gas 12 Jet	5.5kW Circ	11kW Circ	Gas Circ
240V	240V	120V	240V	240V	120V	240V	240V	120V
50A	50A	25A	Dual Circuit	Dual Circuit	50A	30A	50A	15A

Important!

Electrical connection between Hot Tub Control and Gas Heater:

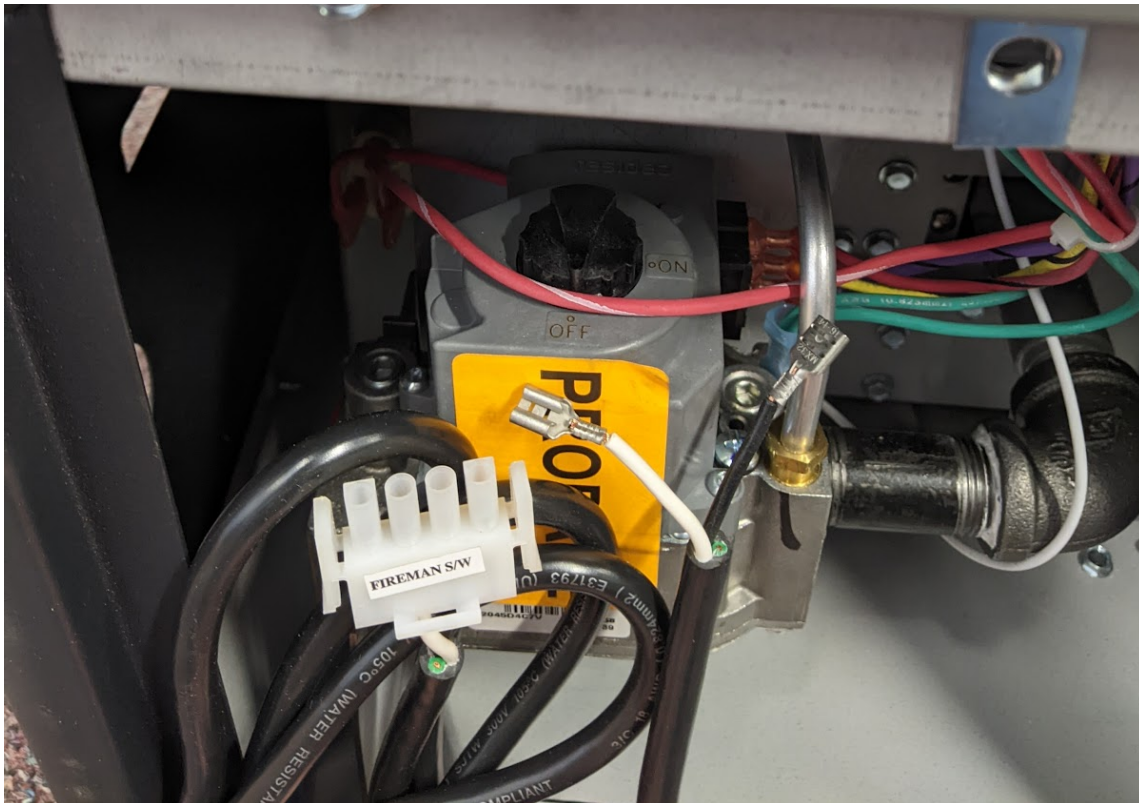
The gas heater must be connected to the Hot Tub Control System by a low voltage signal wire called a “Fireman’s circuit”. This is a signal circuit only, not a power supply circuit.

ACC Control Systems include a prefabricated wire for this purpose.

Refer to the instructions provided with your Gas Heater and your Hot Tub Control System to identify the correct corresponding circuit / switch and wire size.

Typical Installation - ACC SmarTouch controller and RayPak 106A gas heater:

- Open the front access panel on the RayPak heater. Locate the Red/White wire (red with white stripe) and cut in an accessible place.
- Locate the prefabricated wire labeled “Fireman S/W”. Route the end with the two spade connectors through one of the wiring cutouts.
- Connect one cut end of the Red/White wire to the white wire, and the other cut end to the black wire. It doesn’t matter which.
- Plug the other end of the Fireman S/W wire into the ACC control pack.



Parts & Supplies

Photos are to help you identify your parts. Your tub kit may not include all of these items, depending on the options chosen for your tub. Color and style of some items may vary.



PVC Primer & Cement



Suction with elbow nut



Return fitting
(comes assembled)



Union



Tub Light - Optional



Union Ball Valve



Tee



Reducer Bushings



Filter Housing



Filter Base



Filter Cartridge



Water Sanitation Start-up Kit



Street Elbow (left)
Regular Elbow (right)



Topside Controller
Mounting Shelf Kit



Floating Thermometer



Hydro-Jet Body with Jet Fitting



Fitting Wrench



Skimmer Screen

Hot Tub Light (optional)

NOTE: Do not overtighten! The wood will swell considerably once the tub is filled, and could break the fitting. Tighten the nut finger-tight only, and when you fill the tub tighten just enough to stop any leaks.



Starburst™ LED Installation and Operation 10s/28s/72s/202s

Installation inside tub or spa

1. Drain water and disconnect power before attempting to open lens.
2. Utilize the front access tool to loosen lens.
3. Remove bulb by pulling lamp straight out.
4. Making sure the base of bulb and socket tabs line up, insert Starburst LED into the light socket.
5. Screw lens back in place making certain the water-tight gasket is in place properly.

Installation backside of tub or spa

1. Unscrew the light body reflector (white) from body.
2. Remove bulb by pulling lamp straight out.
3. Making sure the base of the bulb and the socket tabs line up, insert the Starburst LED into the light socket.
4. Screw the light body reflector back onto body.

