

Contents

GENERAL INSTALLATION INFORMATION	2
INSTALLATION OVERVIEW	2
INDOOR INSTALLATIONS	4
FOUNDATIONS	4
HOT TUB ASSEMBLY	7
DRAIN KIT INSTALLATION	9
ASSEMBLING THE BANDS	13
INSTALLING THE BANDS.....	18
ROUNDING THE TUB	21
STOVES AND ACCESSORY PLACEMENT	26
BENCHES	27
SNORKEL AND SCUBA STOVE INSTALLATION	28
FENCE ASSEMBLY AND INSTALLATION	30
DOOR HANDLE AND STOVE PIPE INSTALLATION	33
INSTALLING JET SYSTEM AND POWER PAK PLUMBING	37
INSTALLING FILTER PAK (PUMP & FILTER ONLY)	40
FILLING AND SEALING THE TUB	43
SANITATION & JAPANESE STYLE BATHING	45
CHEMICAL SANITATION BASICS	46
WOOD HOT TUB MAINTENANCE	49
WOOD AND ALUMINUM COVER ASSEMBLY	52
SNORKEL AND SCUBA HEATER OPERATING INSTRUCTIONS	56
STOVE MAINTENANCE	58
RIM AND FENCE SHELF ASSEMBLY	60
BOX STEP AND STAIR KIT ASSEMBLY	61
WARRANTY	62

GENERAL INSTALLATION INFORMATION

Thank you for choosing Snorkel Hot Tubs. Your tub should provide you with many years of enjoyment. Please read all portions of this assembly manual pertinent to your installation before starting assembly. It will speed the process and minimize problems. Pages 4-6 offer suggestions for general site planning if you haven't already created your own design. If you have any questions after reading the manual, please call us. We're happy to help. **IF YOU HAVE PURCHASED ONE OF OUR GAS OR ELECTRICALLY HEATED POWER PAK SYSTEMS, THE CONNECTIONS TO THE GAS SUPPLY AND/OR TO THE ELECTRICAL PANEL MUST BE DONE BY A QUALIFIED PROFESSIONAL.** Improperly connected electrical systems can cause fatal electrical shock and leaking gas is highly explosive. Check and follow your local building codes concerning installation of hot tubs and wood-burning heaters. Familiarize yourself thoroughly with the instructions, terms and suggestions. Most of the calls to our tech support staff are from customers who haven't reviewed their manual thoroughly.

ON LINE VIDEO AIDS

We have published a series of 13 videos of the complete assembly process on YouTube. They can be viewed at https://www.youtube.com/channel/UCS_6v6I9qiLqrekbq5zhYBA/playlists. These 13 videos will be referenced at the appropriate places throughout the manual by a QR code as shown below. You can use your smart phone equipped with a QR reader app to read the QR code and it will bring up the appropriate video segment for the portion of the assembly manual you are at to provide a visual demonstration. This can be especially useful when you are actually doing the assembly and need a refresher or if something is unclear.



QR Code for Snorkel Hot Tubs You Tube Playlists

INSTALLATION OVERVIEW

One of the most important installation decisions is deciding where to locate your hot tub. When well placed, a tub is more enjoyable and easier to operate. Factors to consider are esthetic values, exposure, wind, safety, convenience, ability of site to safely handle weight of full tub, hose and water locations, electric or gas service availability, and privacy.

If you are locating the tub near the house, a location close to the bedroom and bathrooms is generally the most convenient. Bathrooms, with showers, towels and bath mats, can be a natural changing and drying off area. Having the tub close to your bedroom is also nice. After enjoying a nighttime soak, it is wonderful to crawl out of the tub and roll into bed.

Location with respect to privacy and scenic views should be considered. For most people, relative privacy is important for enjoying their tubbing experience. Accordingly, your tub should be placed where passersby and neighbors are not in your line of sight. Natural screens of trees and shrubs can maintain privacy while providing scenic views.

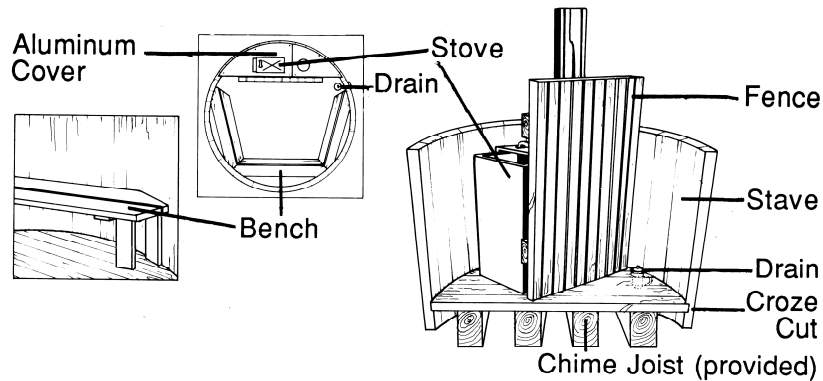
Other considerations include the relative location of the stove and drain. Each tub site presents unique circumstances that may determine where the stove and drain should be positioned. With

regard to the stove, you will want to have your wood supply relatively close by and have easy access to the stove door to feed the fire. You will also want the stove located so that its fence and chimney stack don't block your view. The bench locations and their relative heights should also take into account your views. If your installation is in a place where leaking water would damage the area, please build a watertight frame to catch any overflow water or any leaking from the initial sealing process.

At the same time, you will want to locate the drain so that you have easy access to connect and disconnect a hose if you are using one to drain water away from the tub site. You will also want to orient the tub bottom so that the drain, when positioned properly, will be located in the area just behind the fence where the stove is placed. This will keep people from accidentally dislodging the drain plug. However, you want to be careful not to locate the drain under the stove as it will be impossible to remove the plug.

Please consider the placement of every item you plan to install before you actually begin the installation. Each item can have an effect on other items you plan to install. One simple approach to make sure you have everything planned properly is to lay out the chime joists, place the bottom on the chime joists (with bottom boards perpendicular to the joists). Then simply place the stove and benches (if you are using them) on the tub bottom and see if the relative positions of the stove, drain, and benches are appropriate for the site and your needs.

Note that in the figure below the drain kit is shown on the bather side of the fence only for purposes of illustration. As mentioned above, putting it just on the other side of the fence will reduce the chance of the drain plug being accidentally dislodged.



Once placement has been determined, and the tub assembled, we recommend installing accessories in the order outlined below. The drain kit will be installed before the tub is assembled.

1. Stove
2. Benches
3. Aluminum cover or other cover
4. Jet System, Filter System, Electric or Gas Heating System

Again, give some thought to these items as you plan your installation and then refer to the detailed instructions provided for each item.

INDOOR INSTALLATIONS

Hot tubs installed indoors will greatly increase the humidity in the home. This can be beneficial in a greenhouse. However, in homes, this may cause damage if the humidity is not adequately vented to the outside. Excessive humidity will cause mildew and may damage interior wall and ceiling materials. Please make sure that the humidity is properly vented to the outside and controlled. Consult an HVAC specialist if you have any doubts.

Also, you will need to provide some means of draining the tub. A floor drain is best as it also provides a drain for overflow, splashing, etc.

Indoor Chimney Installation

When a chimney passes through a ceiling or roof, or if it is close to a combustible surface such as a building wall or fence, insulated chimney sections must be used. Virtually all building codes require an insulated chimney in these situations. Even if you are not subject to codes in your area, it is essential to use insulated chimney sections for proper safety. Stack temperatures can get as hot as any wood stove, and un-insulated chimney sections can set fire to nearby combustible material. If you are unfamiliar with these chimneys or when they should be used, first determine what your local building code requires, then, call us or contact your local hardware store or wood stove dealer for information.

FOUNDATIONS

Hot tubs may be supported in a variety of ways. The most important thing to consider is adequate support; a tub full of water will weigh from 2,000 to over 10,000 pounds (see specifications chart below for the weight of your tub).

Types of supports commonly used include posts, piers, concrete blocks, cement slabs, beams or railroad ties. Concrete slabs (at least 4" thick) reinforced with wire mesh provide the most permanent and secure foundation and are recommended where practical. Most other foundations can be prone to uneven settling which may cause the tub to leak. There is a wealth of information on patio design online. Remember, your foundation needs to be able to support the weight of your tub.

HOT TUB SPECIFICATIONS CHART		
Tub Size	Gallons	Weight
4' x 3'	190	1870
4' x 4'	282	2655
5' x 3'	315	3010
5' x 4'	463	4230
6' x 3'	470	4380
6' x 4'	680	6150
7' x 3'	660	6000
7' x 4'	950	8390

These figures are approximate and should be used only as a guide.

Some tubs are placed on existing grade; some are dug down and sunk in the ground. Others are set on decks or trestles to elevate them. In every case, but especially with tubs sunk below grade, it

is important to allow for ventilation under the bottom and around the sides. Good drainage is required to prevent the tub from sitting on damp earth or in water, which can cause it to rot. It is important that draining water or overflow does not splash dirt up on the tub. A good approach is to line the hole with plastic sheet or similar barrier that will prevent the earth from splashing on the tub. The acids in the earth can cause the tub to rot.. A good rule is to allow at least 12" of clearance from the earth around the sides and a minimum of 6" under the bottom boards.

If you are going to put the tub on a deck, you should be aware that most decks are not designed to support the loads created by a hot tub. Consult a structural engineer or contractor to determine the best way to ensure an adequate design for your deck.

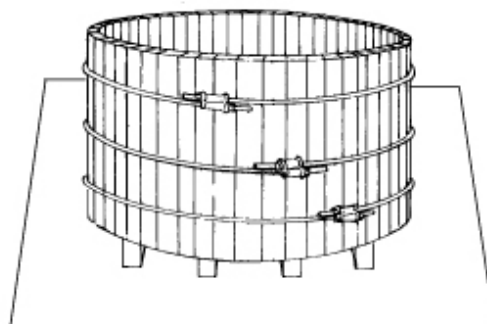
Many people like the idea of having the tub inset into the deck both for aesthetic reasons and ease of access. Tubs inset into a deck are an attractive installation alternative. However, if you inset the tub into the deck or set the tub below grade and are heating your tub with a Snorkel Stove® or Scuba Stove® you should build a sturdy barrier to prevent accidental contact with the hot stove and/or chimney pipe. Alternatively, the stove should be positioned in such a manner (e.g. at the edge of the deck) so that accidental contact is not possible.

With on grade installations, the tub rim is about 36" - 48" above grade and acts as a natural barrier or fence to help prevent someone outside the tub from stumbling or falling against the hot chimney pipe or stove. When a tub is inset into a deck, an accidental stumble or fall can more easily result in contact with the chimney pipe, possibly producing a severe burn. Children could be particularly susceptible to this situation.

A very important consideration when inseting a tub into the deck is to allow for future access to the tub. Plumbing can (will) leak and older tubs can start to develop minor leaks as the wood loses some of its natural resiliency. If leaks of this nature occur, they can usually be dealt with by tightening the bands or, if necessary, reseating the staves by hammering on them with the mallet while tightening the bands. Either approach, but especially the latter requires some degree of access to the tub.

The illustration below shows a tub on a concrete pad, the most stable and, if suitable in your instance, the best base for a tub. Whenever, making a base on ground for the tub, make sure to extend the base **at least** a foot beyond the perimeter of the tub to keep dirt and its acids from splashing up on the tub. If you are using steps to access the tub you will want to expand the perimeter of the pad accordingly. A 4" deep concrete pad with reinforcing mesh is sufficient support for the tub.

Once your site is prepared, you will place the chime joists and begin assembly. Your hot tub will sit on its 4x6 chime joists (provided) which run perpendicular to the bottom boards of the tub.



For a basic installation without concrete pad, frame an area with pressure treated beams or railroad ties, dig out the area and fill with 5/8" (5/8" or less in size) crushed rock - usually available at Home Depot or lawn and garden store. This material packs nicely and doesn't shift as much as a more rounded river rock or pea gravel. For a more foot friendly surface, place pavers or medium river rock on top or the crushed rock once the tub is in place. Smaller pea gravel will stick to your feet and end up in the tub. When setting the 4 x 6 chime joists for your tub bottom make sure the are level and the upper faces are flat (in the same plane) so that tub will have a solid surface to rest on. The gravel bed should be large enough to absorb water overflow.

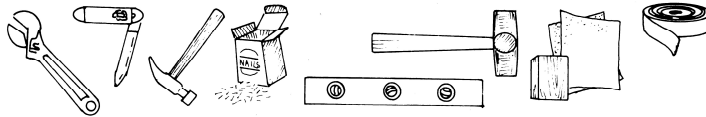
A popular approach is to dig the pit deep enough so that it can be used as a drainage bed. If you have a cement patio, place your supports directly on top of the cement slab. Consider any additions such as decking or steps for access to your tub now, and allow for placement of supports at this time.

HOT TUB ASSEMBLY

GETTING READY

Each step that requires action on your part will have a box for you to check as you complete this step of assembly. We hope this helps you.

Carefully unpack the tub. Inspect each piece to be sure there was no hidden damage that occurred during shipment. If you notice damaged parts that were not apparent when you first received your shipment, please call us immediately. We can help with any after the fact freight claim process and get your replacement parts on the way.



List of Tools Included and Items You Need to Supply

Snorkel Hot Tub Supplied Tools

- Open End Box Wrench with flat bands
- Heavy Rubber Mallet
- Caulking gun and caulk
- Square drive bit

Tools You Need to Supply

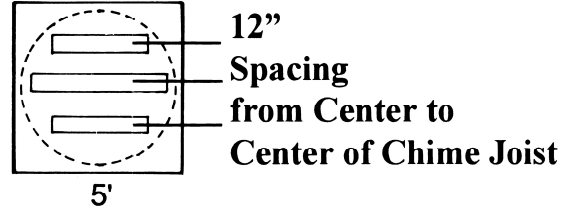
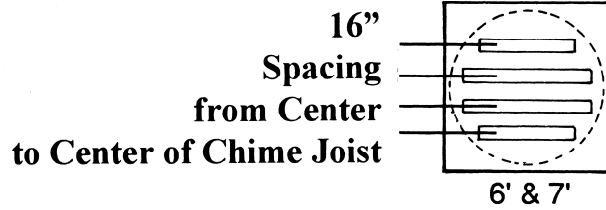
- Adjustable Crescent Wrench
- Utility knife
- Masking Tape
- Level
- Tape Measure
- Drill and 5/16" bit for stove and fence)
- Philips Head Screw Driver
- Sand Paper
- For jet/filter systems: PVC glue and primer, 2 3/8" (preferred) or 2 1/2" hole saw & arbor

ROUND UP YOUR HELPERS

While one person can assemble a tub, it is more enjoyable, as well as quicker and more efficient if you have a few helper or two. Two people familiar with the instructions should be able to put the tub itself together in 4 - 6 hours.

CHIME JOIST PLACEMENT

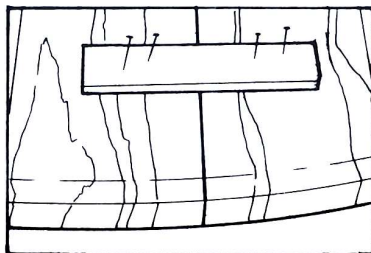
Chime joists should be placed as shown in the diagram on the top of the following page. Be sure you use the proper guide for your size tub. Make sure that: 1) the chime joists run perpendicular to the tub bottom boards; 2) the chime joists are set with the 4" side on the foundation (raising the tub 6" off the base) and that they are positioned so they will not interfere with the drain kit assembly. If you have a 5' tub with a drain kit, the standard placement of the outer chime joists, shown below, may interfere with the drain kit assembly. If necessary, move the appropriate chime joist 2 or 3 inches in towards the center joist to provide clearance for the drain kit.



