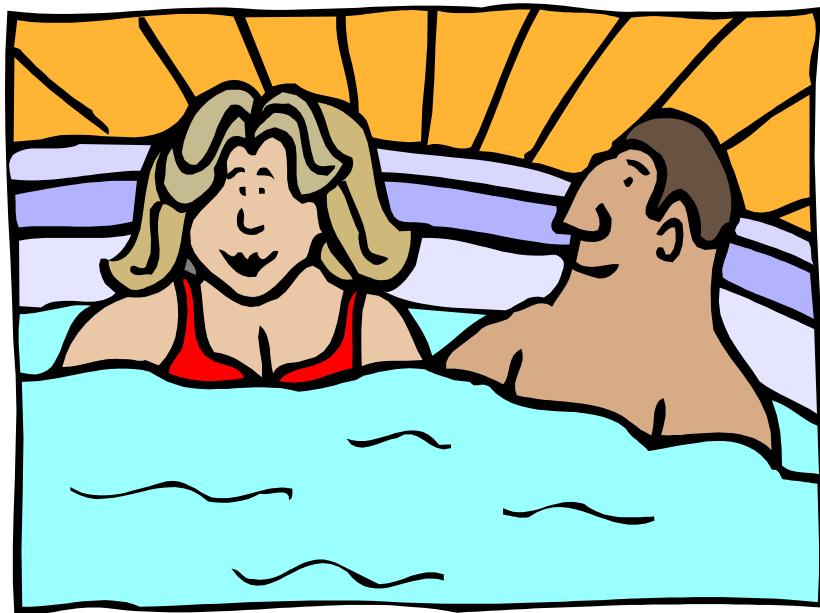




**Staying  
Happy  
and  
Healthy  
in Your**

# **Spa & Hot Tub**

Sixth Edition



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## Introduction

Some cultures, such as the Japanese, have long realized the physical and psychological benefits of soaking in hot water. Now Americans are also discovering the pleasures and benefits of the hot tub and spa.

Soaking in a hot tub can be soothing and relaxing. The warmth relaxes muscles and promotes blood flow to the skin and in the limbs. Many people find that this comfortable experience helps them to rest and manage stress. Some find this to be energizing.

You can appreciate the benefits of your hot tub even more when you know it is being used and maintained correctly. This brochure will provide you with guidelines for the safe use of your hot tub so you can enjoy your tub and avoid most hazards or risks.

For example, bacteria, algae, and fungi love the warm water of your tub. They prosper in moist, warm environments, and can spread infection and disease. The hot water in a hot tub can also be a potential health hazard. Water which is too hot can be harmful, especially if you or your bathers are pregnant, have any circulatory problems, heart disease, are on certain medications, or have been drinking alcohol.

That's why it is very important that you properly use and maintain your hot tub. A well-operated hot tub can bring you many years of enjoyment and satisfaction.

## Definition

In this brochure, we call them by their popular name: spas and hot tubs. They can also be called whirlpools, Jacuzzis (a brand name), hydro-therapy, or soaking tubs. These are large tubs or small pools which hold hot water for people to soak in, not bathe. Some are equipped with whirlpool jets and bubblers for underwater massage. They are made of wood, concrete, tile, plastic or fiberglass. There are many sizes, brands and types, but they all require careful use, operation and maintenance.



**Everyone in  
your  
household  
should read  
this booklet.**

This information is for use primarily with single family residential spas and hot tubs, and should be followed in conjunction with the manufacturer's instructions that came with the equipment. Everyone in your household helping to maintain the hot tub should read this booklet thoroughly. Public spa operators such as those in health clubs, apartments, and condominiums, should consult their local health department for information regarding the correct operation of their facilities.

## Use Your Spa and Hot Tub Safely

### Water Temperature: Hotter is Not Better!

The water of your hot tub should not be warmer than 104°F. Always keep an accurate thermometer in the tub water because your hot tub's thermostat may be in error. Use a high-quality shatterproof thermometer with at least one-degree increments.

Water which is too hot can raise the body temperature high enough to cause heat stroke (the body's inability to regulate its internal temperature), this can be fatal even to healthy adults, if you have any questions about your own fitness or ability to soak in a hot tub, check with your physician.