Specifications

- 1-year warranty
- Retrofits any pool or spa with existing 12v lighting system.
- Consumes 1/10 the power of incandescent bulbs.
- Rated 100,000 hours life expectancy.
- Temperature range: -20°C -104°C
- Humidity range: 0% - 95% non-condensing
- Not recommended for units with dimming systems

Operating Instructions

Starburst™ S-series

- Sequencing your Starburst™ LED light is simply done by utilizing your existing light switch.
- To progress to the next lighting sequence turn the unit off and then on again within 2-3 seconds.
- To reset synchronization, turn units off for 5 seconds and turn back on. Units should flash four times and return to the Bright White color mode. When this has occurred, your units have been reset.
- To recommence a color mode, switch units off and your last color mode will be saved in the memory.
- By cycling the On/Off switch, the following sequence will occur:

Bright White
Aqua Blue
Soothing Violet
Ocean Blue
Majestic Gold
Shamrock Green
Fiery Red
Chameleon Mode
Party Mode

Baqua ***Customers using a Baqua pool chemical which contains hydrogen peroxide, should use a Baqua resistant lens. O'Ryan can provide this product.

Chofu Wood Heat Installation

Understanding Thermosiphon

The Chofu wood-fired tub heater has no pumps or other electrical components, and relies on the principle of 'thermosiphon' or 'thermal cycle' to transfer the heat into the tub. The stove is a low point in the system. As the water in the stove absorbs heat, it wants to rise and begins to flow through the upper pipe into the tub. This creates a gentle suction force on the lower pipe, which draws cooler water from the tub into the stove.

To produce a reliable thermal cycle, the upper pipe must rise upward toward the tub at an angle of 2" per foot, or more. (The included plumbing is roughly 2.5 feet in length, meaning the upper hole in the tub should be at least 5" higher than the upper port on the stove.)

A steeper angle will increase the circulation rate; however, it is important to note that a faster circulation rate will not heat the tub any faster.

The lower pipe must be lower than the upper pipe. Ideally, the tub fitting should be as low as possible, where the coolest water has settled. However, it is important to be able to reach the fitting from outside the tub to install the plug. It should be within arms reach of the rim, and should either be above the benches (if present), or the benches should be rotated and/or cutout so that the suction fitting is accessible.

Since thermal cycling produces a gentle flow, it will be necessary to help mix the water for uniform heat. A short, inexpensive canoe paddle from your local outdoor sports store does an excellent job.

Assembling your Chofu

To install your Chofu wood-fired stove, first prepare a stable base. This can be at ground-level or partially elevated, but must be made of non-combustible material such as cement, tile, stone, or metal. A concrete pad is our preferred tub foundation, and making the pad 2'-3' wider than the tub provides a great platform for any hot tub equipment, including the stove. Alternatively, one or two large pavers (stove footprint is 25" x 16") make another good option for a Chofu base.

The Chofu stove requires at least 8' of pipe for optimum draft. Using the optional stovepipe cap adds restriction to the airflow, and requires an additional 2' of pipe to restore the lost draft. The pipe support bracket is optional with an 8' pipe without cap - some owners like having the ability to easily remove the stovepipe when not in use - but more than 10' of stovepipe must be stabilized with the bracket. The stovepipe sections should be screwed to each other with sheet metal screws, but the assembled stove pipe does NOT need to be screwed to the collar on the stove. It is a snug fit. If you wish to fix the pipe in place, use the support bracket.

Assembling the plumbing is simple. Install the thru-wall fittings into the tub moderately tight. As the tub swells, these joints will tighten significantly. Use the neoprene sleeves and hose clamps to connect the tub fittings to the metal pipes, and the pipes to the stove.

Freeze Protection

The same efficient heat transfer that puts the heat of the fire into the water will pull heat right back out in freezing temperatures. The Chofu heater can be used in the coldest climates, in sub-zero temperatures, but **MUST** be drained when not in use. Using the included plugs allows you to drain the stove without draining the entire tub, if desired. The large thermal mass of the tub means that it can take days for a filled tub to cool and freeze, but the Chofu can freeze up and experience damage in far less time - less than a day in some conditions.

As noted above, the lower port must be within arm's reach of the rim of the tub in order to install the plug.

Initial Tub Filling and Startup

Tub Checks

BEFORE you add water, double-check the band tension. The wood may have settled further into place while you installed the system, and you may be able to tighten the bands up a little more.

As you add water to your tub, look around for leaks. Use the mirror to check under the staves. If you find drips, which you likely will, note where they are to check on them later. Trickles or runs are more cause for concern, and could indicate that something is not installed properly.

Tub thru-fittings should be just tight enough to stop leaks. They will tighten substantially as the wood swells. The light fitting (if used) is especially sensitive to overtightening, and needs to be just barely tight enough to seal the gasket at this time.

System Checks

- Before turning on your system, be sure you have water in the lines at the suction side of your pump, otherwise you risk burning up the seals in your pump. This is also necessary to have a primed pump which means there is water in the pump for it to circulate. If you have a self priming pump you can see if there's water through the clear leaf basket lid. Gravity should have forced the water from your tub, through the lines to the pump. Be sure that all ball valves are in the full open position (handle parallel to the pipe). You may need to open the air relief screw on the top of the filter to let air escape.
- Once your installation is complete and you have water in the tub (at least half full), you can turn on your system. You will use the main GFCI breaker(s) to power your system on or off. Turn on your breakers and wait a few seconds for your system to finish its checks and turn on the pump.
- After your pump begins to run, ensure you have flow to the tub through the jets. If you don't, press the button to turn the pump up from low speed to high speed. Wait a minute or two. If you still have no flow, shut off the pump quickly so you don't burn up the seals and reassess your priming situation. Remember you need water in the pipe between the tub and the suction side of the pump in order to achieve priming.
 - If you have a self priming pump (one with a leaf trap built into it), you can remove the cover, fill it up with water, replace the cover and then turn it back on to high speed and wait a couple of minutes. Repeat until prime is gained.
 - If you have a flooded suction pump (one without the leaf trap built into it) then you just need to release the air lock so the water will flow from the tub through the suctions and up to the suction

side of the pump. The filter has an air relief on top or you can loosen a union joint in the plumbing. Typically air goes to the high points so look for places to release it that are in high points in the plumbing. Remember a flooded suction pump must be installed at an elevation that is below the water line (top level of the water) in the tub.