QR Code for Chime Joists and Bottom Assembly Video

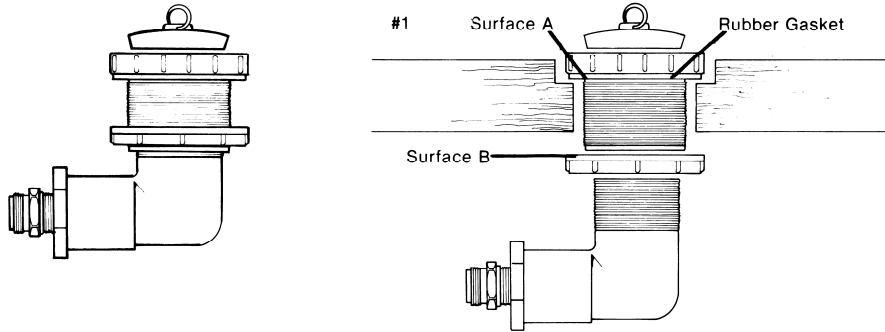
TUB BOTTOM ASSEMBLY

- 1. Verify that your bottom is a matched set by comparing the marking on each half. Place the two bottom sections on top of the chime joists with the side that has “This Side Up” and the two concentric red lines around the perimeter of the bottom facing up. **Make sure that the floor boards are perpendicular to the chime joists so that all the floor boards are evenly supported.**
- 2. Align the tongues and grooves of the two opposing halves so they mesh with each other and then slide the two halves together as snugly as you can.
- 3. Nail the two (8" x 1 1/2" x 1/4") wood strips (they are provided and are in the plastic bag with the band, lugs, etc. which are in the stove) across the center seam on the top face of the tub bottom (see image below). Do not pound nails in more than 3/4". Offset the nails as shown to prevent cracking and provide more stability to the bottom boards. This is to ensure the two halves do not separate during the assembly process.



DRAIN KIT INSTALLATION

If you purchased our drain kit, this is the best point in the assembly to install it. The following pictures show how it fits into the pre-drilled hole in the tub bottom.

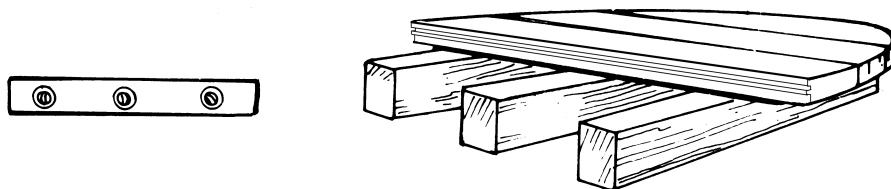


□ A. Remove nut, gasket, and 90° elbow from drain fitting. On the tub bottom apply a large bead of silicone to the recessed lip of the counter sunk hole. Then spread silicone sealant freely (using Snorkel Hot Tub supplied caulk and caulk gun) on surface A. (the underside of the grey fitting). Push the rubber gasket so it seats against the fitting and then apply silicone to the bottom of gasket, the side that contacts the drain hole cut in the tub. Insert fitting into hole from inside tub. Then apply a little silicone to surface B, the flat side of the plastic nut. Screw the nut snugly on the outside of the threaded end of fitting. Be careful not to cross thread or over tighten the nut. The tub will expand when it gets wet and may crack the fitting if over tightened.

□ B. Choose the drain fitting adapter you will be using: a reducer with brass adapter for garden hose or the straight PVC pipe for a vinyl drain line. Screw the threaded end of whichever adapter you will be using into the inside thread of the elbow and then thread into the drain fitting. Thread the elbow into the drain fitting far enough so it is well seated, but not so far that you can't access the drain fitting easily beneath the stove.

□ C. Install stopper on the inside of the tub. To prevent freeze-ups in the winter, make sure the drain line runs continuously downhill, so no water is left in the line.

□ 4. Place the bottom on the chime joists. Use a level to assure the bottom is level. If not, re-level the chime joists. Do not use shims between the chime joists and the tub bottom to level the bottom.



□ 5. Check to see that the bottom makes even contact with the chime joists and that the chime joists are level and contacting the foundation. If necessary use wood shims between the chime joists and the foundation to level them. When the bottom is in place, it should overhang the joists by at least 1 1/2" (more is O.K.). If necessary, adjust the bottom and/or chime joists slightly. This ensures that the weight of the tub will be borne by the bottom and not by the staves. Fine tuning the position of the bottom on the chimes is not critical at this point, as the bottom will move on the chime joists when standing the staves and will probably require a final adjustment later.

ASSEMBLING THE BANDS



QR Code for Bamd Assembly Video

NOTE: WHEN HANDLING BANDS, PLEASE WEAR GLOVES. The edges are sharp and can cut your fingers.

Assembling the bands is a very easy process. Simply uncoil the band. The clamping lugs are already in place and the band is bent back to keep them in position.

Once the band is uncoiled and laying flat, insert the threaded rod through the tube of one lug and then through the tube on the opposing lug. Place a washer on each end of the threaded rod and then thread a nut on each end. You will want to thread the nut on just far enough so the threaded rod is flush with the end of the nut. This will give you the maximum of circumference in the band and make it easiest to slide over the staves.

The threaded rod we supply is stainless steel, but the nuts are a silicone bronze alloy. We use that material because it eliminates the need for messy anti-seize lubricant that is required when tightening stainless steel nuts on stainless threaded rod.

STANDING THE STAVES

GENERAL INFORMATION

Each of the staves has a croze (or dado) cut that allows you to pressure fit it onto the tub bottom. It is a special dado cut made on a radius so that the stave will fit snugly against the rounded circumference of the tub bottom. As your tub wood has been kiln dried to about 8-10% residual moisture, it can absorb moisture from the air causing it to swell slightly. This sometimes causes some of the staves to fit excessively tight when trying to put them on the bottom. You don't want to force the staves on in this situation as it could cause the bottom of the stave to crack off. If you find that the croze seems too tight for the staves to tap easily onto the bottom, lightly shave or sand the bottom boards where necessary until you are able to tap the staves into place.

Putting the staves on the tub is a two stage process. When you initially stand the staves on the bottom, you will only put them part way onto the bottom, to the first red line, with a slight gap between the edges of the staves. After all the staves are on the tub, you will put the bands on and begin tightening the bands and tapping the staves, gradually drawing them in and removing the slack between the staves.

There are two red concentric circles drawn around the perimeter of the tub bottom. The outer circle is 1/4." away from the inner circle. This inner circle will be the true finished inside diameter once the staves are fully seated. When initially standing the staves, tap the staves just to the outer circle on the bottom. **DO NOT TAP THE STAVES TO THE INNER CIRCLE AT THIS TIME.**

Also, at this initial standing of the staves, do not try to seat them tight against each other. You want to leave a slight gap (about 1/32") between them (at the croze cut not the top). By putting them on only part way initially and then pulling them in later while tightening the bands, you will eliminate the gaps between the staves. This process is designed to pull all the staves tightly together at the same time that the back of the croze cut is drawn snugly against the edge of the bottom.

It is okay if there is some variation in the size of the gap between the staves, but you don't want to have several staves in a row with large gaps (1/8" or greater) and then a similar amount in a row with no gaps between the staves. You want the gaps fairly evenly distributed around the perimeter of the tub so that they can easily be drawn in evenly.

When the staves are drawn on to the inner red line approximately 1 1/2" of total gap between the staves is removed. That may sound like a lot, but amounts to reducing only about 1/32" gap between each stave on a typical 6' tub, a little less on larger tubs with more staves and a little more on smaller tubs with fewer staves. Again, be sure to look at and gauge the gaps at the level of the croze cut, as that is the critical area, not at the top of the staves.

Understanding and executing this process will affect how quickly the tub will swell and seal itself. Fortunately, tubs are very forgiving and absolute perfection in assembly is not required. Our kiln-dried Western Red Cedar will swell anywhere from 2-4% (4" - 9" around a 6' diameter tub) when wet and is capable of eliminating a number of minor flaws in assembly. However, that does not mean you can have a gap of 1" and expect it to seal, as there is a limit to how far the staves can move freely when seated and bound. Accordingly, you should have no more than a few gaps of 1/32 - 1/16" between staves once the tub is assembled.

The table below shows the number of full staves and key staves for each tub diameter.

Tub Diameter	# of Full Staves	# of Key Staves	Tub Diameter	# of Full Staves	# of Key Staves
4'	27	2	7'	48	2
5'	34	2	8'	55	2
6'	41	2			

GET STARTED

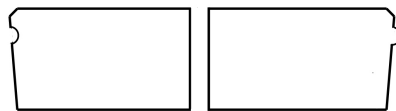


QR Code for Stacking and Standing the Staves Video

□ 1. Sort through the staves and locate the four staves marked with chalk lines on the outside and the two key staves. The key staves are those that have one flat side with a tongue or groove on the opposing side. Set the marked staves and key staves aside.

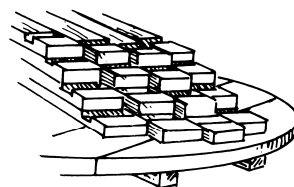
The chalked lines on the four marked staves indicate the height at which each band is placed. You want to place these marked staves at roughly equal distances around the tub to aid in band placement around the tub.

The key staves are used to fit in the gap for the last stave. Generally, it is easier to assemble a tub using two key staves with opposing flat surfaces rather than trying to nest in a full tongue and groove stave into that gap, particularly if it is a tight fit. Accordingly, we have provided two appropriately size key staves to fit in the final gap when standing the staves.



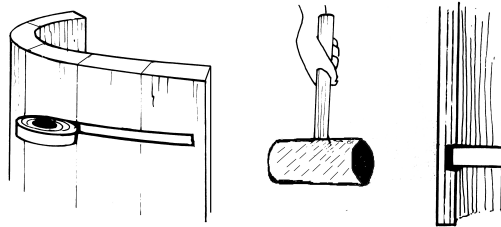
Key Staves

□ 2. We find it convenient to stack all the staves on top of the tub bottom, croze (groove) side up as shown. The weight of the staves will help keep the bottom in place as you work.



□ 3. Using your provided Snorkel Hot Tub rubber mallet, erect the first stave (starting with a chalk-line marked stave is a good idea). **This stave must be centered over the seam between the two halves of the tub bottom.** Make sure the croze engages both boards.

□ 4. **Please read this whole step before proceeding.** Put on all the full width staves first - with each stave nesting against the preceding stave - by **tapping each onto the outside red line** on the tub bottom. It generally works best if you try to engage the tongue in the neighboring stave's groove before trying to tap it on. As you work your way around the tub use tape (blue masking tape works best) to hold the staves together. The tape is extremely useful in helping keep the staves upright on the tub when you are trying to nudge a stave sideways with the mallet. Without it, they will tend to fall off.



As you stand the staves, distribute the four chalk marked staves evenly around the perimeter of the tub. The staves should be just barely touching one another with just slight gaps in between. Small 1/32" gaps (credit card thickness) at the croze cut are perfect for a 6' diameter tub, a little more for a 5' tub and a little less for a 7' tub. Again, the concept is to have the staves drawn in tight once they are moved to the inside red line, not on the initial placement. Every four or five staves that you place, check back to make sure that none of the previous staves are being shoved off, and that they are still lined up correctly against the outer red circular line.

The tops of the staves may tend to flop apart, which is fine. Use masking tape as needed around the tops of the staves to help keep them in place, making it easier to slide the bands over the top of the tub.

The fit at the bottom (croze cut level) is the critical area to focus on. Don't be concerned with how close or far apart the staves are further up. Ideally, there would be an equal gap between each stave at the bottom, but reasonably close works here. **It is important, however, that you do try to have the inter-stave gaps evenly distributed around the tub so that when the bands are placed and tightened the staves can be drawn in evenly.** You do not want (to take an extreme example) to have the staves on one half of the tub with the staves perfectly tight against each other and the staves on the other half with 1/16" to 1/8" gaps.

□ 5. Check the tub floor for a gap between the two halves as you proceed. The two tack strips should hold the bottom halves in place, but pounding staves on can create a gap. Any gap between the two halves should be 1/8" or less when finished standing the staves. Use your mallet to move the staves into alignment as you proceed standing them around the tub. At this step, the staves should nest fairly close together with roughly equal inter-stave gaps between them where they join the floor. When you begin to tighten the bands, you'll hammer with the mallet to seat the staves all the way onto the tub bottom.

THE KEY STAVES

After standing all the full width staves, you will fit in the key staves. Make sure that you've taped the tops of the adjacent staves together to avoid pushing them off the tub bottom when inserting the key staves. The key staves are installed with their flat edges pressed tightly together with their tongue and groove on the outside. The two key staves provided should fit snugly into the remaining gap. If there is excess remaining space, the other staves are too tight together. If the key staves are too tight or won't fit at all, there is too much inter-stave gap between the full width staves.

There are 3 basic scenarios you could encounter when fitting in the key staves:

1. The key staves are a perfect fit, fitting snugly in their gap. Congratulations, you are good to go on to the next stage, putting on the bands.
2. The gap for the key staves is too wide for the key staves to fit snugly. That is, there is a gap of $> 1/16''$ on either side of the key staves. See Fix #1 below.
3. The gap is too narrow for the key staves to fit. See Fix #2 below. Note that if all the staves and their gaps look good (about $1/32'' - 1/16''$), but the key staves still fit tightly, it seems to work best to tightly press the two key staves together and slide them in from the top until the croze cut is over the edge of the bottom and then tap them on.
Another approach is to insert the key stave with groove first and then slide the tongued key stave in.

Fixing key stave gap problems involves "shuffling" the staves you first put on to increase or reduce, as necessary, the key stave gap. That is, you will move (shuffle) the staves that you first put on to increase/reduce the key stave gap by peanut butter spreading the excess or deficit evenly between the first "X" number of staves you put on. "X" is typically 8 to 12 staves, but, in unusual situations could involve all the staves on the tub. The goal is to have all the staves staged on the outside red line with the gaps between them all roughly equal. This will insure a nice tight fit between them when you tighten the bands and round the tub bringing the staves to the inside red line.

Fix #1. Proceed as follows: Install the key staves in the gap against the **last full width** stave you installed. Remove the first two full width staves you installed, which are next to the resulting gap. Reinstall one of the staves you just removed next to the key staves leaving a small gap, $1/16''$ or less between it and the key staves. Remove the next stave (3rd stave installed) and move it over and install it leaving a small gap, $1/16''$ or less between it and the adjacent stave. Continue your way around the tub repeating this until the gap that is left is a good fit for the final full width stave, leaving just a small gap on either side of it. As stated above, this typically involves no more than "shuffling" about 8 to 12 staves. When done, you can proceed to the next stage of putting on the bands.

Fix #2. Proceed as follows: Remove the first two full width staves you installed, which are next to the key stave gap. Install the key staves in the gap against the **last full width** stave you installed. Reinstall one of the staves you just removed next to the key staves with a gap of no more than 1/32". Remove the next stave (3rd stave installed) and move it over and install it next to the one just installed with, again, a gap of no more than 1/32" between the two. Work your way around the tub until the gap is a good fit for a full width stave. You may not need to "shuffle" all the staves all the way around the tub to achieve this. When done, you can proceed to the next stage of putting on the bands.

This is the time to critically examine how things have worked out with standing the staves. Getting it right (the gaps between the staves) at this point is much easier than completing assembly, filling with water and then realizing it was wrong and then having to dry the tub, disassemble it and start over. When we refer to gaps, we are only concerned with the gap at the croze cut level on the inside of the tub. That is the critical part of the tub.