Hot tub water should not exceed 104°F. Use an accurate thermometer.

A temperature of 100°F-104°F is considered safe and comfortable for a healthy adult. Most healthy adults can enjoy this water temperature for as long as desired, although it may raise the body temperature to the water temperature, and eventually become more uncomfortable (like a fever).

At higher water temperatures, the soaking time should be shortened; for example, limit your soak to a maximum of 15-20 minutes at a water temperature of 104°F. If you are planning a long rest in the tub, lower the temperature closer to normal body temperature, about 99°F. Some people find even lower water temperatures useful as an energizing experience. Try different water temperatures in the 98°F- 104°F range until you find what suits you best.

One way to prevent overheating is to not submerge your entire body in the hot tub water. Keeping your arms and shoulders out of the water is a good way to keep from getting too hot.



Check your thermometer regularly.

Shorter soaks are recommended for children and pregnant women.

The surrounding air temperature will also affect the way your hot tub water feels, especially for outdoor tubs. On hot or cold days, the hot tub water may seem warmer or cooler than it really is. Therefore, always check your thermometer for the true water temperature before adjusting your water heater. The point is that you should not rely on your estimate of the water temperature because you may inadvertently raise the temperature too high for safety.

Checking your thermometer is also protection against the possibility of a faulty heater thermostat.

Special caution on water temperature is recommended for young children; their temperatures rise faster than adults.

Children's small bodies cannot absorb much heat, and their sweat glands are not fully developed.

Pregnant women should be careful to limit their hot tub soaks to 10-15 minutes at a maximum water temperature of 102°F. Longer soaks can raise the body temperature high enough to cause fetal damage, particularly during the first three months of pregnancy (possibly resulting in a child with brain damage or deformity). Women in their child-bearing ages may want to note this precaution in the event they may be pregnant and not know it.

## Do Not Use Alcoholic Beverages During Tub Use

Despite the popular image of people in hot tubs drinking wine or other alcoholic beverages, do not use alcoholic beverages before or during hot tub use. Alcohol is a depressant which causes slowed reflexes and drowsiness, especially in conjunction with the relaxed soaking in hot water. This can lead to sleep or unconsciousness, and has resulted in drowning.

Hot tubbing with other people is not a preventative measure if they are also drinking and likely to become similarly affected by the combination of alcohol and soaking in hot water. Deaths have occurred from this kind of situation. The spa and hot tub industry has also taken a strong position against mixing hot tubbing and alcohol.



Do not use  
alcohol during  
hot tub use.

## Health Conditions and Medications

Soaking in hot water causes changes in the circulatory system, such as enlargement of blood vessels near the skin. Therefore, people with a medical history of heart disease, circulatory problems, diabetes, or blood pressure problems should check with their physicians before using hot tubs. Additionally, people taking medications causing drowsiness, such as tranquilizers, narcotics, antihistamines, or anticoagulants should not use hot tubs without asking their physicians, due to the risk of drowning described in the previous section. Any drugs and substances which may affect your judgement, or cause drowsiness or sluggishness, should also be avoided while hot tubbing for the same reason.

## Preventing an Infection from Tub Water

People with skin, ear, vaginal or other body infections, open sores or wounds should not use a hot tub because of the possibility of spreading infection. Hot water which is not adequately disinfected or maintained correctly can help grow some bacteria and other microorganisms which cause infection. Hot moist skin is also more easily infected. Submerging your head may increase risk of ear, eye or throat infection if the water is not properly disinfected.

One common bacterium called *Pseudomonas* is usually to blame for the occasional skin infections resulting from poorly maintained tub water. These bacteria are often found in water, so there is no way to prevent them from getting into your tub. Once the bacteria are there, though, you want to disinfect the water to keep the *Pseudomonas* from infecting the skin. When the chlorine level drops too low the bacteria grow, and can infect the hair follicles, an infection called "folliculitis."