- Once you have flow, check your glue joints and threaded connections. If you have any leaks, turn off your system and correct them at this time.
- Refer to the tub control system user manual to learn how to set the temperature, time of day, filtration (sanitation) schedule and other heater functions.
- **Turn the temperature on the gas heater (if applicable) all the way up to the highest setting.** The actual temperature setting will be done on the tub control system control touchpad.
- Set the temperature to about 100 degrees on the tub control system.
- To operate the jets, press the pump/jet button icon on your touchpad. This will set the pump on high speed. Press it again to return to low speed (while the system is calling for heat), or to turn the pump off (while no call for heat). Subsequent presses cycle through these 2 or 3 pump settings in a loop in this manner. Opening the Air Control Valves allows air into the water stream to create a faster, more powerful massage jet.
- For most tubs, the filtration cycle should be set to run at least four hours total per day, ideally in two cycles about 12 hours apart.
 - ACC SmarTouch Spa Packs have a default filtration cycle that can be used as-is, or overridden. See ACC manual.
 - See the Water Sanitation section for more information
- Ensure your sanitizer is calibrated and set up correctly.
 - Ozonators require the injector valve to be calibrated to draw in the proper amount of air / ozone gas. This should be a one-time adjustment, but should be checked at least annually. Ozone gas is generated during the filtration cycle, but during other times the injector manifold will continue to draw air into the water stream. See included manual for full details.
 - Ionizers require the system to be operated from its dedicated control panel in accordance with the included manual. (this step can optionally be postponed until after the break-in period, when tannins are no longer present and frequent water changes are no longer required)
- Adjust the eyeballs in the jet fittings as needed to direct the jet action where you want it.

Water Sanitation and Treatment

Sanitation Procedure Quick Reference

NOTE: Be sure you have read and understood the full length "Recommended Sanitation Procedure" we have provided. This is for quick reference only.

Dichlor Only

1. Test pH and adjust as necessary
2. Add _____ tablespoons of Spa 56 or equiv for my tub (1x dose indicated in Table 1)
3. Test chlorine levels after 5 minutes: range is 2-3 ppm
4. Add at least 30 minutes and not more than 24 hours BEFORE soaking
5. Maintenance shock every 2 - 4 weeks with _____ tablespoons for my tub (2x dose indicated in Table 1)
6. Shock after filling, after heavy use, after period of no use, or if contamination from algae or bacteria is suspected
7. Rotate your filter cartridge for a clean one about every 10th to 15th tub use.
8. Drain and refill your tub about every 2 - 4 months. Before refilling, scrub all interior surfaces with a medium brush, rinse and fully drain the tub, then refill with fresh water.

Ozonator with Dichlor

1. Test pH and adjust as necessary
2. Add _____ tablespoons of Spa 56 or equiv for my tub (1/2 of dose indicated in Table 1)
3. Test chlorine levels after 5 minutes: range is 1-2 ppm
4. Add between 24 hours and 30 minutes BEFORE soaking
5. Maintenance shock should not be necessary, and is an indicator that the ozonator is not set correctly or is not working
6. Shock after filling, after heavy use, after period of no use, or if contamination from algae or bacteria is suspected
7. Rotate your filter cartridge for a clean one about every 10th to 15th tub use.
8. Drain and refill your tub about every 2 - 4 months. Before refilling, scrub all interior surfaces with a medium brush, rinse and fully drain the tub, then refill with fresh water

Ionizer (ClearBlue) with Dichlor

1. Test pH and adjust as necessary
2. Check that copper levels are between 0.2 and 0.8 ppm
 - a. IMPORTANT: if copper levels are below range, use Dichlor-Only sanitation instructions until ion levels have risen to at least 0.2 ppm
3. Add _____ tablespoons of Spa 56 or equiv for my tub (1/4 of dose indicated in Table 1)
4. Test chlorine levels after 5 minutes: range is .5-1 ppm
5. Add dichlor between 24 hours and 30 minutes BEFORE soaking
6. Maintenance shock every 2 - 4 weeks with _____ tablespoons for my tub (2x dose indicated in Table 1)
7. Shock after filling, after heavy use, after period of no use, or if contamination from algae or bacteria is suspected
8. Rotate your filter cartridge for a clean one about every 10th to 15th tub use.
9. Drain and refill your tub about every 2 - 4 months. Before refilling, scrub all interior surfaces with a medium brush, rinse and fully drain the tub, then refill with fresh water

Key Sanitation Concepts

Introduction

In any hot tub, clean, balanced water is vital for your health and safety. Too little sanitation and you could come down with some nasty rashes or illnesses caused by bacteria or other waterborne pathogens; too much sanitation, and you could end up with different sorts of rashes, damaged hair, and bleached swimwear.

When you have a cedar tub, clean, balanced water is **also vital to the health and safety of the cedar wood!** Many of the water treatment products used in the spa industry are harsh on cedar, and some of them can cause severe damage. Let's take a deeper look at the most common sanitizing agent, which is also the one we recommend, and how it interacts with your cedar tub.