Having all the inter-stave gaps perfectly equal and the key staves fitting perfectly isn't necessary, but you have to make an honest assessment of things at this stage and do a little rework, if necessary. A little backtracking here can save a major rework project later. The gaps between the staves at the inside croze level should be roughly equal and there shouldn't be any gaps of 1/8" or greater between any of the staves. "Shuffle" as necessary any staves to eliminate gaps of 1/8" or greater.

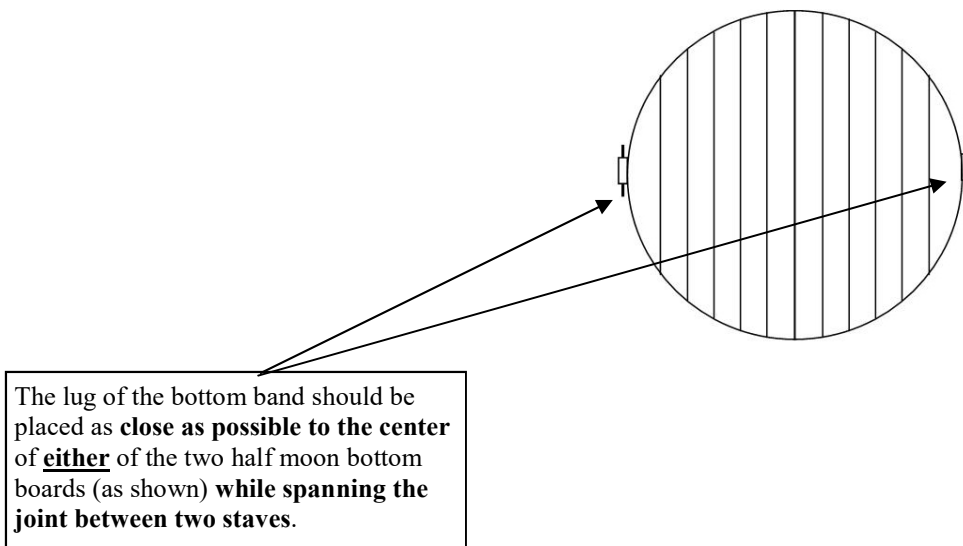
Occasionally, if the tub has been stored for awhile before assembly in an environment that is either wet and humid or very dry (Arizona, New Mexico, etc) the staves may expand or shrink sufficiently that it may be necessary to have us make new key staves and send them to you. This is why we recommend that the tubs be assembled as soon as possible after delivery. This is especially true for dry environments where the wood may shrink. In that instance, if the wood has shrunk so that the key staves are not at all tight, we will probably have to supply new larger key staves.

In the case where the wood has absorbed humidity and expanded, you may be able to trim one or both of the key staves to make them fit if you have a table saw or if you can rig a circular saw with a good guide system that will let you make a clean straight cut. If you don't have tools, but have a lumber yard, Home Depot or Lowe's nearby they will usually make the cut for you. We are happy to supply new key staves in this circumstance, but those options are probably quicker.

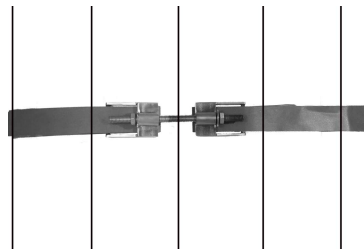
INSTALLING THE BANDS

While one person can position the bands at the top of the tub and slide them down, it is much easier to put them on with two people. **NOTE: THE EDGES OF THE BANDS HAVE BEEN DEBURRED, BUT CAN STILL BE SHARP. PLEASE WEAR GLOVES TO PRODUCT YOUR FINGERS.**

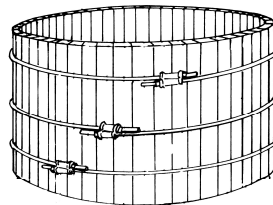
- The first step is to assemble the bands. Uncoil the bands so the lugs are facing each other. Then insert the threaded rod through the cylindrical portions of the lugs. Slip the washer on and then the nut on each side and hand tighten the nut a few turns so the band will slip over the top easily, but still grip the tightly enough so it won't slide all the way down.
- Position the bottom band first. All bands should be placed vertically so that the chalk lines are just above the top edge of the bands.
- Once the band has been fitted over the top of the tub, it should slide down fairly easily. If it sticks a bit, use a block of wood, (a bench leg works) to tap it down. Hold the block of wood on the band with one hand and use a hammer with your other hand to tap the block of wood. The band will move easily.
- Position the bottom band first. All bands should be placed vertically so that **the chalk lines are just above the top edge of the bands.**
- The chalk lines are marked at (measured from the bottom of the stave) 4.5", 16.5" and 32" for three foot tall tubs and 4.5", 16.5", 29" and 44" for four foot tall tubs..
- Position the lugs of the bottom band so they: **1. span the joint between two staves;** and **2. are as close as possible to the midpoint** of one of the two shortest (half moon shaped) bottom boards. See below illustrations.



- Remove slack in the bands so they will stay in place (slack only, you're just positioning the bands) by tightening the nuts with a wrench so that they are tight enough to stay in place. Tighten both nuts equally.
- Repeat process for the remaining bands. Place the nails (if needed), set the band, remove slack).
- **The placement of the lugs of the bottom band is critical for drawing the two halves of the bottom together.** (See below). The lugs of the bottom band must span the joint and be as close as possible to the mid-point of the half moon shaped floor board. Space each subsequent lug pair three stave joints away from the one below it.



All lug pairs **must span the joint** between two staves.



ROUNDING THE TUB



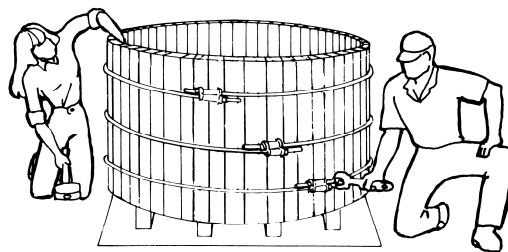
QR Code for Band Installation/Rounding the Tub

This is the most important part of the tub assembly process. At this point the staves should be reasonably snug on the tub bottom and should have a very slight gap (about 1/32" for a 6' diameter tub, a little more for smaller tubs and less for larger tubs) between them. Ideally you want the gaps between the staves to be as close to equal as possible.

There should be no large gaps between the staves, nothing larger than 1/8". If there is a gap of 1/4" or larger between two staves, you should take the bands off and reposition the staves to eliminate the large gap. All the staves should be covering the outside of the red line. When rounding is completed, the bottom boards and staves should all be snug together. This next series of steps is a repetitive process of "rounding" the tub while tightening the bands.

"Rounding" is a repetitive process (typically 4 or 5 iterations) of: 1) pounding the **bottom band** to move the staves inward; 2) tightening the bands; and 3) keeping the staves aligned so their tongues and grooves stay engaged. Moving the staves inward by pounding the bottom band creates slack in all the bands, which is then taken up by tightening them. This job is easiest when done with two people, one person tightening the bands while the other is pounding on the **bottom band** to move the staves in. When done, the center of the staves should be slightly over the inner red line.

We have found that with the bands much less pounding on them is required to move the staves in. As the bands are more flexible than the old style rigid steel hoops they exert a more uniform force on the staves when they are tightened and tend to draw them in more evenly. You may find that very little pounding is required to move the staves to the inner red line.



□ 1. Start rounding the tub by tapping the bottom band with the mallet to move the staves a little further onto the bottom. **DO NOT HIT THE STAVES DIRECTLY.** Hitting the staves directly can damage them if you are using all your strength. Do not hit the bottom of the staves below the bottom band as you may break the bottom of the stave off. Start at the middle of the bottom band (opposite the lugs) and work your way around one side to the lug while taking up the slack in each of the lugs by tightening the nuts. Then repeat, starting at the middle of the bottom band and work your way around the other side while again taking up the slack in each of the lugs. **You only need to pound the bottom band to help seat the staves on the bottom, do NOT**

hit the middle or top bands other than tapping them to align the staves if needed.

On the first go-round of tightening light blows, if any, are all that is needed to move the staves inward. When you get to the latter iterations of the process considerably more force is needed to move the staves inward to the inner red line. At the end you may need to hit the bottom band pretty hard to move the staves that last little bit to the inner red line.

Caution: Do not try to shortcut the process by tapping the staves all the way on in one pass. To assemble the tub correctly, you must repeat this process 4 or 5 times to insure the staves move in evenly.

DO NOT TRY TO RELY ON JUST TIGHTENING THE BANDS TO PULL THE STAVES IN. THIS DOES NOT WORK . SOME STAVES JUST WON'T MOVE INWARDS WITHOUT SOME POUNDING.

□ 2. You may need to **lightly** tap the upper part of the staves with the mallet as necessary to keep them aligned. The tongue and groove feature of the staves acts as a self aligning mechanism, but as you move the staves inward, the tongue and groove may become disengaged. You may have to tap the staves both from the inside and the outside and along the length of the staves to get the tongue re-engaged in the groove. When hitting from the inside of the tub, hit opposite the band and not in between band.

Maintain equal tension on all bands, as measured by an even amount of exposed thread on band ends. **It is critical to not over tighten the upper bands.** It is easy to over tighten the upper bands, especially the top one. This will create a slightly conically shaped tub as they do not have the resistance provided by the tub bottom. You want the staves to be vertical and the tub to be as close to a true cylinder as possible to maximize its sealing capability. Over tightening the top bands tilts them inward deforming the geometry of the croze cut against the bottom and is a cause of leaking.

□ 3. You will repeat steps 1 and 2 about 4 or 5 times, drawing the staves a little further onto the tub each time. As the staves are drawn in, you will have to hit the bottom band (in step 1) harder and harder to get them to move the last little bit. This process is a little monotonous and tedious, but will ensure that your tub is as tight as possible.

When you aren't able to move the staves anymore by hammering, **STOP TIGHTENING.** Once the staves have moved to cover the inner red line, the bottom band is tight and the tub sounds like a drum when you pound it with the mallet and your tub has been creaking and groaning and resonates like a tight drum, you are done

While it is important to make sure the bottom band is tight, don't overtighten. About 30-40 foot pounds of torque is adequate. You do not want to go overboard and strip the threads.

It is important to have an approximately even amount of exposed thread on each band. That indicates that they have been tightened evenly and the upper bands haven't been over tightened.

The final goal is to have the staves tightly compressed against each other with the center of each of stave over the inner red line, ensuring that your tub is nice and tight. As with any hand crafting process, however, there can be variances. Also, wood can expand and contract significantly based

on changes in relative humidity which can affect how the tub goes together. Allowing for variances, however, the vast majority of the staves should be on the inner red line with no more than about 5 or 6 staves 1/32" - 1/16" short of the inner red line. If this is not the case with your tub, you should give us a call before proceeding as there may be a problem.

At this point any gaps between the sides of the staves should be completely closed up and the gap between the two bottom halves shouldn't be more than 1/16". If this is not the case, repeat the hammering and tightening of the bottom band. If repeated efforts are unsuccessful and there are only a few minimal (1/32 - 1/16") gaps between staves and **at most** a 3/32" gap between bottom boards, you can stop and consider it complete. Sealing might take a little longer, but the tub is capable of swelling and sealing those gaps.

SHUFFLING THE STAVES

The key stave widths are calculated to properly fill the gap after all full width staves have been installed. That said, wood reacts to temperature and humidity and after leaving our shop can swell or, more typically, shrink a bit. The longer the time period between the tub leaving our shop and assembly, the more likely the wood is to shrink.

The wood is kiln dried down to 8-10% moisture, but can continue to give up moisture and shrink even at that level. This is why try to stress to customers to assemble the tub as soon as they can after receiving it.

If you have seated the staves and still have a gap 1/8" or larger between one or more staves you will need to loosen and drop the bands and "shuffle" the staves to eliminate the large gaps. Gaps of 1/8" or larger cannot be sealed by the swelling of the wood.

The process is simple. Gently tap the stave that is adjacent to the gap off while working it from side to side. Tap gently just above the croze cut. You want to be careful so you don't break off the bottom part of the stave that is gripping the tub bottom from the under side. Do this for 4 or 5 staves on either side of the gap. Choose the ones that most tightly seated against each other so you have more ability to absorb the initial gap. Then, simply reseat the staves you have just taken off so that the large gap is evenly spread between the staves as you reseat them, resulting in a series of very small gaps.

The last step is to apply silicone sealant around the perimeter of the tub bottom, where the staves meet the floor. Using the caulk gun, lay a bead of caulk (about 1/4" - 3/8" in diameter) at the stave/bottom joint. Then, using the nitrile gloves that were included with the tub, run your forefinger over the sealant with moderate pressure so the sealant is pressed snugly into the joint. The purpose of the silicone is to provide an initial seal for the joint so there is minimal leaking while the wood is swelling and sealing the tub.

FILLING YOUR TUB

TIP: Most tubs will leak at first. If water is scarce in your area, do not attempt to fill it to the top. The extra pressure from filling to the top will just worsen the leaking. We suggest putting a rotating sprinkler in the tub at very slow speed or a small spray sprinkler just to keep things wet. Another is to simply just put in about 5 gallons of water periodically. You can “paste” wet brown paper bag sections over any problem seams to slow down leaking until the wood swells.

LEAKING PROBLEMS

New Tubs

Almost all tubs will leak when first put together. Typically, the leaks are fairly minor and will seal up within a few days. Even more substantial leaks should seal within a week or so. If you are experiencing unusually heavy leaking and/or it has been more than 10 days and you still have moderate leaking, there are a couple of things you can look for:

- First, review your process of rounding the tub and seating the staves. Did you really get all the inter-stave gaps down to 1/16” or less? If not, and there were gaps of 1/8” or more, you are fighting a losing battle. You will need to drain the tub and let it dry (if saturated) and shuffle the staves to reduce the gap. See “Shuffling” heading in previous section.
- Second, make sure all the bands are tight and equally tensioned. They are equally tensioned if the total amount of thread showing on the outside of the nuts is the same on all bands. If the bands aren’t tight enough, you will have to drain the water and retighten them. You don’t want to strip the threads, but you will need to be putting a lot of pressure on the nuts to make sure the bands are tight. They nuts should be creaking a bit as a sign they are tight.
- Make sure the back underside of the stave below the croze hasn’t sheared off. This is a rare occurrence, but cedar is noted for its easy splitting capability and this can happen if there was a hidden flaw in the wood.

Older Tubs

When tubs are about 6-8 years of age they tend to start leaking. This is just the result of the wood aging and shrinking slightly. The fix is simple. Drain the tub and let the wood dry out completely. It helps if you can let the process go until warm weather when the wood will dry out more quickly. We recommend letting it dry for 10-14 days, but if it is warm, a week or so should do it.

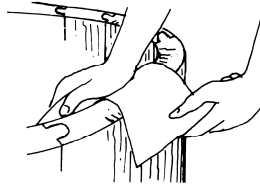
Once the tub is dry, reseat the staves as you did in the very last step in the section Rounding the Tub. Hit the lowest band with the mallet very firmly while tightening the bands. You are trying to drive it onto the bottom to make sure it is firmly seated against the bottom. This will also help reduce any gaps between staves that may have been created as a result of the wood shrinking.

Once the staves are firmly re-seated and the bottom band tightened, then tighten the remaining bands so they have the same amount of thread showing as the lowest band.

If none of these tips work, please give us a call. We are here to help you. We want your tub to be a pleasant experience, not a hassle and will do whatever we can to insure that.

FINISHING TOUCHES

Once the tub is assembled, you may want to sand off any sharp corners on the top of the staves.