Folliculitis can look serious (although it usually isn't), and it itches, it has been mistaken for chicken pox, flea bites, or scabies. Usually, however, simple folliculitis will heal by itself in 1-2 weeks. The bacteria may sometimes cause additional infections (for example, of deep sweat glands), which then take several weeks to heal. Hot tub bathers who develop an infection should contact their doctors if the problem does not clear up in 7-10 days.

If you get an infection from the hot tub, you will have to drain, clean and disinfect the tub (see page 16).

Questions have been raised as to whether the herpes virus can be spread through the water in a hot tub (this virus is responsible for a number of conditions, including genital herpes and cold sores). There is currently no medical evidence which suggests that the herpes virus can be transmitted in hot tub water. This virus is spread by direct contact only (e.g. sexual contact for genital herpes).

Similarly, the AIDS virus is not spread through the water in a hot tub. This virus is transmitted only when semen, blood, or vaginal fluids get directly into the blood or mucous membranes of another person through a break in their skin; e.g., during sex, or when needles are shared. The AIDS virus is fragile and is easily destroyed by disinfectants (such as chlorine) used in maintaining the hot tub water.

## **Shower Before and After Tub Use**

All bathers should shower with soap and hot water thoroughly before and after using a hot tub.

Showering before hot tub use is important not only because it washes away many of the common skin bacteria, but also because it removes perspiration, lotions, deodorants, creams, etc. Perspiration and lotions will reduce the effectiveness of the disinfectant (chlorine), and lessen the ability of the hot tub filter to work efficiently because the oils coat and clog the filter mesh. Soaps and lotions can also form foam and scum in the water (this includes suntan lotions,

bath oils and soaps, and shampoo). These oils also promote the growth of bacteria. Therefore, rinse well when showering before getting into the hot tub.

Showering after hot tub use will help wash away any bacteria, algae, etc. picked up in the tub which might cause an infection (remember that proper ongoing disinfection will minimize the chance of infection).

## Safety and Accident Prevention



**Supervise  
children while  
hot tubbing.**

Do not allow children to use a hot tub without supervision. Adults should also use caution. As a minimum safety precaution, one person using a tub should have someone within calling distance check the bather regularly. Ideally, a hot tub should never be used alone.

Prevent unauthorized tub use and accidental drowning by keeping a cover securely locked over the tub. Alternatively, install self-closing locked doors to the hot tub area. Outdoor spas should be secured by fences at least five feet high with self-closing gates. Latches should be high enough to be out of the reach of children. Install at least 54" high.

Slips and falls on wet tub and deck surfaces can also cause injury. Do not allow running or roughhousing around your tub. Non-slip surfaces, good deck drainage, steps, and hand holds are important safety features.

Whenever you have beverages around your hot tub, do not use glass or other breakable containers. Broken glass is very hard to remove from a hot tub and usually requires draining all the water.

Injuries or deaths can occur when long hair or a body part is trapped by suction from a drain or outlet whose cover is broken or removed. Children are particularly vulnerable, and they should be closely supervised due to this danger. Broken or missing drain covers should be replaced immediately.

If your hot tub has raised drain covers which can snare long hair, make sure long hair is pinned up or at least not flowing loosely. If a child's body is sucked against a flat drain whose grate is broken or missing, the child can be freed by shutting off the pump immediately or placing your flattened hand between the child and the drain to break the suction.



**Pin up long  
hair while hot  
tubbing.**

All hot tub electrical equipment should be wired according to the National Electric Code and all relevant local codes under city, county, or state permit. Such work should be inspected by the local jurisdiction for your protection (safety and liability). Additionally, the National Electric Code (and most local codes) require a 120 volt electrical outlet installed between 1 and 15 feet from the hot tub. The

outlet must be GFCI (ground fault circuit interrupter) protected to prevent electric shock.

Do not use electrical appliances while using your hot tub (e.g., hair dryers, radios, etc.) in order to avoid electric shock. Battery-operated radios or appliances are good safety measures.

For portable spas and all hot tub electrical equipment, look for a U.L. (Underwriters' Laboratory) listing, which should be clearly displayed on the manufacturer's nameplate.

We recommend having a list of emergency numbers taped to your phone, including your local emergency medical personnel or fire department, and poison control. Include your own address on the list so a non-family member can direct emergency personnel to your home if necessary.