Chlorine

Chlorine was the first water treatment method discovered by humanity that could cheaply and efficiently sanitize large amounts of water. In less than 150 years, chlorine sanitation has prevented incalculable hundreds of thousands of deaths and illnesses caused by waterborne pathogens. While the harsh smell and feel associated with chlorine has prompted the development of other supplemental sanitization products that can greatly reduce the amount of chlorine needed, the fact remains that some small amount of either chlorine or bromine plays an important role in every certified sanitation system.

When chlorine attacks contaminants, it binds to them and forms chemical compounds called chloramines. It's actually the chloramines building up over time that are responsible for most of the nasty smell and itchy feel we associate with 'chlorine'. Since we want to avoid that, we need a way to break up the chloramines. We do this by oxidation - adding powerful oxygen atoms that tear apart the chloramine molecules. **This process is called 'shock' treatment.** There are lots of different oxidizing products out there, and believe it or not one of the simplest ones is a big dose of...more chlorine. Yes, chlorine is both a sanitizer and an oxidizer! Using chlorine products for every step of the sanitizing process is quite common in the pool and spa industry.

That's not great for our cedar tubs though. Chlorine can't tell the difference between wood and other organic particles. Any chlorine that is left over once the water is clean will start to degrade the wood. The chlorine product we supply is Spa 56 by Leisure Time, and it is a **sodium dichlor chlorinating granules** product. Chlorine comes in many forms: sodium dichlor is much gentler than some of the alternatives and is what you want to use in your cedar tub. Using the wrong type of chlorine, or using far too much sodium dichlor, can attack the wood very quickly. It bleaches and loosens the wood fibers, giving the wood a whitish, hairy appearance that has to be sanded down once the tub is drained and dried.

Even correct doses of sodium dichlor are somewhat harsh on the wood and will reduce the service life of the tub. We don't want that, so what can we do? Enter the supplemental sanitation systems.

*But first, a quick note about Bromine. Bromine is a chemical similar to chlorine that is a little less unpleasant to humans than chlorine, and therefore is a popular substitute for some spas. We do **not** recommend it's use for cedar tubs though! Excess chlorine evaporates, which helps us keep it in the sweet spot of being enough to clean the water, but not too much to damage the tub. Excess bromine does **not** evaporate and instead builds up in the wood itself, which makes it very hard to prevent premature wood deterioration. Others may disagree, but we say **no to bromine!***

Oxidizing Supplemental Sanitation Systems

Ozone

The oxygen we breathe is a molecule made of two oxygen atoms, or O_2 . Ozone is a molecule made of three oxygen atoms, or O_3 , but that extra oxygen atom is not strongly bound to the other two. If another molecule passes by, the third oxygen atom breaks away from the Ozone and attaches itself to the other molecule, which severely damages or entirely destroys it. Ozone is extremely powerful. It can easily break down bacteria and other pathogens, algae, lotion, makeup, chloramines, sweat, and more in a matter of minutes.

Ozone can be generated from atmospheric oxygen in one of two ways: exposure to certain wavelengths of UV light, or exposure to an electrical arc called 'Corona Discharge' or 'CD' for short. CD is cheaper, produces more ozone, and lasts longer than UV-generated ozone, and is becoming the industry standard.

Ozone is a gas, so we have to bubble it into the water. The most common way to do this uses a 'venturi' similar to a carburetor - calibrated water flow through the venturi creates a suction that draws in the ozone-rich air. This produces very fine bubbles (described as champagne bubbles) any time the pump is running.

Note: the presence of bubbles does NOT mean that the ozonator is producing ozone. The ozonator is only activated during the control system's "filtration" cycle, which is set from the topside touchpad. The rest of the time, the champagne bubbles are just air.

What about drawbacks? If excessive amounts of ozone wind up in the tub itself, the ozone can bleach the inside of the cover, and sometimes the wood itself especially above the waterline. Some cheap spas have this problem due to poor design, but in our tubs bleaching indicates a calibration error and can be avoided by calibrating the venturi correctly and by adjusting the length of the filtration cycle. Truly excessive amounts of ozone can be harmful to your lungs and eyes, but this is extremely unlikely with spa sanitation products.

The biggest drawback of ozone is that it can be difficult to tell if it's on or not. Some people notice a fresh, slightly metallic smell when lifting the cover, but it is hard to detect at all. Keeping a careful eye on total chlorine levels can also help identify an ozonator failure, since chloramines will start building up without the ozonator. There are test strips available to detect ozone in water, but the water samples have to be taken near the ozone injection manifold while the ozonator is active.

Whether an ozonator uses UV bulbs or CD chips, both will eventually wear out and need to be replaced. CD chips tend to last longer - typically around 2-3 years depending on usage - and are easier to replace.

Another quick note, about Hydrogen Peroxide: You may come across references to hydrogen peroxide water treatment. Like ozone, hydrogen peroxide (H_2O_2) is an unstable molecule with an extra oxygen atom that wants to break off and attack something. Where ozone breaks down into oxygen, hydrogen peroxide breaks down into water. Although hydrogen peroxide does a great job at cleaning water, it's less commonly used because it's highly volatile stuff. This isn't your drugstore 3% solution for cleaning cuts - pool sanitation hydrogen peroxide is more like 35% and is capable of giving careless users significant chemical burns. Since it is in concentrated liquid form, it is much more likely to splash onto your skin or soak into your clothing than dichlor granules, which bounce off. While hydrogen peroxide itself is not flammable, it stores a tremendous amount of oxygen and can make existing fire hazards much more hazardous if improperly stored. We don't recommend it for these safety reasons. Finally, while it is highly effective at the moment it is added, it breaks down within minutes and does not provide any level of residual protection at all. If you insist on using hydrogen peroxide, it can only be used as a shock and not a residual sanitizer.