STOVE AND ACCESSORIES

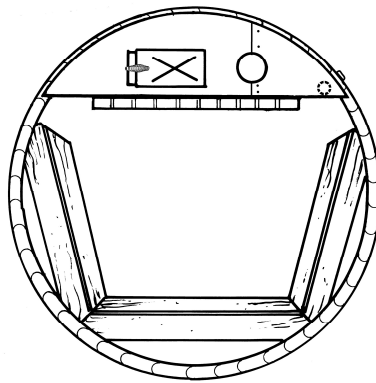
See the installation overview section for a description of how the relative positioning of these items can affect your installation.

□ It is necessary to consider placement of each item you plan to install and any effect it might have on another accessory installed in the hot tub. We recommend reading at least through the stove placement tips on page 21 before beginning any installation processes. Before you install any items inside the tub, determine placement for the following:

- A. Drain (should already be installed)
- B. Benches
- C. Stove
- D. Aluminum Cover,
- E. Jet Fittings

Once placement for the above has been decided, we recommended installing accessories in this order; 1. Drain (if not already installed) 2. Stove and Fence 3. Benches 4. Aluminum cover and/or other cover 5. Jet System/Filter System/Action Pak System

Please refer to the instructions provided for each item for more details.



BENCHES

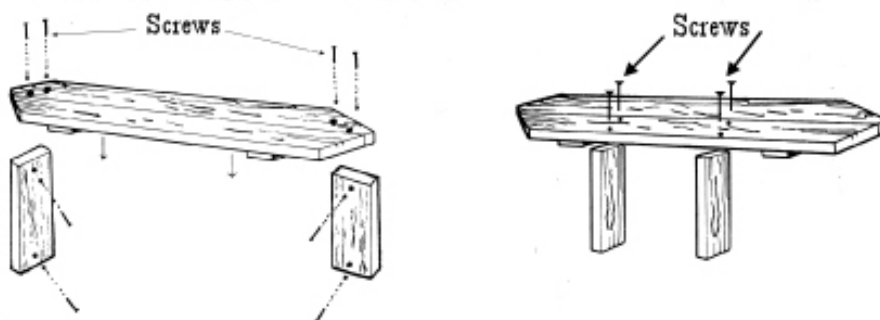


QR Code for Bench Installation Video

If you ordered benches, you received either three (for our wood heated systems) or five (for gas/electric heated Action Pak systems) bench seats, and four 2x6 supports for each seat. The bench supports might look like really short stave pieces. These supports vary in length, allowing you to install your bench seats at staggered heights. If the supports we gave you aren't the exact height you need, just trim down (4) supports per bench to the desired height.

Your benches are installed by screwing two wooden bench supports against the tub wall and two supports under the front ends (forward edge) of the bench. Each bench will require twelve 2 1/2" stainless screws for installation.

- 1. Determine the height you want each bench. Staggering bench heights allows different sized people to enjoy the tub, and also provides seating areas for cooling off. Remember to be mindful of any views you may wish to enjoy as you tub.
- 2. Set bench against tub wall and measure distance from bottom of bench to tub floor. If necessary, trim (4) supports to that desired height. Take two supports, and using two 2 1/2" stainless screws per support carefully screw the supports to tub wall (from the inside of the tub) where your bench touches the staves. Center screws 2" from end on each support.
- 3. Next, screw two supports onto the front of the bench, perpendicular to seat front (see drawing), making sure edge of the support lines up with the front edge of the bench.
- 4. Place bench on top of supports screwed to tub wall. Drive the screws down through the bench into the two supports, completing your installation.



Note - Pre-drilling guide holes for screws prior to putting them in will help prevent splitting in the wood. Also, if your supports are less than 6" in height sink the screws into opposite diagonal corners from each other in order to avoid splitting the support by screwing two screws into the center of a short board.

SNORKEL AND SCUBA STOVE INSTALLATION



QR Code for Stove Installation Video

Before starting the installation of the stove please check the aluminum cover installation section. You will want to make sure that the stove is located in an area that will provide the best possible fit for the aluminum cover before starting to drill holes. **DO NOT INSTALL THE STOVE BEFORE THE TUB IS COMPLETELY ASSEMBLED.** If you drill the mounting holes for the stove before the tub is completely tightened, the holes may no longer be in the proper position and the stove will need to be replaced.

Tool list

- Hammer
 - Pliers
 - Crescent Wrench
 - Drill
 - 5/16" Drill Bit
 - Pencil
-
- 1. Completely read the stove installation instructions before starting.
 - 2. Determine the best stove location and orientation (i.e. do you want to lift the door open with your right or left hand?). If you are installing an aluminum cover, please read the installation instructions before making final determination on your stove location. Also consider stove pipe location, access to woodpile, ease of operation, and view. If you have purchased one of our soft covers the stove **MUST BE** installed with the chimney on a certain side. This side would be the left side if you are standing in the tub facing the stove or it would be the right side if you are outside the tub and facing the stove.
 - 3. Place stove in tub and climb in with it.
 - 4. Using pliers or a crescent wrench, bend the mounting brackets on the side of the stove to be mounted to the tub so they conform to the curvature of your tub. Do not use a hammer.
 - 5. Hold the stove in place, level, with door opening (top edge of the stove) 1" above the rim of the tub. **THIS IS CRITICAL, OTHERWISE WATER WILL GET INSIDE YOUR STOVE WHEN PEOPLE GET INTO THE TUB.** It is easiest to use supports under the stove to hold it in place, but remove the support before tightening the bolts completely. For a **Snorkel Stove, setting it on a** combination of a fence board and a bench support (or any other 2x6 material) provides just the right amount of height under a Snorkel Stove for its vertical alignment in our 3' tall tubs. Doubling that combination provides just about the right height for a Scuba Stove. **Always check to make sure the door opening is at least 1" above the rim of the tub.**

The Snorkel and Scuba stove both need a minimum of 1" clearance underneath to allow water to draw heat off the metal. The minimum water level for a Snorkel stove is 27" while a Scuba stove requires a 20" minimum water level. This allows for 1" of water under the stove and 3" of water over the stack plate.

- 6. Using a short pencil or chalk, mark the hole locations through the bracket holes, being careful not to move the stove until done. Make sure the brackets are centered as close as possible to the middle of any stave you might drill through. Tip: Cut the end off a sharp pencil creating a stub 3/8" long. Then use a pair of pliers or vice grips to hold it for marking both the tub wall and fence.
- 7. Set the stove aside and drill a 5/16" hole through the tub at each mark, being careful not to splinter the wood. Hold a block of wood on the backside of the stave you are drilling through to help prevent splintering. Use a rasp or file to clean the hole if necessary.
- 8. Open mounting package with carriage bolts, nuts and black rubber washers. Slip the rubber washers onto the carriage bolt until it touches the head of the bolt. Push carriage bolts through holes you just drilled. The bolt head and the O-ring are on the outside of the tub.
- 9. Place stove back into position in the tub running the carriage bolts through the holes in the mounting brackets. Put the nuts on the carriage bolts finger tight. Remove any supports before tightening the bolts then tighten the nuts securely with a crescent wrench.
- 10. Be sure the stove is held securely to the tub wall. The Snorkel and Scuba stoves have over 250 pounds of positive buoyancy when submerged in water. The stoves must be bolted in firmly.

Note: When mounting stove to plastic or fiberglass, steel or other surfaces, use caulk or rubber gasket between stove and wall, and cover the bolt heads with caulk. If your tub wall is thin use 2x4's and build a mounting frame on outside of tub. Bolt through the 2x4's.

If installing a stove in a shallow tub, be aware that when several people get out of the tub the water level can drop significantly, possibly exposing the stack plate. If the fire is still burning, the stove could then easily be damaged.

FENCE ASSEMBLY AND INSTALLATION



QR Code for Fence Assembly Video

SNORKEL STOVE FENCE ASSEMBLY/INSTALLATION

The fence is attached to the Snorkel stove by bolting it to the four mounting brackets facing the center of the tub. The vertical distance between the fence mounting holes is approximately 20” (see drawing). The fence is attached to the stove by four 1 3/4” carriage bolts and wing nuts. The carriage bolts and wing nuts are in your stove mounting pack.

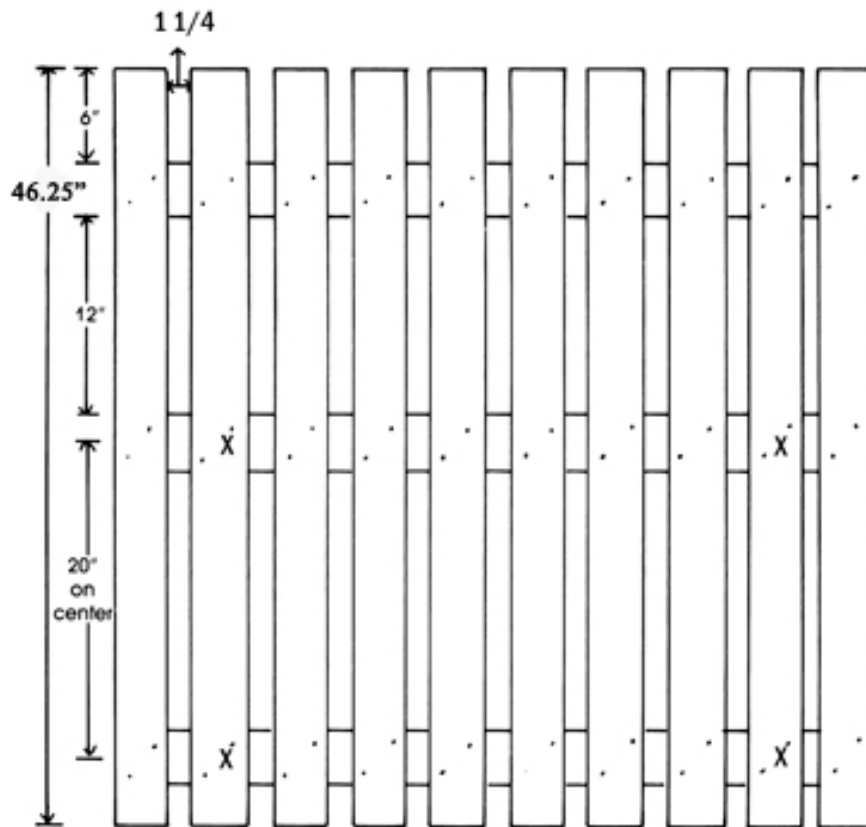
- Mark the three horizontal fence boards for vertical fence board placement according to the diagram. The fence boards are 3 1/2” wide and the gap between them is 1 1/4”. We have provided a 1 1/4” block which you may use as a jig to space your boards appropriately.
- Attach the vertical fence boards to the three horizontal fence boards using the 1 1/4” stainless screws provided. For a clean look, drive the screws from the back of the fence (stove side/side with horizontal boards). For an “industrial look”, drive the screws from the front of the fence (tub side).
- Place the stove on the fence. The mounting bracket holes will be in the center of the second vertical fence board in from each end, see the “X” in the image on the following page. Mark and drill the four 5/16” holes.
- Mount the fence to the stove using the 1 3/4” carriage bolts and wing nuts. (Wing nuts are used for easy removal of the fence for cleaning under the stove.)

The actual inside depths of our tubs are 31” for the three foot tub and 43” for the four foot tub. If your installation is in a shallower tub, adjust the two bottom horizontal boards accordingly.

MOUNTING THE FENCE TO THE STOVE



QR Code for Mounting the Fence to the Stove Video



Scuba Stove Fence Assembly/Installation

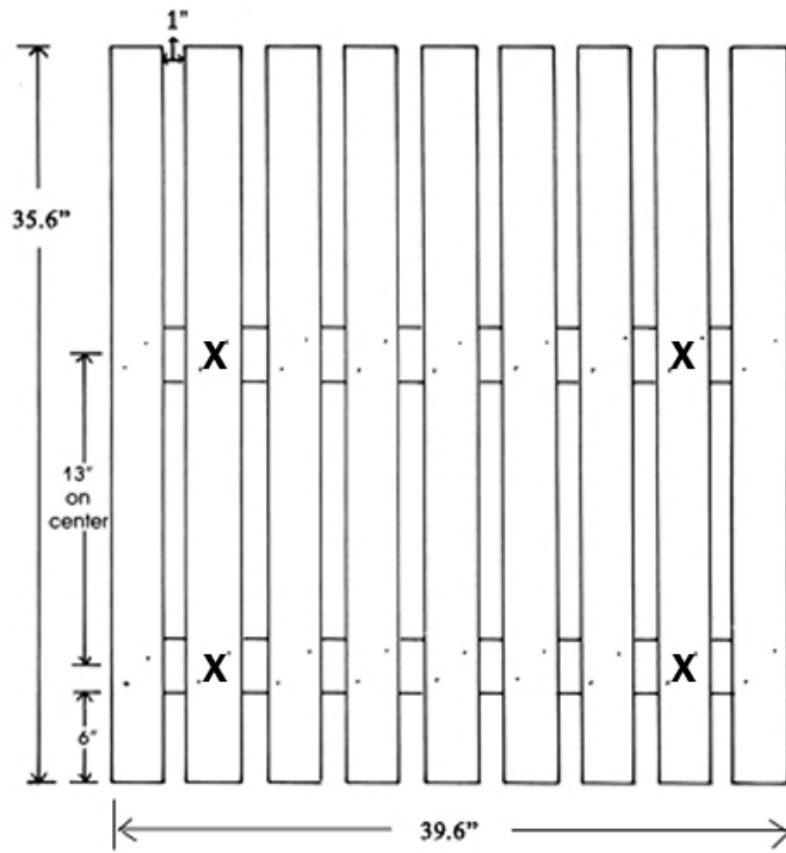
Unlike the Snorkel fence, in which all the boards are the same length, the Scuba fence has two long, 39 5/8" fence boards for the horizontal members and 9 shorter boards, 35 5/8" for the vertical members.

The fence is attached to the Scuba stove by bolting it to the four mounting brackets facing the center of the tub. The vertical distance between the fence mounting holes is approximately 13" (see drawing). The fence is attached to the stove by four 1 3/4" carriage bolts and wing nuts. The carriage bolts and wing nuts are in your stove mounting pack.

- Mark the two longer horizontal fence boards for vertical fence board placement according to the diagram, next page. The fence boards are 3 1/2" wide and the gap between them is 1". We have provided a 1" block that you may use as a jig to space boards appropriately.
- Attach the vertical fence boards to the three horizontal fence boards using the 1-1/4" stainless screws provided. For a clean look, drive the screws from the back of the fence (stove side/side with horizontal boards). For an "industrial look", drive the screws from the front of the fence (tub side).

- Place the stove on the fence. The mounting bracket holes will be on the second vertical fence board in from each end, see the “X” in the image below. Mark and drill the four 5/16” holes.
- Mount the fence to the stove using the 1 3/4” carriage bolts and wing nuts. (Wing nuts are used for easy removal of the fence for cleaning under the stove.)

The actual inside depths of our tubs are 2 1/2’ for the three foot tub and 3 1/2’ for the four foot tub. If your installation is in shallower tub, adjust the horizontal boards accordingly.

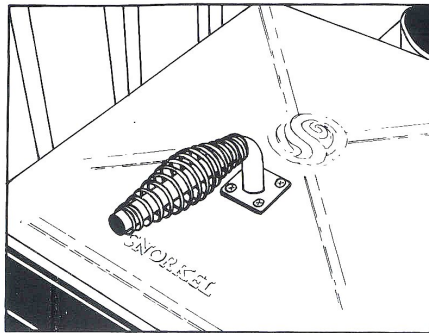


DOOR HANDLE ASSEMBLY



QR Code for Door and/Baffle Assembly

- Bolt the handle to the stove door. The handle should be oriented so the grip is facing the end of the stove door, not the center.