AOP

Ozone is great, but it can be made even better. When ozonated water is passed under certain wavelengths of ultraviolet light, the extra oxygen molecule in the ozone combines with some of the hydrogen atoms in the water to form Hydroxyl Radicals - 'OH, one oxygen and one hydrogen. And boy are they fierce! Anything ozone can kill in minutes, these little molecules can kill in milliseconds. Because they work so fast, they break down in the pipes and never come in contact with the cover or the wood. These high-tech systems go by the abbreviation AOP, short for "Advanced Oxidation Process", and they are capable of producing the most beautiful, clear, clean water you've ever seen, with just the tiniest amount of chlorine to keep it that way between AOP cycles.

What's the catch? Well, cutting edge technology tends to be expensive, and AOP is no exception. Good ozone systems can be found for \$100-\$200, but AOP costs around \$1000-\$3000. If you want the best and price is no issue, go for it!

Other Supplemental Sanitation Systems

UV-C

We've all seen the sunscreen ads about how we need to protect ourselves from harmful UV rays: UV-C sanitation uses similar, but even more powerful UV rays to work zapping bacteria, algae, and other biological contaminants! The radiation doesn't kill them immediately, but it does scramble their DNA, which makes it impossible for them to reproduce. Since bacteria reproduce every 4 to 20 minutes, that makes a huge impact!

UV-C systems are somewhat effective at breaking down chloramines, but are less effective than the oxidizing systems. The exact effectiveness can vary; it is possible to completely remove all chlorine and chloramines with UV light, but such systems use different wavelengths and much more intensity than typical pool or spa biological sanitizers. It may still be necessary to use chemical shocks more often than with oxidizing systems.

The special UV lightbulbs have to be replaced at fairly regular intervals, even if they are producing light, to make sure that the correct wavelengths are being produced. This task must be done carefully, because the UV light is dangerous if you are exposed to an illuminated bulb, and there are dangerous chemicals inside the bulb if it is accidentally broken. That said, in between bulb changes the UV system is maintenance-free.

Ionization

First off, what's an ion? An ion is a particle with an electrical charge, either positive or negative. If a negatively charged ion meets a positively charged ion, they will stick together just like the north and south poles of a magnet. We'll come back to that in a moment.

Silver has antibacterial properties. This was discovered at least thousands of years ago - the ancient Greeks already knew about it and used silver jars to help stave off bacteria. Zinc is likewise effective against some forms of bacteria. Meanwhile, copper is effective against algae growth.

Rather than make a hot tub out of silver, modern technology lets us make tiny, charged ions out of these three metals by applying low voltage electricity to special bars made of a mix of the three metals. Now, it turns out that bacteria have a net negative electrical charge - each bacteria is essentially a living, negative ion! So if we

produce metal ions with a positive charge, they will stick to the bacteria or algae like magnets and kill them! The ions are completely harmless to humans and cedar tubs, and unlike chlorine or ozone, they don't evaporate. They will just circulate around the tub waiting to protect it from bacteria or algae. There is no by-product, no smell, no residue...just super-clear, inviting water.

NOTE: not all ionizers come with all three metals! There are cheaper ionizers out there that only come with copper-zinc, or even copper-only. They are still partly effective against a narrower range of algae, but they are NOT the same as the silver-copper-zinc ionizers such as ClearBlue, the brand we supply.

Ionizers are quite affordable, and low-maintenance. There are test strips to measure the amount of ions, and occasionally adjustments need to be made on the controller to keep the ions in the recommended range. The mineral cell (metal bars) need to be replaced every so often.

Ionizers work slowly. They must be used in conjunction with a small amount of chlorine (and optionally, with an oxidizing system) that will keep the bacteria or algae population from growing out of control faster than the ionizer can remove them. Ionizers also have no effect on non-biological contaminants (sweat, sunscreen, lotion, etc), which the chlorine will take care of.

Ionizers have no effect on chloramines either. If using an ionizer, you will need to either use a chlorine or non-chlorine shock treatment, or install an oxidizing sanitation system in addition to the ionizer. Ozone and ions together can produce excellent water quality at a reasonable price point.

Break-In Water Treatment Procedure

PH and Alkalinity

The first thing you need to do after filling the tub is use a test strip to check the pH and alkalinity. These two measurements both have to do with whether the water is acidic, basic, or balanced. Both are adjusted with the same Spa Up and Spa Down products provided (or equivalent). Most domestic water sources are already close to balanced, and only need minor adjustments. If larger adjustments are necessary, focus on Alkalinity first, then fine-tune the pH balance once Alkalinity levels are within range.

Sanitation

The second thing you will do after filling the tub is 'shock' the water with a large dose of chlorine, then continue adding small doses of chlorine either daily or every few days, depending on how much the tub is used. The dichlor sanitation instructions are important even if you have supplemental sanitation systems installed. **During the break-in period, the same Dichlor-Only instructions apply no matter what system you have.** If you have a supplemental sanitation system, after break-in you can follow the appropriate reduced-chlorine sanitation procedure.

During the first several months of using a new tub, dark-colored pigments called tannins will steep out of the wood and discolor the water. These are very similar to the tannins in coffee or tea, and will make your tub water look like...well...coffee or tea. The tannins themselves are not harmful, but some of your chlorine will be used up breaking down tannins and won't be available for breaking down bacteria. You will need to follow a slightly more robust sanitation routine until they are all gone.

- Part of that break-in routine is increasing the frequency of water changes and filter cleanings.
- The other part is adding a dose of dichlor daily, to replace what is used up by the tannins.

If you have an **ozonator**, you may optionally increase the length of the filtration cycle in addition to adding a standard dose of dichlor. Ozone will help break down the tannins. *NOTE: HydroQuip systems come with an ozonator. Our ACC controllers are wired and programmed to run an aftermarket ozonator, if desired.*

If you have an **ionizer**, you may be changing the water too frequently for the ion levels to build up to the needed levels. You will need to use the standard dose of dichlor, and you may wish to simply leave the ionizer off until the break-in period is over. *NOTE: We provide an ionizer with our ACC systems.*

During the break-in period, add a small dose of dichlor every day, if possible. The jets should be running to help mix in the chlorine; if you don't have jets, stirring with a paddle is recommended. Add the chlorine at least 30 minutes before using the tub, to allow the chlorine to fully dissolve and have time to sanitize. Since any excess chlorine eats at the cedar, your chlorine levels will drop to zero much more quickly than they would in a plastic spa. You will not be able to get a reading of stable free chlorine levels in between soaks no matter how much you add; it will just damage the wood. *Note: For this reason, we do not recommend systems that generate a constant flow of chlorine (e.g. salt chlorine generators) or products that dispense a constant supply of chlorine (e.g. chlorine floating tabs). Stick with dichlor granules.*

If you are using the provided Spa 56 dichlor, add enough to reach 2-3 ppm (parts per million). Since parts per million is not a convenient measurement system, we've converted to tablespoons for each of our tub sizes:

NOTE: Dry chemicals are dosed in ounces by WEIGHT; however, dichlor is close to 1 oz of weight per 1 oz of volume											
Tub	Gal.	oz	tbsp	Tub	Gal.	oz	tbsp	Tub	Gal.	oz	tbsp
Reference	500	0.5	1.0	5' Round 42"	400	0.4	0.8	7' Ellipse 48"	720	0.7	1.4
				5' Round 48"	460	0.5	0.9	7' Round 29"	530	0.5	1.1
4' Ellipse 29"	125	0.1	0.3	6' Ellipse 29"	300	0.3	0.6	7' Round 36"	680	0.7	1.4
4' Ellipse 36"	160	0.2	0.3	6' Ellipse 36"	375	0.4	0.8	7' Round 42"	810	0.8	1.6
4' Ellipse 42"	190	0.2	0.4	6' Ellipse 42"	450	0.5	0.9	7' Round 48"	940	0.9	1.9
4' Round 29"	165	0.2	0.3	6' Ellipse 48"	525	0.5	1.1	8' Ellipse 29"	535	0.5	1.1
4' Round 36"	210	0.2	0.4	6' Round 29"	390	0.4	0.8	8' Ellipse 36"	690	0.7	1.4
4' Round 42"	250	0.3	0.5	6' Round 36"	495	0.5	1.0	8' Ellipse 42"	820	0.8	1.6
5' Ellipse 29"	200	0.2	0.4	6' Round 42"	590	0.6	1.2	8' Ellipse 48"	950	1.0	1.9
5' Ellipse 36"	255	0.3	0.5	6' Round 48"	685	0.7	1.4	8' Round 29"	700	0.7	1.4
5' Ellipse 42"	305	0.3	0.6	7' Ellipse 29"	410	0.4	0.8	8' Round 36"	900	0.9	1.8
5' Round 29"	260	0.3	0.5	7' Ellipse 36"	520	0.5	1.0	8' Round 42"	1075	1.1	2.2
5' Round 36"	330	0.3	0.7	7' Ellipse 42"	620	0.6	1.2	8' Round 48"	1250	1.3	2.5

Table 1: Spa 56 DiChlor Granules

Tbsp doses are ONLY for Spa 56 or direct 5oz-per-500 gal equivalents!
Refer to product labeling for other dichlor or non-chlorine shock products.

After 5 minutes, the chlorine will have dissolved enough to check your chlorine levels with a test strip. If you added a little too much, up to 5 ppm is safe to enter, or waiting a bit longer with the jets on will help evaporate some of that excess chlorine. If you have less than 2 ppm, add another dose of chlorine and stop. Don't test again. You may not be able to read the first dose anymore, and will end up adding too much.

IMPORTANT: 5 minutes is the only time you will be able to get an accurate reading.

If the same few people are using the tub several times per week, this amount of chlorine will be plenty. If you have a few extra guests over, add another dose of chlorine AFTER everyone is out of the tub to help with the extra bather load.

Maintenance Shocking

About every 2 - 4 weeks, you will need to shock the tub to break up the chloramines. You can use Spa 56 to shock, by doubling the dose. Or you can use non-chlorine shock products, as long as they are compatible with chlorine, by following the manufacturer's instructions. REMEMBER: Either use a sodium dichlor product like Spa 56 or a non-chlorine shock that's compatible with chlorine. DO NOT use other chlorine shock products on cedar tubs!

Conditional 'Shocking'

Any time your water equilibrium is disrupted, it can be a good idea to super-sanitize your tub. Technically speaking, we're not shocking chloramines, but since the process is the same as a dichlor shock, it's common for people to refer to this super-sanitation as 'shocking' as well. Times you will want to super-sanitize include:

- After refilling the tub
- After heavy bather loads (more people, longer soaking,)
- Before using if the tub has not been used for a while
- Anytime there is indication that bacteria or algae may be present (water cloudiness, slime or film on the walls)

Programming your Filtration Cycle

In general, your filtration program should be set to run for a total of four hours per day. If possible, it is best to filter in two, 2-hour cycles every 12 hours. 2 hours is long enough to filter all the water in the tub, and two cycles per day offers better protection against quickly-multiplying bacteria. However, running one 4-hour cycle every 24 hours still gives good results.

Heavily used tubs may need a total of 6 or 8 hours of filtration per day. On the other hand, small and lightly used tubs may not need as much. Err to the side of caution based on your anticipated use, and then fine-tune as you gain experience maintaining your tub water.

Pre-Soak Showering

A thorough shower is one of the most important steps of your sanitation routine! Every time we step in a tub, we bring various bacteria with us. Once they're there, hot tubs unfortunately are the perfect environment to incubate bacteria. This means that 4 people in a 100°F hot tub is the equivalent bather load of 300 people in an 80°F pool! The sanitation products and filtration system need to cope with any sweat, body oils, dead skin, lotion, makeup, etc. in addition to bacteria and algae, so the more you can scrub off before you hop in, the better your water quality will be for less effort.