STOVE PIPE INSTALLATION



QR Code for Stove Pipe and Damper Installation

Both the Snorkel and Scuba stove require at least 6 feet of stovepipe to draw properly. Additional pipe may be added to carry smoke, sparks or ash away from roofs, decks, neighbors, etc. Any variety of standard stove pipe will work with our stoves. The Snorkel stove uses 6" diameter pipe and the Scuba uses 5" diameter pipe. Stainless steel pipe, while more expensive, lasts longer and looks more attractive throughout its life. Galvanized pipe is less expensive and will last a little longer than non-coated pipe, about 1 year in rainy climates and longer in dry areas.

□ To assemble galvanized pipe, insert one edge into the slot of the pipe and squeeze it until it snaps into place. If this is difficult, try rolling the pipe on the floor (with a knee placed in the middle) and squeezing at the same time. In either case be careful, the stovepipe has sharp edges. Don't let the pipe fall on your toes. If you have stainless steel pipe with a white plastic coating, simply peel off the coating (it should come off like a large sticker) before assembling the stack.

□ If you are using a damper please see below for installation instructions. You will want to install the damper before placing the chimney stack.

□ Place the chimney pipe over the outside of the stack on the stove body; the crimped end of the pipe should be facing up. This is a tight fit and is intended to provide stability for the stove pipe, but lining up the seam of the stove pipe so that it is slightly offset to one side of the weld seam of the stove stack will make it easier to slide the stove pipe on.

If you have an older stove or a Scuba stove without an exterior stove collar, insert the crimped end of the chimney pipe directly into the stove stack. Once you have the pipe assembled, you may wish to secure the pieces together. You can pop rivet or install sheet metal screws at the joints, using three fasteners per joint. You can secure the pipe to the stove in the same manner. Drill holes 1/4" from the top of the stack.

CHIMNEY CAP

Chimney caps prevent rain from getting inside the stovepipe. Place the chimney cap over the crimped end of the chimney pipe. If you have an older stove or a Scuba stove without an exterior stove collar, insert the chimney cap over the non-crimped end of the chimney pipe.

DAMPER

Dampers give added control over heat output when used in conjunction with the door draft. To increase the efficiency of the stoves, we recommend installing a damper. For outdoor installation, the best location for a damper is six inches above the stove. In an indoor installation it may be advantageous to place the damper further up the stovepipe, allowing heat to radiate into room.

□ 1. First remove the damper handle/pin from the damper. Hold the round part in your hand. Compress the spring on the pin using your palm. Push the wide end until the spring compresses, then turn the pin until you can pull it out of the damper.

□ 2. You will use the handle/pin to make an indentation in the pipe as a drilling guide. First, slide the spring on the handle to one side of the handle. Then, make a mark about 12" up from the non crimped end of the chimney section and 90° away from the welded seam. Position the pointed end of the handle on the mark you just made and use a hammer, to pound the handle so the pin makes an indentation in the pipe. This will help keep the drill from wandering.

□ 3. Put a few drops of all purpose oil on the indentation and drill the hole for the handle

- 4. Next, insert the handle into the hole you just drilled and install the damper plate on the handle. Position the damper so it will swivel freely. Then, use your hammer to pound the handle so it will make an indentation on the other side of the pipe directly opposite the hole you just drilled.
- 5. Remove the damper handle from the damper like you did in #1 above and then use the handle and a hammer to pound the protruding dimple on the pipe that you created in in step 4 back into the pipe. Apply some oil and drill the hole.
- 6. Push the spring on the handle of the pin back in place, insert the pin in the pipe and thread it into the damper and push the pointed end of the pin through the opposite hole and you are done.



PLUMBING INSTALLATION FOR JET AND POWER PAK™ SYSTEMS



QR Code for Plumbing of Suction Fittings

Notes for All Systems:

The basic plumbing procedures in this section are the same for Power Pak™ Gas/Electric heat systems, Simple Soaker systems, the Filter Pak and jet systems for wood-fired tubs. The only plumbing difference of note is that the Simple Soaker systems and the Filter Pak do not use jet fittings for the returns to the tub.

ALL GAS AND ELECTRICAL CONNECTIONS AND HOOKUPS MUST BE MADE QUALIFIED ELCTRICIANS AND GAS COMPANY TECHNICIANS.

WARNING: FEDERAL LAW AND STATE AND LOCAL REGULATIONS REQUIRE THAT THE SUCTION FITTINGS BE LOCATED AT LEAST THREE (3) FEET APART. This minimizes the risk of entrapment. For a wood-fired system, locate the suction fittings in the area behind the stove and fence for further safety.

Understand and follow your local building codes, they are for your safety. All codes require a minimum distance of 5 feet between the equipment skid system and the tub unless there is a permanent barrier between the tub and the equipment. This is to ensure that the equipment can't be touched by someone in the hot tub.

General Plumbing Notes

1. Do not try to install the plumbing if it is below 40° F as the flex hose becomes almost rigid
2. Flex PVC should not be buried in the ground. It is not rated for underground use.
3. The suction fittings as shown below are almost opposite the jet fittings. This is for illustration purposes, typically they are below the jet fittings.
4. If you have purchased a 4 jet system, you must install all 4 jets. Failure to install all jets can result in excessive back pressure and will damage the equipment.
5. Keep plumbing runs as short as possible along with minimizing the use of 90° elbows. 45° elbows are preferred where practical to reduce resistance in the system.

Plumbing can be done by a modestly competent DIYer, but if you are unsure or don't have time to read and follow all instructions, it is best to hire a pool/spa tech for both plumbing and equipment setup.

The best height (drill center point) for the suction fittings is 4" to 9" from the tub floor, and at least 3" from the nearest band. Within the following guidelines, you can put the jets pretty much where you want, but be aware that flex hose is only moderately flexible. The exhaust jets should be below the top band and be at least 3" from the nearest band. Three staves between each jet is a comfortable distance for the 1 1/2" flexible PVC to bend into place. Center all suction and exhaust

fittings in the middle of the staves. The hole for the fittings should not span the joint between two staves.

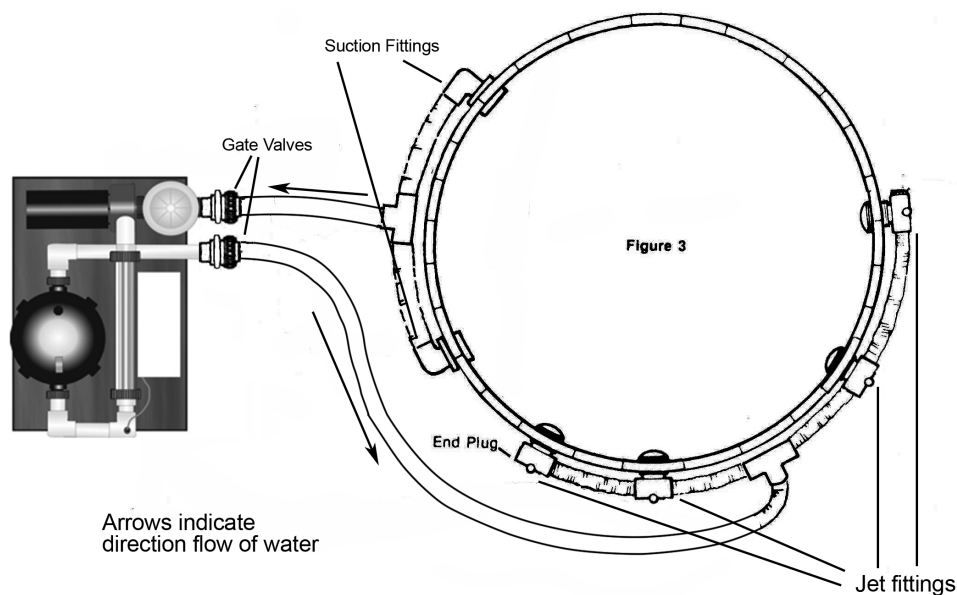
Tool List

□ PVC cutter or hack saw □ Drill □ Expanding drill bit or hole saw and mandrel (2 3/8" diameter is perfect 2 1/2" will work) □ Sand paper □ Dry rag/cloth □Screw driver □Teflon tape □ PVC glue & primer **rated for both flex and rigid PVC.**

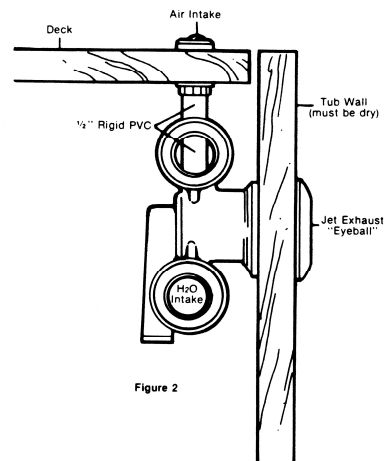
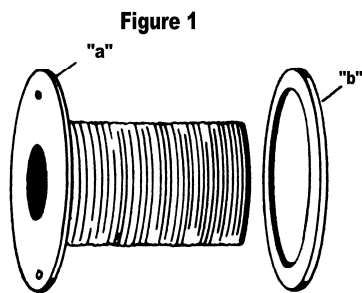
- 1. Read entire instruction sheet and manufacturer's information before starting.
- 2. Check the materials/packing list to verify that you have received all parts and to become familiar with them.
- 3. Mark jet (exhaust) and suction fittings locations on the inside of the tub.
- 4. Position skid on a firm level surface, at or slightly below the level of the bottom boards.
- 5. Most pumps for our systems do not have debris traps and a few have debris traps that are an integral part of the pump housing. But if your pump has a separate debris trap, wrap 3-4 turns (clockwise) of Teflon tape on the threaded intake of the pump. Thread the large black circular fitting from the back of the debris trap onto the pump intake.
- 6. Installing gate valves: Glue the 1 1/2 x 2 3/4" pieces of PVC into the end of each gate valve. Glue a union fitting onto the opposite end of the 2 3/4" PVC on each gate valve. This allows each of the gate valves to be threaded onto the debris trap and the filter housing (figure #3, below).

Notes:

1. In the image below all flex PVC hose is 1 1/2" except for the run from the T fitting joining the two suction fittings to the pump. That is 2" flex PVC.



□ 7. Drill holes for the jet fittings and two suction fittings. A 2 3/8" hole saw is ideal if you have one, but 2 1/2" works fine if a 2 3/8" isn't available. The holes should be in the center of the stave. **THE SUCTION FITTINGS MUST BE LOCATED AT LEAST THREE (3) FEET APART. THIS IS A FEDERAL LAW AND PART OF ALL STATE AND LOCAL REGULATIONS.** Start drilling from the outside of the tub and when the pilot bit for the hole saw penetrates the inside, go to the inside of the tub and finish the hole by drilling to the outside. This will eliminate wood splintering from the hole saw exiting on a straight through cut. Also, you can see where the hole is going to be relative to the bands and make sure you have enough room for the jet fitting flanges before you finish your cut.



□ 8. See Figure #1. Spread silicone sealant freely on surface A, backside of the fitting. Install the rubber gasket and apply silicone to surface B (tub side of the gasket). Slide the fitting into the hole from the inside of the tub. Screw on the outside piece until snug. Make the sure suction fittings are positioned with outlets facing each other. For jet fittings, stop when the air intake hole is facing up (see Figure #2). Stop tightening all fittings when they are fairly snug, but not too tight as this may cause them to crack as the wood tub swells.

□ 9. If using individual air dials, cut air intake pipe for the jets (1/2" PVC) to length using a hacksaw. The top of the air intake fittings should be at or above the top of the tub (see Figure #2). Insert the pipe into the jet fittings to check the measurement but do not glue yet.

□ 10. Cut pieces of 1 1/2" flexible PVC to fit between the jet (exhaust) fittings, from the return-side T-fitting to the filter gate valve, from the suction fittings to the T-fitting. 2: flex PVC is used from the T-fitting to the pump/debris trap gate valve (see Figure #3). Because the air intake pipes eliminate the upper set of 1 1/2" holes on the jet fittings, the 1 1/2" flexible PVC is attached to the lower set of holes. The 1 1/2" end plugs are placed over the lower open ends of the jet fittings.

□ 11. Completely lay out the flexible PVC for the entire system and position the plumbing pieces prior to gluing to make sure measurements and setup are correct.

□ 12. After verifying proper fit of all sections of flex pipe, glue flex pipe into fittings. Apply primer onto outside of flex and into fittings without leaving puddles, and then apply glue in the same manner. Make sure to cover the entire sealing surface with glue. **Be generous with the glue, you want to make sure there are no voids so leaks won't occur.**

Insert the flex into fitting, **turn 1/4 turn and hold for 30 seconds before letting go.** Gluing the opposite end is a little trickier as you won't be able to turn the PVC much. After applying the glue, insert the flex into the fitting, give it as much of a twist as you can and then let it relax into place and hold it for 30 seconds. After gluing all fittings let dry for 24 hours before using! Apply same process with air intake pipes and jet fittings.

□ 13. When gluing the air intake pipe for the jets to the jet fitting, be especial careful of your gluing technique as the gluing surface is very small. Apply glue generously, twist and hold for 60 seconds to be sure it is set.

WARNING: DO NOT RUN THE PUMP WITHOUT WATER IN THE SYSTEM!

Helpful Tips: You will need to clean/change the filter very frequently in the early months of the tubs life because the tannins leaching out will tend to clog the filter. The tannin leaching will be fairly heavy for the first 2-3 months and should gradually abate by about 6 months.

You should clean the filter frequently. Close the two gate valves and remove the filter to keep tub from draining and hose it off thoroughly at least once a week. It is a good idea to have two filters, soaking one in filter cleaner while the other is in use. A dirty filter can be a breeding ground for bacteria and algae. It does little good to clean your tub, fill it with clean water, and run that through a dirty filter. Use a hand skimmer to remove surface debris from your hot tub. Change the water as often as you can afford to. Chemical build-up is hard on plumbing, wood, and aluminum, especially when combined with hard water.

WINTER USE OF JET SYSTEM

Gas/Electric Systems

All gas/electric systems are equipped with freeze protection that will cause the pump to start once the temperature drops below the set point to prevent water from freezing in the plumbing and equipment

Wood-Fired Jet Systems

Wood-fired jet systems do not have freeze protection. You can leave the pump running on low to help prevent damage to the system in moderately cold conditions. For severe cold, you will need to drain the system. You still use the tub by installing screw plugs in place of eyeball jets and suction screen fittings. Be sure to drain the pump and filter completely to prevent damage.

All Systems

If there is a power outage in sub freezing weather you have two options: 1) Drain both the tub and equipment leaving a few inches of water in the tub. This is the easiest approach; or 2) As in preceding paragraph above, install screw plugs in place of eyeball jets and suction screen fittings to keep the water in the tub. Then disconnect and drain the pump and filter completely.

FILTER PAK & SIMPLE SOAKER (no jets)



QR Code for Plumbing of Suction Fittings

Tool List

Hack saw Drill Expanding drill bit or hole saw (2 3/8" diameter is perfect 2 1/2" will work) Sand paper Dry rag/cloth Large nail Pipe wrench Screw driver Teflon tape PVC glue & primer

1. Read entire instruction sheet and manufacturer's information to familiarize yourself with project before you start. **Learn, understand and follow your local building codes**, they are designed for your safety. **For reference, Washington state code requires a minimum distance of 5 feet between the pump system and the tub.**

2. Check the materials/packing list to verify that you have received all parts and to become familiar with them.

3. Mark jet (exhaust) and suction fittings locations on the inside of the tub. **WARNING: FEDERAL LAW AND STATE AND LOCAL REGULATIONS REQUIRE THAT THE SUCTION FITTINGS BE LOCATED AT LEAST THREE (3) FEET APART.** This minimizes the risk of entrapment. If you have a wood-fired system, locate the suction fittings in the area behind the stove and fence where bathers hair or suits are at less risk for entrapment. The best height for the suction fittings is 4" to 9" from the bottom of the tub, and at least 3" from the nearest band. The exhaust jets should be below the top band and be at least 3" from the nearest band. Three staves between each jet is a comfortable distance for the 1 1/2" flexible PVC to bend into place. Center all suction and exhaust fittings in the middle of the staves. The hole for the fittings should not span the joint between two staves.

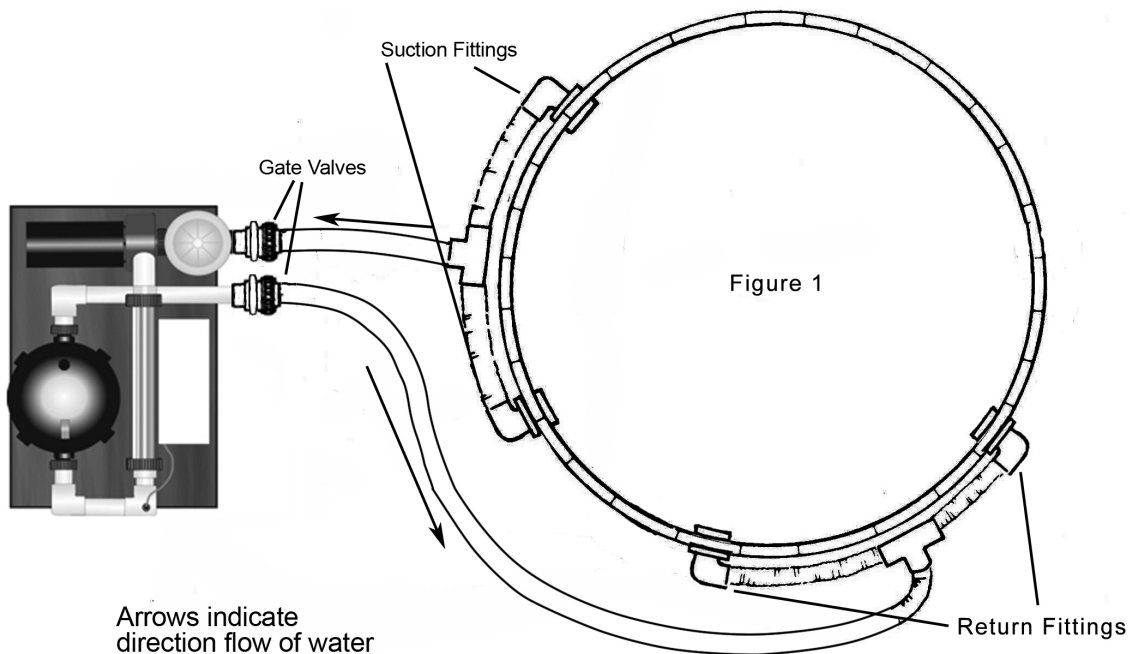
4. Position skid on a firm level surface, preferably at or slightly below the level of the tub bottom.

6. Installing the gate valves: Glue the 1 1/2" x 2 3/4" pieces of PVC into the end of each gate valve. Glue a union fitting onto the opposite end of the 2 3/4" PVC on each gate valve. This allows each of the gate valves to be threaded onto pump and the filter housing (see Figure #3).

7. Drill 2 1/2" holes for the return and the two suction fittings. The holes should be in the center of the stave and **the suction fittings MUST be at least 3' apart**. Start drilling from the outside of the tub and when the pilot bit for the hole saw penetrates the inside, go to the inside of the tub and finish the hole by drilling to the outside. This will eliminate wood splintering from the hole saw exiting on a straight through cut. Also, when starting from the outside of the tub, you can see where the hole is going to be relative to the bands and ensure you have enough room for the fitting flanges before you start your cut.

Notes:

1. In the Figure 1 below all flex PVC hose is 1 1/2" except for the run from the T fitting joining the two suction fittings to the pump. That is 2" flex PVC.
2. Flex PVC should not be buried in the ground. It is not rated for underground use.
3. The suction fittings as shown below are almost opposite the jet fittings. This is for illustration purposes, typically they are immediately below the jet fittings.
4. If you have purchased a 4 jet system, you must install all 4 jets. Failure to install all jets will result in excessive back pressure and will damage the equipment.
5. Keep plumbing runs as short as possible along with minimizing the use of 90° elbows. 45° elbows are preferred where practical to reduce resistance in the system.
6. The basic fittings for both the suction and returns are the same, 90° elbow and thru wall fitting. The difference is that the suction has a 6" diameter specially designed perforated faceplate which is designed to prevent entrapment and/or hair entanglement.
7. Filter Pak systems, because of the reduced horsepower of the pump have only one return fitting supplied.
8. The equipment skid shown is modeled after the Power Pak system. Your skid will have a different configuration depending on which type of Simple Soaker system you have or if it is a Filter Pak.



- 8. Spread silicone sealant freely on surface A (see Figure #1 page 28), the backside of the fitting. Install the rubber gasket and apply silicone to surface B (tub side of the gasket). Slide the fitting into the hole from the inside of the tub. Screw on the outside piece until snug. Make sure suction fittings are positioned with outlets facing each other. Stop tightening all fittings when they are fairly snug, but don't over tighten as this may cause them to crack as the wood tub swells.
- 9. Completely lay out the flexible PVC for the entire system and dry fit the plumbing pieces prior to gluing to make sure measurements and setup are correct.
- 10. After verifying proper fit of all sections of flex pipe, glue flex pipe into fittings. Apply primer onto outside of flex and into fittings without leaving puddles, and then apply glue in the same manner. Insert the flex into fitting, turn 1/4 turn and hold for 30 seconds before letting go. After gluing all fittings let dry for 24 hours before using!

MAKE SURE YOU HAVE FOLLOWED ALL BUILDING CODES FOR ELECTRICAL CONNECTIONS BEFORE YOU PLUG IN FILTER UNIT.

Helpful Tips: Follow manufacturer's instructions for pump unit startup. You should clean the filter frequently. Close the wall fittings off by plugging them with the enclosed plugs. They screw into the wall fitting from the inside of the tub. There is a small drain plug located near the base of the filter canister. Hose the filter cartridge off thoroughly once per week. It's also a good idea to soak the filter in filter cleaner as needed to keep water flowing freely through your system. The filter is the prime breeding ground for bacteria and algae. It does little good to clean your tub and then run the clean new water through a dirty filter.

WINTER USE OF JET SYSTEM

Gas/Electric Simple Soaker Systems

All gas/electric systems are equipped with freeze protection that will cause the pump to start once the temperature drops below the set point to prevent water from freezing in the plumbing and equipment

Filter Pak Systems

Wood-fired jet systems do not have freeze protection. You can leave the pump running on low to help prevent damage to the system in moderately cold conditions. For severe cold, you will need to drain the system. You still use the tub by installing screw plugs in place of eyeball jets and suction screen fittings. Be sure to drain the pump and filter completely to prevent damage.

All Systems

If there is a power outage in sub freezing weather you have two options: 1) Drain both the tub and equipment leaving a few inches of water in the tub. This is the easiest approach; or 2) As in preceding paragraph above, install screw plugs in place of eyeball jets and suction screen fittings to keep the water in the tub. Then disconnect and drain the pump and filter completely.

FILLING AND SEALING THE TUB

Your tub will seal itself and achieve a watertight seal through the natural swelling of the wood that occurs as water is absorbed into the wood.

Begin to fill your tub with water using a standard garden hose. If your water supply is limited, see tip#4 in the following section on leaks.

Once the tub has begun to hold water, you can expect some dripping and leaking. If you have done a superior job it may hardly leak at all. If your tub is not as tight as some it may leak more. Don't get nervous if you see small streams of water. As long as you have closed your gaps to less than the thickness of a matchbook cover and there aren't more than a half dozen or so such gaps between the staves, the tub will be able to swell and seal itself. If your tub is holding water above the minimum water level of the stove, and you plan on keeping a careful eye on the water level, you can start a small fire and heat your tub up a bit. The warm water helps the wood swell. Don't let the water drop below the minimum water level on the stove.

The swelling and sealing process may take three days to a week to run its course. Cold winter weather can cause the swelling process to take longer. Occasionally, a tub may even drain completely after the initial filling, but the wood is absorbing water and swelling so keep adding water.

TIPS IF YOU EXPERIENCE LEAKS

There are a number of steps you can take to reduce the leaking and/or speed up the swelling of the wood.

1. First, if you have a big leak, say pencil sized stream or larger, or if you are concerned, call us at 1-800-962-6208. We are here to help. With a leak that large you will probably need to do some disassembly/reassembly.
2. If there is a leak between staves or the bottom halves coming from an obvious gap and the gap is less than 1/8" , tear or cut a strip of a brown paper shopping bag, get it wet and tape it over the opening. This can reduce water loss while the wood swells.
3. One of the simplest general purpose solutions for stopping leaks in a new tub is an old tank maker's trick, using sawdust. Make a paste from fine sawdust and water and then press the paste into the areas in the tub where there is leaking. Then fill the tub slowly. The sawdust will be drawn towards the void where the leak is and block it or slow it down. This is a temporary measure that slows leaking enough to retain water in the tub so the wood can become saturated and swell.
4. If you are in a location where water is a scarce resource and you are concerned about excess water use, there are two other approaches that use less water than just running a hose until any leaks have stopped. The first is to get a couple of buckets of hot tap water and put those in the tub. The hot water speeds up the swelling process significantly. The other approach is to use a lawn sprinkler. Put it in the tub and turn it on low. The water will keep the stave and floorboards wet so they will swell without wasting a lot of water.

Again, if you are having problems and aren't sure what to do, call us.

TANNIN LEACHING

At first, tannins from the wood will leach into the water turning it reddish brown. This leaching process may last anywhere from 2 - 3 months depending on the amount of tannin contained in the wood. The tannins are not harmful and in fact are indicative of the amount of natural preservative in the wood, but they can discolor bathing suits.

The discoloration of the water can be controlled with chlorine and related standard spa chemicals. Because the tannins leach out quickly at first, you will find that you have to replenish the chlorine fairly often in order to keep the water clear, but this should decrease noticeably after a few weeks. As always when adding chlorine to a tub, dissolve it in water in a bucket first. **NEVER ADD CHLORINE TO A TUB BY SIMPLY THROWING CHLORINE GRANULES DIRECTLY INTO IT.**

SANITATION

PLEASE READ THE ENCLOSED BOOKLET PUBLISHED BY THE SEATTLE KING COUNTY PUBLIC HEALTH DEPARTMENT THOROUGHLY. MAKE THIS INFORMATION AVAILABLE TO ALL BATHERS WHO WILL BE USING YOUR HOT TUB. THIS IS SAFETY AND HEALTH INFORMATION.

Hot tub water that is improperly maintained can commonly cause an irritating poison ivy like rash that is painful and uncomfortable. The rash is caused by pseudomonas, a common bacterium which is present in most water supplies and on people's skin. It reproduces quickly, especially at normal tubbing temperatures. This is even more prevalent when a large number of people are using the tub. Much less common, but far more dangerous is the Legionella bacterium which causes the potentially fatal Legionnaires disease. To avoid these problems, it is essential that you maintain your hot tub water properly.

A spa or tub requires more vigilant water maintenance than a pool. Generally a hot tub has only about 2-3% as much water as a pool, and is kept 20-30 degrees warmer. Moreover, 5 or 6 people in a hot tub can be the equivalent to 150 to 160 people in a swimming pool. The King County booklet we have provided is an excellent reference for water cleanliness.

There are two basic approaches to sanitation used with our hot tubs, Japanese style bathing and conventional chemical sanitation, both are discussed below. Japanese style (chemical free) bathing appeals mostly to owners of wood-fired hot tubs and where water is basically a free resource. Conventional chemical sanitation is standard for most users and a sanitizer should always be used if there is any concern whatever about water quality.

JAPANESE STYLE BATHING

Traditionally in Japan, many people, regardless of wealth, enjoy a daily hot tub. Everyone scrubs themselves clean before entering the hot tub to prevent contaminating the water. In addition the water is changed regularly.

Our wood-fired hot tubs may be used Japanese style - i.e., simply draining, cleaning and refilling. The frequency with which you change your water will depend on a number of variables. The variables include the number of bathers, how clean they are when they enter the tub, and the size of the tub. This method is a practical alternative with our quick heating stoves and is used by many people who don't want to use chemicals. In considering your sanitation plan, please bear in mind that a hot tub is really just a large bath tub and if in doubt always use a sanitizer such as chlorine.

If you are going to use your tub Japanese style, there are four important elements.

1. The bather is clean upon entering the tub. (Scrub off with soap and water right before entering)
2. Water is changed frequently (this can be once a day with a high bather load like a family party over a special weekend). You should strongly consider using chlorine when there are going to be a large number of people using the tub regardless of your preferences on chemicals. Your guests' safety should come first.

3. If your water looks dirty, or is in any way questionable, change it.
4. Clean your tub with a bleach and water solution (follow guidelines on container, typically about a half cup per gallon) and scrub with a stiff brush, then rinse with clean water before refilling.

CONVENTIONAL CHEMICAL SANITATION

Basic Hot Tub Chemistry:

In order to keep your hot tub water clean and sanitary there are two primary chemical functions you need to be familiar with, sanitizing and oxidizing. To keep the discussion simple, we won't get into total water chemistry, pH, alkalinity, etc. These are important subjects, and necessary for optimal sanitation and oxidation, but there is a vast amount of information available on the internet on maintaining proper water chemistry. Similarly, there are a number of lesser used sanitizers and oxidizers on the market that won't be covered.

Sanitizing: Sanitizing, just like it sounds, is the process of killing pathogens such as bacteria, algae, viruses, etc. in the water. There are many sanitizers on the market, but the most common sanitizers are chlorine, bromine and metallic (copper, silver, zinc) ions. Chlorine also has the ability to work as an oxidizer and is widely used as such.

Ozonators and ultraviolet systems are also used as sanitizers. They can only be used with hot tubs that have pumps and circulating water. We don't believe that either ozone or ultraviolet are particularly useful for sanitizing hot tubs. They are effective at killing bacteria as the water passes through the unit, but ultraviolet does not leave any residual sanitizer at all in the water and the ozone that is introduced into the water as it passes through the ozonator off gasses quickly, leaving no long-term residual sanitizer.

That is why we offer automatic ionization systems with our gas and electric heated hot tubs. They inject ions into the water that are both effective and remain in the water as a residual bacteria killer. In addition to the automatic ionizer, ions are available as Instant Ions in granular form, so they are suitable for non-plumbed wood-fired hot tubs.

For sanitation in our hot tubs we recommend chlorine and/or ions/ionization. We believe that ions and/or chlorine are the best route for sanitizing wood hot tubs. Chlorine has been in use for decades is cheap, widely available and a well understood sanitizer. Chlorine can also be used as an oxidizer.

If you plan to use chlorine, always use sodium di-chlor. **Never use tri-chlor, typically sold in the form of tablets or "pucks"**. Tri-chlor is very acidic and the pucks are intended for 12-18,000 gallon swimming pools not 600 gallon hot tubs. They can destroy the wood pretty rapidly. If you do use dichlor, the quick-dissolving fine granular formulation is the best. Avoid the larger pellets as they take too long to dissolve, and you should always dissolve the dichlor in a bucket of water first before adding to the hot tub. Never just throw the granules in the tub. They will eat at the wood.