Pre-soak cleanliness applies to your bathing attire as well. It is a very good idea to have dedicated hot-tub swimwear that never goes to the beach, public pools, or anywhere else where it could bring home unwanted bacteria or other contaminants.

Filter Cleaning and Changes

Properly cleaning your filters is important for your water quality. No matter what sanitation system you use, your filter plays an important role in the cleanliness of your tub water. Made from pleated paper, the filter

captures particles of debris out of the water. While individual bacteria and algae are small enough to pass through, the filter captures a lot of the particles they're eating, therefore playing a key role in sanitation as well. Optional clarifier products such as Leisure Time Bright & Clear can help increase the filter's effectiveness.

Your filter needs to be rinsed with clean water regularly. To remove the filter, turn off the system, and then close the two ball valves. Lift the lock pin and rotate the ring to remove the top of the filter housing. Use a water stream, such as a hose nozzle set to 'jet' or a kitchen sink sprayer, to spray between each pleat at an angle, to flush the dirt out of the pleat from top to bottom. DO NOT use a pressure washer, or you will destroy your filter. During break-in, rinse your filter at least every two weeks. After you have cared for your tub for a while, you can rinse your filter as-needed, approximately every 3 or 4 weeks. But remember, it's much easier to clean a slightly soiled filter than a very soiled filter. You will likely spend less total time cleaning frequently rather than infrequently. When in doubt, give it a washout.

Filter cartridges perform more effectively if you allow them to dry in between cleanings. This is why we supply a spare filter cartridge as standard equipment. Rinse the filter immediately after removing it from service, then let it air dry, then rinse it again before putting it back into service.

At longer intervals the filter needs to be cleaned more thoroughly and degreased. This should be done about 3 months or 30-40 uses, though this varies depending on a variety of factors. Soak the dirty filter in a cleaning solution for at least 2 hours. Overnight is fine if you prefer. If your filter doesn't have too much greasy buildup, you can use a 50:50 mix of hot water and white vinegar. If you need more cleaning power, there are specially formulated spa filter degreaser products widely available that are just right for the job. Do not use household cleaning products - they may be too harsh and wear out your filter prematurely, and they may introduce foamy detergent residues into your tub water that you will then have to remove. Once cleaned and rinsed, set this filter aside to dry in a clean and dry location where it will be ready for the next filter swap.

If you take good care of your filters and your tub water, your filters should last 1-2 years each. If you are rotating your filters every 3 months as we recommend, that means you will have to buy 2 new filters every 2-4 years. Regular, gentle cleaning and good water sanitation practices will maximize their service life.

Replacement filters are widely available online and at hot tub / pool supply stores. Use a FC-2390 or equivalent 50 square foot replacement filter cartridge. If you are ever in doubt about whether or not to replace a filter cartridge, just replace it. In the grand scheme of things it is inexpensive insurance.

Water Changes

While chlorine, ozonators, ionizers, and filters are integral parts to keeping your hot tubbing experience healthy and enjoyable, do not overlook the importance of water changes and physical scrubbing of your hot tub's interior. We recommend changing the water every 1 - 2 weeks, if possible, during the break-in period with a new tub. Most of the tannins will come out in the first few water changes, and in most cases they will be gone in about 4 to 6 months with these frequent water changes.

After that, your water change schedule depends on how you use and care for your tub. We recommend draining, scrubbing, and refilling every 30 - 40 hot tub uses, or every 4 months, whichever happens first. If you use only dichlor-only for sanitation, you will need to change the water regularly due to inevitable chemical buildups. If ever in doubt, change the water. Fresh water is the cheapest 'product' you can add to your tub!

Also whenever taking your tub out of service, remember stagnant water, even in small amounts such as in the pockets of your plumbing (bottom of pump, filter, heater, etc.), is breeding grounds for bacteria, algae etc. If your tub is not running, drain and ventilate all parts of your hot tub system, including the system components and plumbing. Always super-chlorinate your tub after refilling.

Tub Scrubbing

Scrubbing should be done with a medium bristle brush. Scrubbing with warm water may be sufficient; if your tub needs more you can use a small amount of dish soap, or half a **teaspoon** (not tablespoon!) of Spa 56 per gallon of water in your scrubbing bucket.

Maintenance Water Treatment Procedure (after Break-In)

Dichlor

After break-in, you may be able to reduce **how often** you add dichlor, depending on how often you use the tub. We recommend that you add chlorine 30 minutes to 24 hours BEFORE soaking. Allowing at least 30 minutes gives the chlorine enough time to kill any bacteria that may be present. After 24 hours, much of the chlorine will have evaporated, and enough time will have passed that bacteria could begin growing again soon. If you use the tub daily, you can add chlorine immediately after soaking, since your next soak is about 24 hours away.

We also recommend that you add chlorine at least twice per week, even if you are using the tub less than that.

If you are also using a supplemental sanitation system, you can also reduce **how much** dichlor you add each time. Refer to whichever of the following sections is applicable:

Ozonator

If using an ozonator, you can reduce your chlorine dose by about half, to between 1 - 2 ppm.

Maintenance shocking for chloramines can be greatly reduced, and may not be necessary at all. It is still advisable to shock the tub in high-sanitation-load circumstances as listed above.

Ionizer

The effectiveness of ionizers varies according to the makeup of the mineral cells. Our preferred brand, ClearBlue, recommends 0.5 - 1 ppm chlorine. The ClearBlue ionizer includes copper test strips that directly measure the copper ions, and indirectly measure the silver and zinc ions since all are produced proportionally. Use the ClearBlue instructions to bring your copper levels to between 0.2 and 0.4 ppm, and then check the copper levels every two weeks after that. **The reduced dichlor ONLY applies when the copper levels are at or above 0.2 ppm.** After every water change, you will need to use the full amount of dichlor while the ionizer mineralizes the new water.

As the ionizer has no effect on chloramines, and is slow to respond to changes in water chemistry, you will need to follow the shocking instructions as written above in the dichlor section.

Other Water Quality Notes

Water sanitation has many variables, from the set temperature to the number of bathers to the local environment. These Sanitation Guidelines cannot account for everything, but they do provide you with what you need to know to fine tune your own sanitation routine to fit your usage and environment. For example, If you have low intensity usage (few people, clean people, usually the same people) and you have an ionizer and/or ozonator, you may be able to use even less chlorine or go further between water changes. On the other hand, if you love hosting hot tub parties, you will probably need to err to the conservative side of our recommendations. If this is your first hot tub and this all seems a little overwhelming, we hear you! It's a lot to grasp all at once. But rest assured, it isn't that bad once you get into the routine, and the relaxation that comes from worry free hot tubbing is totally worth it!

Storage or Winterization

Note on wintertime use: In most climates (wintertime temps 0°F or above), our spa systems make it possible to keep on soaking in spite of the snow. For some, the more chill is in the air, the more inviting the water feels. Our systems work just fine in typical winter conditions, and even feature built-in freeze protection programming: if the heat source fails and the water drops below 40°F, the pump will run 24/7 to guard against freezing while the heat is repaired, or until the tub can be drained and winterized. That said, **you must be able to keep a close watch on your tub in freezing conditions.** If the power fails, you will need to drain your tub and empty the plumbing promptly in order to prevent freeze damage. Tubs that are only wood-fired have no freeze protection, and must be watched closely if used during the winter. The Chofu stove needs to be drained after every use. The large amount of thermal mass in the tub takes a while to lose heat, but you will need to be ready to either drain it or heat it quickly if the water temperature in the tub drops too low.

Storage/Winterization Procedure

If you will not be using the tub during the winter; if you are going on a trip of any length during freezing conditions; or if you are going on an extended trip longer than two weeks at any time of the year, you will want to drain and 'winterize' the tub to prevent freeze damage or runaway biological contamination.

Shut off power to the system. Drain the tub, but leave about 1/8" of water in the bottom. If possible, the wood will benefit from waiting to drain the tub until temperatures are already below freezing. Frost will develop on the interior of the tub, and will prevent the tub from drying out and developing leaks. If frost is not available, leaving a little water in the tub will increase the humidity under the cover.

Drain the system by loosening the unions and/or drain plugs at every low point in the system. Make sure you completely drain the spa pack, pump, filter housing, and (if applicable) gas heater.

Tip: a shop-vac on the blower setting or a leaf blower can be used to blow pockets of water out of the plumbing towards the nearest drain point.

Unless you are certain that the water in the tub will stay very cold or frozen until you are ready to refill, you should add a mineral bactericide/algaecide (such as Cleanwater Blue) to provide protection against biological contaminants. These products work in the same way as the ClearBlue ionizer systems.

Before refilling, drain the residual water and scrub the inside of the tub. Rinse the tub before refilling. If possible, it is recommended to rinse the inside of the plumbing before filling as well. Use a hose to add water to the highest accessible point of the plumbing.

Always shock the water after refilling, and remember to use a standard dose of chlorine until the copper test strips show that the ionizer has added sufficient mineral levels to the tub.

Moving your Tub

If you ever find yourself needing to move your cedar hot tub, such as in the case you move to a new home, it is recommended you try to move the wooden tub portion in its assembled state, rather than trying to disassemble it. The problems with trying to disassemble a cedar hot tub is that the bottom inside portions of the staves are prone to breaking off when you remove the staves and it's difficult to get your tub back to a completely leak-free state after reassembly.

Simply drain your tub and move it by hand with the help of several people. Typically 3 or 4 people are strong enough to move a dry tub, however use as many as you need to do it safely. Also note that the more time you give your tub to sit empty, with the cover removed, in favorable conditions (e.g. not raining), the more it can dry out and the lighter it will be. Wood takes a long time to dry, so we recommend planning at least 2 weeks for this. Also, you can remove the benches if you wish, to further reduce the assembled tub weight. Before you move the tub, remember a dry tub will often shrink, so if you need to re-tighten the staves and retention bands, do so before you move it. You'll want to check it again after you move it, before you refill it. Note that there is more to it than simply tightening the retention band bolts. See the band tightening section of this manual for details.

You can sit an empty tub on the staves, however it is still a good idea to have the tub on chine joists whenever possible, especially when transporting the tub by road, to prevent damage. You may at some point wonder if it's ok to put the tub on its side, such as in the event of passing it through a fence gate. This is possible, however first make sure the staves and retention bands are fully tightened, and the outside of the tub is protected. If possible it's better to carry it on its side rather than roll it on its side, mostly to prevent marring of the outside of the tub.

If it's impossible to move it without disassembling it, here's how to do that. Let it dry as much as possible. Remove the benches and the retention bands. Using a rubber mallet from inside the tub, carefully tap the staves from the inside out, down as close to the floor as possible. It is much better to use lots of little/soft taps than too few big/hard ones. Take very special care to label the floor and staves in such a manner that when you reassemble the tub you can get the staves back on both in the same order, and as much as possible, each back onto the floor in the same spot they were in before. If easily possible, take the floor segments apart from each other while moving. If not, be very careful to keep them in a flat plane while moving them. Don't let them bend or buckle at the seams. Reassemble and tighten according to the correlating sections of this manual. If you do break a stave or two, contact us for replacement(s). Remember, if at all possible, it is better to move the tub assembled.