Ions, while newer, are effective at killing bacteria and appeal to many because of their "natural" aspect and, probably just because they aren't chlorine, which has a somewhat undeserved bad rap.

Ions should be used with a minimal level of chlorine (0.5 ppm) as a background sanitizer. Because of the trace amount of chlorine used, you won't be bothered by the chlorine odor that arises when it forms chloramines.

In its active state, chlorine is called free chlorine. When it kills and combines with organic matter it forms chloramines. It is these combined chloramines, rather than the active free chlorine, which produce the obnoxious chlorine odor and eye irritant that most people are familiar with and dislike. A properly maintained pool or spa should have minimal chloramines present and little to no "chlorine smell".

With chlorine, you will test for the free chlorine in the tub either before or after use and add chlorine as necessary. While all tubs should be shocked periodically (typically at least once a week), it is appropriate to add more of the sanitizer as it is depleted. With bromine, however, it is better to shock it back to its active state, rather than adding more bromine to the hot tub. This prevents building up too much of a bromine bank (residual).

We do not recommend using bromine in our wood hot tubs for several reasons. First, many people think of bromine as a chlorine substitute and a way to get away from chlorine. In fact, bromine products include chlorine. A quick glance at a bromine product label will show a "chloro" or "dichlor" compound as part of the product. Second, it is a little more complicated to use than chlorine or ions. Third, and most importantly, it has been our experience that many customers who have used bromine in their tubs have encountered extensive bleaching and degradation of the wood fibers in the tub.

Bromine attacks bacteria and other molecules in a slightly different manner than chlorine, but its main difference is that it is still about 80% active even when it is "used up", that is once it becomes bromamine (or bromide). It is possible the bleaching and degradation of the wood fibers experienced by bromine users is the result of the way bromine works or, most likely, it is because they have allowed a large bromide residual to build up in the tub.

We suspect that it is probably the latter. That is, the customers simply kept adding active bromine (hypobromous acid) over time with floating dispensers rather than shocking the (relatively) inactive bromide/bromamines to produce active bromine. This can lead to a large bromide residual which, still being active, is what likely attacked the wood fibers. Note that although bromine is still active once it is combined as a bromamine, its ability to kill bacteria is minimal because its reaction to bacteria is so slow as to be useless from a practical perspective.

If you do use bromine in your tub, we suggest keeping the bromide bank in the 15 - 20 ppm (max) range and shock as necessary to keep the active bromine in the proper 3-5 ppm level. If you have maintained proper levels and still begin to see the bleaching of wood fibers in the tub, we would recommend draining and switching to either chlorine or ions.

Oxidizing:

Oxidizing, also called shocking, is the chemical burning off of organic matter in the water such as oils, skin cells, sweat, dust, pollen, etc. along with food that can be a food supply for bacteria. Oxidizing these types of contaminants leaves sanitizers free to focus on pathogens like bacteria, viruses, etc.

Chlorine oxidation, in particular, also releases combined chloramines and bromamines back to their active state.

Sanitizers are somewhat indiscriminate in what they attack. They will kill pathogens, but will also combine with organic matter when present. That means that there is less effective sanitizer in the water and, in the case of chlorine, more stinky chloramines. Chlorine or bromine, when they combine with organic matter, particularly ammonia based matter, form chloramines or bromamines.

It is these combined (used up) chloramine (in the case of chlorine) molecules that give off the that characteristic chlorine odor found in pools and spas. Chloramines and bromamines can be removed either by draining the tub or by shocking with chlorine.

The two most popular oxidizers are chlorine and potassium peroxydisulfate usually referred to as monopersulfate, or MPS. Each can be used regardless if the sanitizer used is chlorine, bromine or ions and each has its advantages and disadvantages as summarized below:

Chlorine

Advantages

- It is fast acting
- It oxidizes organic contaminants
- It removes chloramines and bromamines allowing the chlorine or bromine to be released back to its “free” state where it can kill pathogens
- It kills algae and pathogens.

Disadvantages

- You may have to wait 12-24 hours before chlorine levels return to the point where you can use the hot tub again.
- It needs to be dissolved in water before adding to hot tub.
- Requires a little more computation to determine how much to add. You want to add 10x the ppm of the combined chlorine in the tub. That is calculated by measuring the total chlorine less the free chlorine in the tub.
- Can be harsh on the wood surface of the hot tub.
- Slightly acidic

Monopersulfate

Advantages

- The hot tub can be used within 15-30 minutes of applying the shock.
- Oxidizes organic contaminants
- No pre-dissolving is required.
- No odor
- Easy to use, about 1 ounce or so for average hot tub (follow manufacturer’s directions)
- Reacts with bromamines to release the bromine back to its “free” state

Disadvantages

- Does not remove combined chloramines
- Fairly high acidity- don't over dose with it.
- Does not sanitize or kill algae like chlorine
- It is a little more expensive
- Nitrates (algae food) are a byproduct of its oxidation reaction.
- Distorts the chlorine level readings when using DPD testing kits.

Chlorine is available for shock in several different forms the most common of which are calcium hypochlorite and dichlor (the same as the sanitizer). Calcium hypochlorite is best used in pools. For hot tubs, stick with the same dichlor that is used for sanitation. In all cases when using chemicals, follow the manufacturers directions.

WOOD HOT TUB MAINTENANCE

Wood hot tubs require little maintenance outside of cleaning the interior when the water is changed. For the exterior of the tub you can elect to either simply let it age, in which case it will gradually turn to a darker gray first and then slowly become a lighter gray color.

If you want to keep the exterior of the tub looking “new” you can apply a non-sealing oil such as boiled linseed oil, Australian Timber oil, etc. Oils will darken natural color of the cedar to a more mahogany color and will need to be re-applied periodically. Application with a brush or roller is simple and doesn't take much time.

Other than for draining to clean and refill the tub, you should **try to leave the tub full of water all the time. When the wood goes through the cycle of being saturated and then drying out completely it loses a little of its resiliency—its ability to swell and seal itself. After repeated cycles it will no longer be able to swell to prevent leaking. Similarly, draining the tub and allowing it to sit dry for extended periods will also shorten its life because the wood will shrink. The wood can shrink enough that it is incapable of swelling enough to seal.** These instances can usually be addressed by replacing 8-10 staves around the tub to provide new swelling capability

However, during the winter you do not want your tub to freeze solid. If you won't be using your tub for an extended period during cold winter months, there are a number of approaches you can take (see our section on freezing.)

If the interior or exterior of your tub shows signs of wear after a number of years, the easiest thing to do is to sand the surface with medium to fine grit (as appropriate) sandpaper.

FREEZING WEATHER

How you deal with freezing temperatures will differ depending on your usage pattern and whether you have a wood-fired tub or one heated with gas or electricity.

WOOD-FIRED TUBS

While our wood-fired tubs don't have any plumbing to freeze and break, letting your tub freeze to a solid block of ice may cause severe damage to the tub. If you will be using your tub every week or ten days you can probably get by with doing nothing if the temperatures are above zero. If you won't be using your tub during extended periods during freezing temperatures, there are a number of approaches you can take.

1. Some owners who have electricity near the tub like to use stock tank heaters to keep the water from freezing.
2. If electricity is unavailable and water to refill your tub isn't a problem, drain all but about six inches of water from the tub. This will keep the bottom sealed and no damage will occur.
3. Some owners with tubs at cabins where there is no water available during winter to refill during their visits leave their tubs full, but secure a large, partially inflated inner tube to the bottom of the tub. A similar and easier approach is to anchor several air-filled plastic milk jugs at various levels of the tub. Either procedure allows the inner tube or milk jugs to take the stress of the expanding ice so that the tub is not damaged. (The inner tube needs to be completely submerged near or at the bottom).

When heating a frozen or partially frozen tub with a Snorkel Stove® heater, make sure the stove is covered by sufficient ice/water. Then build a small fire and let the stove heat slowly. A fast burning fire quickly melts the ice around the stove and then boils the water away exposing the stove to air. **Without water surrounding the stove, it can melt.** If necessary, add water to the tub on top of the frozen surface while melting the ice.

GAS AND ELECTRIC HEATED TUBS

With gas and electrically heated tubs the simple option (not available to wood-fired tub owners) is to simply set the thermostat and forget it. That said, power outages in cold weather can create real havoc. If the temperatures are quite cold, 5-10 Fahrenheit degrees or less, the water in the heater and plumbing can freeze fairly quickly and break the pipes and interior components in the heater. Once that happens the tub is the subject to freezing.

If you are going to be around the tub (at home for instance) and are able to react to things like power outages, you can certainly just leave the tub running as you normally would. If you are going to be away for an extended period, and don't want to take chances, you may want to drain the system components: heater, filter canister, flex PVC, gas heater and tub (leaving the water below the suction fitting in the tub to keep the bottom seasoned).

EXTERIOR FINISHING

It is not necessary to coat the tub with a protective finish. Left alone the tub will weather and turn light gray. We recommend that you do not use wood sealer or paints on the tub, because the wood

benefits from exposure to the air. The water will seal the interior surface; therefore it is important to leave the exterior surface unsealed so it can breathe.

If you want your tub to have a finished look, you can apply boiled linseed oil, Australian Timber Oil or similar to the exterior. It is absorbed into the wood without making a permanent seal. When applying linseed, coat the exterior (only) with a brush or roller.

MOVING YOUR TUB

When possible, it is easiest to move your tub assembled.

1. Drain your tub and let it dry for a bit. It will be lighter than if the wood is saturated.
2. Remove stovepipe and plumbing fittings from the tub.
3. With a few helpers, tip tub onto its side.
4. Roll on the steel bands. If necessary use lumber to build a ramp into your moving vehicle. Block into place with the chime joists, placing them on both ends of the tub. Secure with tie downs.
5. When resituating make sure the chime joists are perpendicular to the floor boards. You may have to re-tension at least the bottom band by pounding on it and tightening the nuts.

DISASSEMBLING AND REASSEMBLING THE TUB

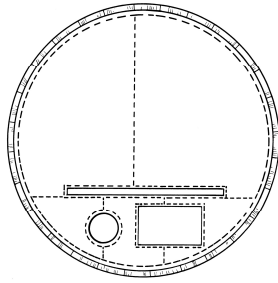
To disassemble your tub:

- 1. Allow the wood to dry and contract. This will help minimize disassembly damage.
- 2. Carefully tap the staves off from the inside. Tap the staves gently at the bottom of the tub. Be extra careful not to pry the staves off and split them
- 3. If you are going to store the wood for an extended period, stack the staves with spacers in between them so the air can circulate between them and dry them evenly. Store them in a protected area. They will still contain moisture and can split or crack if not allowed to dry evenly, i.e. if stacked tightly together. Allowing the wood to dry evenly prevents warping and splitting. Follow tub assembly instructions for reassembly. The staves may shrink over time to the point where you may need to purchase one or two new ones to get complete coverage around the tub.

COVERS

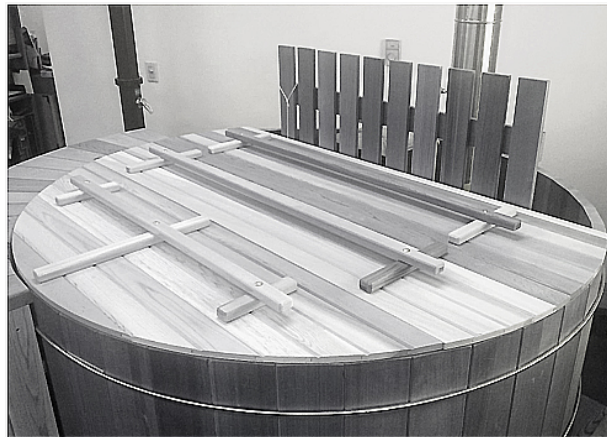
FOAM COVER

Our closed cell foam cover material provides 1/4" of insulation and when trimmed carefully also greatly reduces evaporative heat loss. To trim the foam cover, it is easiest to make a template to fit your tub (you can use the cardboard the tub came in) and then put this pattern over the foam cover and cut it to size.



WOOD COVER

HANDLE INSTALLATION INSTRUCTIONS



5' Diameter Cover Includes:

- Two Cover Sections

- Two Handles

- Bolt Pack (kit #300765): 5 Carriage Bolts, 5 Washers, 5 Acorn Nuts

6' Diameter Cover Includes:

- Three Cover Sections

- Three Handles

- Bolt Pack (kit #300766): 7 Carriage Bolts, 7 Washers, 7 Acorn Nuts

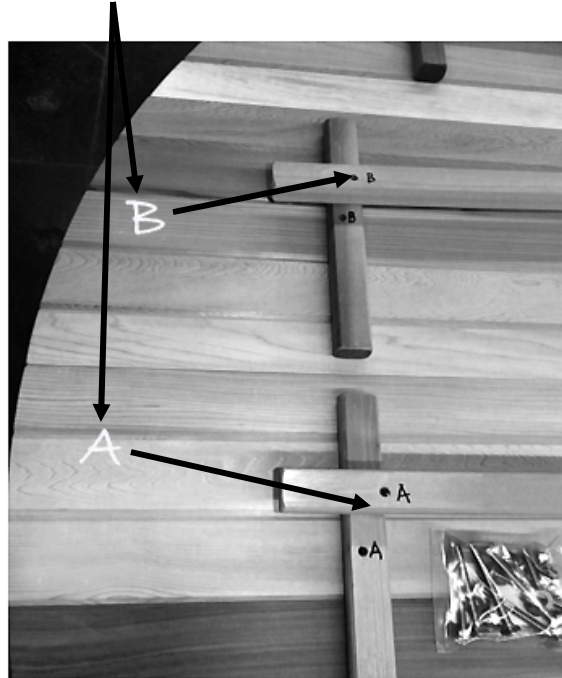
7' Diameter Cover Includes:

Three Cover Sections

Three Handles

Bolt Pack (kit #300767): 9 Carriage Bolts, 9 Washers, 9 Acorn Nuts

- 1) Lay out the cover sections like they will rest on the tub.
- 2) Lay out the cover handles. Each will have a letter on the backside near the bolt hole.
- 3) Match the letters on the cover section to the letters on the handle.



- 4) Attach the handle to the cover through the predrilled hole with a 3" carriage bolt. Install the carriage bolt from the front of the cover.



5) Install the washer and acorn nut on carriage bolt on the back of the cover.



6) Repeat this process through all predrilled holes in all the handles.

7) Your cover is now ready for use.

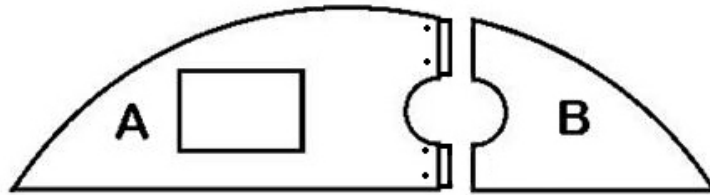
ALUMINUM COVER



QR Code for Aluminum Cover Assembly

Our aluminum covers are machine cut to a true circle and your tub most likely is not a perfect circle so the fit around the rim of the tub may be just slightly off. The cutouts for the stack and stove door have some extra clearance (about 1/4") so there shouldn't be any problem with fit. It just may overhang or be a little short of the edge of the tub.

□ Refer to drawing for part identification. Attach the angle bracket to the fence, about midway between the cutout for the door and the cutout for the stack, with the 3/4" sheet metal screw. The angle bracket supports Part A. Fasten the two aluminum support strips to Part A. Part B rests on the strip.



SNORKEL® AND SCUBA® STOVE OPERATING INSTRUCTIONS

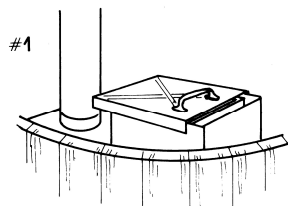
ALWAYS MAKE SURE TO MAINTAIN THE PROPER WATER LEVEL AROUND THE STOVE.

The stove is made of aluminum and will melt at the hot temperatures produced by wood fires if not submerged sufficiently in water. The label on the end of the stove indicates the minimum water level. It is essential that the stack plate, (the horizontal plate from which the chimney flue emerges) be covered with at least 1" of water. If the stack plate is exposed to air when a fire is burning in the stove, it can melt in a matter of minutes. Most problems occur when owners let friends use their hot tub without adequate instructions. Be sure to inform anyone using the tub that it must be filled with water before starting a fire.

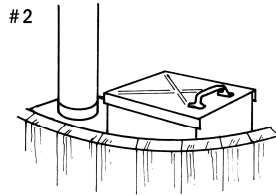
It is very easy to start a fire in the Snorkel® and Scuba® Stoves

1. Place several pieces of wadded newspaper or cardboard on the bottom of the stove.
2. Over this, lay generous amount of kindling and small logs in a criss-cross pattern.
3. Check to make sure the damper is open.
4. Light the paper and set the door to the edge of the intake baffle (the steel divider). Air will draw in through the Snorkel air intake quickly finding the fire, and then draft up the chimney. To produce a clean burn, always start your fire with clean, dry kindling. If you get excessive smoke, reduce the amount of wood you are starting your fire with.
5. Once the fire has taken hold add more wood to the stove. Start by adding smaller pieces slowly. Give the fuel a chance to catch fire; this helps eliminate smothering your fire and excessive smoking. You eventually want to have your stove 1/2 filled with burning wood. Refill frequently (visiting the stove box every 20 minutes or so) to produce the optimum heating rates. If your fire dies out, your stove is not heating at its full capacity. Keep your fire burning hot until your tub is about 10 degrees from desired tubbing temperature, then begin to let the fire burn down. The hotter and faster the fire burns the quicker the tub will heat up. Most people tub at 102-104 degrees.
6. Occasionally stir the water to prevent stratification (i.e. hot water on top, cold on the bottom), check the temperature and decide whether you need to add more wood to the fire.
7. Check the water temperature before entering the tub. Make sure it is within the recommended levels outlined in the King County Spa and Hot Tub Manual. Most people tub between 102-104. .

For maximum draft and fastest rate of burn, position the door fully open. That is, with the leading edge of the door lined up with the baffle. If you want the fire to burn more slowly, slide the door about half way over the air intake opening between the baffle plate and the edge of the stove.



You can put the fire out by sliding the door completely across the opening. This cuts off the air intake to the fire.



Always close door when stove is not in use

Adjusting the damper will help increase the efficiency. When the stack is producing clear exhaust, your stove is burning at its maximum efficiency.

CAUTION: Always use care when operating a wood stove. Keep hands, face, head and clothing away from the door and the chimney sections. Always open damper prior to opening the door for fueling and starting stove.

TEMPERATURE CONTROL AND EFFICIENCY

With our wood burning stoves it is possible to heat the water in excess of the normal maximum hot tub temperature, 104°. If you are heating beyond this temperature, please use extreme caution to ensure that no one accidentally enters the tub. Always check the temperature before entering.

Heating rates vary depending on the species of wood used for fuel, its dryness, how frequently you refuel your stove, and the size of your fuel. These factors all determine the BTU output rate.

For maximum heating speed, cut your wood small, fill the stove as full as possible, set the air intake to allow maximum draw (diagram #1), and set the damper (if any) at 45 degrees. For longer burns and more efficiency, use less airflow. Restrict exit first with the damper, then the intake.

Without agitation, water will stratify into layers, with the hottest water on the top. Heat loss will occur more slowly if you mix the water up occasionally. A simple approach is to use a board or canoe paddle to stir the water, make sure to pull the cold water to the surface.

An excellent alternative to stirring the water with a board or paddle is to circulate the water with one of our stand-alone filter systems. They provide water movement and filtration and increase the efficiency of the heat transfer from the stove. A small circulating pump can also be used.

If you overheat the water, it is easy to cool the tub back down. Simply add cold water and mix it with the existing water until the desired temperature is reached. After using the stove a few times, you will be able to gauge fairly accurately the heating time required.

If you are leaving for the day and want a hot tub on your return, fill up the stove with wood and

use the damper to slow the rate of burn. It should be hot when you return. This is not recommended in high fire season. It is always best to have someone attending a wood-burning stove. Always agitate the water and check the temperature before entering the hot tub.

STOVE MAINTENANCE

ASH REMOVAL

Your stove will heat more efficiently if the ashes are cleaned out frequently. The bottom of your stove is an important heat transfer surface and old ashes can act as an insulating barrier. Use our ash scoop or a shop vac to remove ashes. Ensure the fire is out before vacuuming or otherwise disposing of the ashes.

If you live in a wet climate it is important to remove the ashes after every fire and to prevent water from getting in the stove. The mixture of water and ash forms lye, which can quickly eat through the aluminum stove.

The stove flue is designed to have the chimney sections mounted the opposite of normal stovepipe. That is, the crimped section is to point up rather than down. This provides a shingling effect making the water run down the outside of the stovepipe instead of directing to the inside of the pipe and into the stove. This help keeps the water out of the stove, but a chimney cap should also be used.

The stove door provides good cover for the feed opening, but if water is still getting in, put a plastic sheet over the stove door opening (the fire must be out) and then put the door on to hold the plastic in place. Always close the stove door and provide some cover for the chimney pipe (cap or bucket, etc) when not in use to keep the rain out. If you will be gone for an extended period, remove the stack and put a bucket or something similar over the flue pipe of the stove.

Creosote can build up inside the stove and reduce efficiency. This usually occurs when the stove is not fired hot and fast. This may be eliminated by a couple of hot fires or a little scraping with the ash scoop or shovel.

SMOKE

Most stoves will smoke a bit when first ignited. A slow burning fire generally produces more smoke, indicating less efficiency than a fast burning fire. If you are concerned about neighbors, it is best to burn a hot and fast fire. To achieve this, use smaller pieces of wood, load the wood with lots of space for air circulation, and only fill the fire box up half way. Pull the stove door straight back so that it is touching the chimney pipe and set the damper at a 45 degree angle. Do not burn scrap wood covered with grease, glue or paint.

CAUTIONS

NEVER FIRE STOVE UNLESS WATER LEVEL IS ABOVE STACK PLATE

If the water level drops below the stack plate (the horizontal surface to which the stack (flue) is welded) you must immediately put out the fire to protect the stove from excessive heat. You can put the fire out by closing the stove door completely or dousing with water. Keep the stove cool by running water over it. Operating the stove with an insufficient water level could cause warping of the stack plate, and thereby void your warranty. As long as the fire is put out immediately, your stack plate should be safe.

DON'T DRAIN YOUR TUB WITH A FIRE IN THE STOVE

If you are in a hurry, throw a few buckets of water in the stove and put out the fire.

NEVER OPERATE YOUR STOVE WITHOUT A PROTECTIVE FENCE

Although the body of the stove remains cool, the door and stovepipe get hot and can cause a bad burn if touched. In addition, the fence mounting brackets are sharp and can be dangerous without the fence to shield you from them.

USE CAUTION: THE STOVE DOOR AND STOVE PIPE GET VERY HOT

OPEN DAMPER FIRST BEFORE FIRING AND RELOADING STOVE

Opening the damper first will prevent smoke and possibly flames from exiting through the door opening. Stove door may get hotter when using a damper.

SAFETY CONCERNS

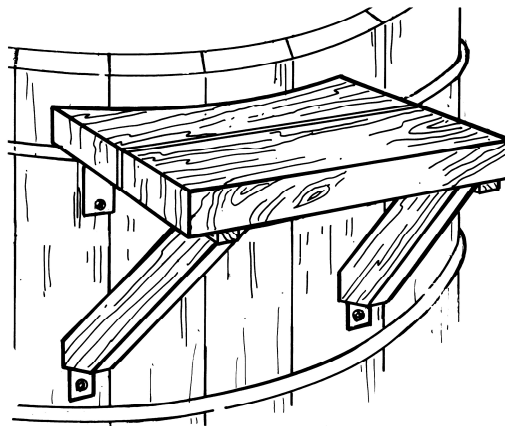
Hot tubs are not toys, nor are they places for small children. Never let your tub be used by unsupervised children. Drowning is a very real risk. Hot tubs are designed for sitting and relaxing in. Never use a hot tub for playing in or diving in. Please review the Safety and Accident Prevention information starting on page 4 of the King County Health Manual with your family. Put this information into practice.

Children should use the tub at lower temperatures. Consult your personal physician regarding hot tubbing and children, pregnant women, or if you have specific questions relating to your health and safety. Hot tubbing can accelerate your heartbeat, lower your sperm count, and may overheat pregnant women. Don't take long hot baths if you are concerned about these items. Consult your physician if you are concerned. Drinking, drugs and hot tubs do not mix and can be lethal.

The enclosed King County Department of Health booklet also contains a wealth of information pertaining to using and maintaining hot tubs and sanitation.

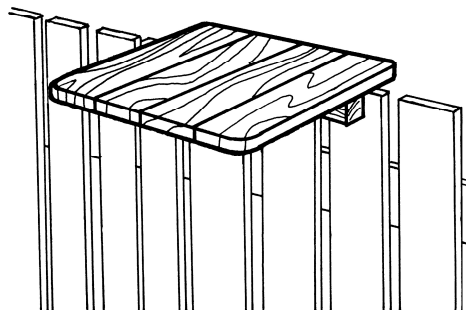
SHELF MOUNTING INSTRUCTIONS

1. Attach shelf braces to shelf by inserting carriage bolt through hole. Screw on washer and nut. Tighten with wrench.
2. Attach angle brackets to shelf and braces with 2 1/2" lag bolts. (Mark and pre-tap holes 1/2" deep).
3. Rest shelf on top band of tub. Make sure the notch in shelf fits over the band. The center of the shelf should contact the tub.
4. Avoid positioning lag bolts on a stave joint.
5. Mark and pre-tap 1/4" diameter holes 1/2" deep into tub wall. Mount shelf to tub with 1 1/4" lag bolts.



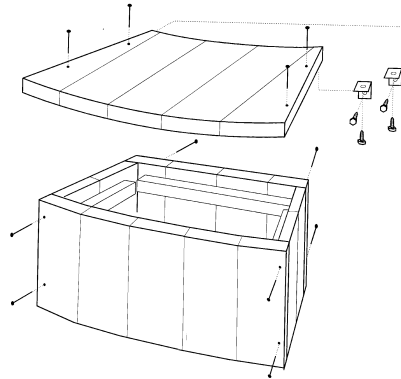
FENCE SHELF INSTRUCTIONS

1. Place the fence shelf on the fence in front of the stove, so that the fence is situated between the shelf cleats/supports on the bottom of the fence shelf.
2. No assembly is required and the fence shelf can be moved as desired.



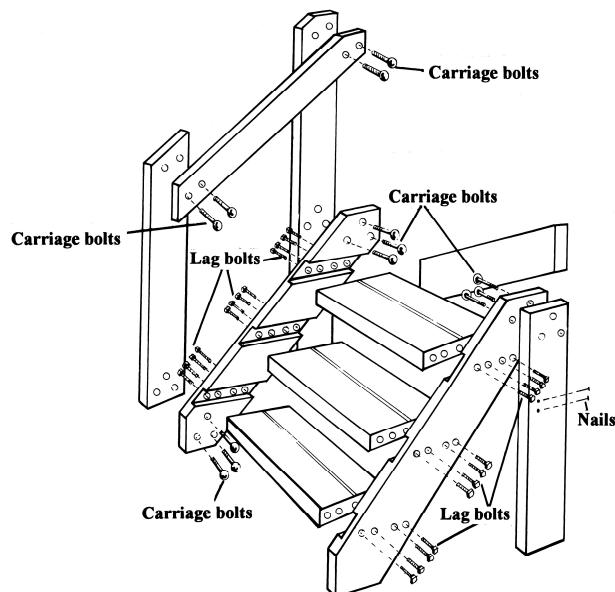
BOX STEP ASSEMBLY (15" & 30")

1. Use the drawing and predrilled holes as a guide for screw locations.
2. Screw both side sections to the front.
3. Screw the back section to the sides.
4. Screw the top to the completed base.
5. Attach angle bracket to the under side of step. (Pre drilling will help prevent splitting).
6. Attach steps to the tub using four 1" screws. (Pre drilling will help prevent splitting).



STAIR KIT ASSEMBLY

1. See drawing for detail.
2. Attach treads to jacks (pre-drill holes for lag bolts).
3. Attach rear rail support to left side of steps.
4. Attach step support to right side of steps.
5. Attach front rail support and railing.
6. Tap diagonal support before nailing.
7. Screw diagonal support brace across rear of stairs.



WARRANTY

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESSED AND IMPLIED WARRANTIES WHATSOEVER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE. UNDER NO CIRCUMSTANCES SHALL SNORKEL STOVE COMPANY, ITS OFFICERS, DIRECTORS, EMPLOYEES, CONTRACTORS OR AGENTS BE SUBJECT TO ANY CONSEQUENTIAL, INCIDENTAL, INDIRECT, OR CONTINGENT DAMAGES WHATSOEVER WITH RESPECT TO CLAIMS MADE HEREUNDER OR BY ANY PURCHASER OR USER OF PRODUCTS.

The Purchaser shall indemnify and hold harmless Snorkel Stove Company, its officers, directors, employees, contractors and agents, from and against any and all liabilities, damages, losses, claims, lawsuits, including costs and expenses in connection therewith, for death or injury to any persons or loss of property whatsoever, caused in any manner by Purchaser's possession, use or operation of the Products.

- 1.) Snorkel Stove Company warrants that its wood tubs, seats, steps and other wooden accessories shall be free from defects in material and workmanship under normal conditions of use and service for a period of five (5) years.
- 2.) The Snorkel Stove Company fully warrants stove models Snorkel and Scuba shall be free from defects in material and workmanship under normal conditions of use and service for one (1) year. The Snorkel Stove Company will repair, replace or provide replacement parts for said defective stove units: at its expense including freight.

The warranty period begins on the date the item is shipped from The Snorkel Stove Company or one of its authorized dealers.

Warranty is void if the product has been misused or damaged and/or if evidence is present that the product was altered, modified or serviced by unauthorized service people. Proper use is outlined in the owner's manual entitled: **"Assembly, Installation and Owners Manual for Snorkel Hot Tubs, Stoves and Accessories."**

We expressly deny any power or authority on the part of any person to incur or assume for us any other liability in connection with the sale of any hot tub or stove. This warranty does not extend to damage resulting from: assembly, improper chemical maintenance of water in the hot tub; disassembly and re-assembly of the hot tub; repair or alteration of stoves or hot tubs outside our factory in any way so as to affect its use and operation; misuse, negligence or accident; or operation contrary to printed instructions.

Products made by other manufacturers are covered under the warranties issued by those manufacturers.

WARRANTY CLAIM PROCEDURE

Hot tubs, stoves and accessories may not be returned without prior authorization from The Snorkel Stove Company. Warranty claims should be made by directly notifying The Snorkel Stove Company in writing to the address below, and/or by telephoning one of the numbers listed.

Disclaimers: There are no other warranties expressed or implied unless stated herein.

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www.snorkel.com