**Post  
emergency  
numbers by  
your phone.**

It is also a good idea for you and family members to be trained in CPR (cardiopulmonary resuscitation). Training is available from many community agencies.

## **Keep up with new developments!**

- Check with your Spa company or the Product Safety Commission to see if there are any new precautions or recalls. Recently, several drain covers were recalled by manufacturers because the risk of injury and accident was too high.
- For the most current information on protective barriers for your spa or hot tub, call your local building department.

## **Maintaining Your Spa and Hot Tub**

### **Chlorine is the Best Disinfectant**

The purpose of using a disinfectant is:

- to sanitize the water (kill bacteria and other germs) and
- to break down (or "oxidize") organic material in the water, such as body oils and perspiration.

Chlorine is the most commonly used disinfectant, and we feel it is the best. It is an excellent disinfectant to preventing the growth of bacteria and algae in the water, and it helps to keep the water clear. Chlorine is available in many forms (it

is a gas in its natural state), but is usually available in liquid, granular (coarse powder), and solid forms.

There are various chlorine products available, and you can obtain advice from your pool and spa store on the right kind for your hot tub. Cyanuric acid helps stabilize chlorine against sunlight, so products with a cyanuric acid base are particularly useful in outdoor hot tubs. Your pool and spa retailer can recommend a product without cyanuric acid if you have an indoor hot tub.

Carefully read the labels on your chemical products to determine their content, instructions for storage and proper method for handling, and use. Never mix chemicals, not even different types of chlorine. Many chemicals are not compatible with one another, and may cause an explosion or fire if mixed together. For example, if you have a tablet chlorine feeder, never put granular chlorine in it.



**Chlorine is an excellent disinfectant.**

We do not recommend using household bleach (liquid sodium hypochlorite) because it may raise the level of total dissolved solids in the water, and it loses strength in storage.

## Free Chlorine Residual



**Maintain at least 3 ppm free chlorine residual.**

Private hot tubs should be maintained at a chlorine level of at least 3 ppm free chlorine residual (ppm means parts per million.)

It is quite tricky to keep the right minimum level of chlorine in your hot tub. Sunlight, heat, bubbling water, perspiration, bodies and body oils cause the release and use of the chlorine from the water. That's why the term free chlorine residual is important. The free chlorine residual is the amount of chlorine which is still in the water after some has been released, used up, or combined chemically with substances in the water. Free chlorine residual is therefore the amount of chlorine which is chemically available to do the job of killing bacteria and algae. You need to check the free chlorine residual level regularly, especially just prior to use, and when the hot tub is being used, to make sure you're keeping the free chlorine residual at 3 ppm or above. Do not use a hot tub with a free chlorine residual below 1.0 ppm, or you will risk catching or spreading infection.

If you had experience maintaining swimming pools, you may notice that hot tub maintenance is different from swimming pool maintenance. The higher water temperatures, aeration jets, and body oils cause chlorine use and loss more quickly than a swimming pool water (as much as four times as fast.) It has been estimated that four adults in a 90°F hot tub can use up to about 3 to 3.5 ppm chlorine in 15 minutes. It is important to note that therefore a tub being used

over an extended period of time, such as a whole afternoon or evening will need chlorine added at least every half hour in order to maintain the safe minimum level of 3 ppm free chlorine residual. This will especially be true if there are a number of people using the tub.

After using your hot tub, let the pump filter continue running for one or two hours, and chlorinate the water back up to 3-6 ppm free chlorine residual. (Following a period of heavy or extended use, it may also be helpful to superchlorinate up to 10 ppm to remove chloramines. See next section.) This will destroy bacteria which bathers left in the water, as well as filter out much of the suspended material which people may have on their skin and carry on them into the water.

Although we recommend at least 3 ppm free chlorine residual for hot tubs, some owners maintain their hot tubs at higher levels, e.g., 4-6 ppm free chlorine residual, to provide a greater margin of disinfectant safety. Pool operators have noticed that some gradual bleaching of swimming suits occurs at about 8-10 ppm free chlorine residual, although this poses no health hazard.

## Super-Chlorinating

In addition to maintaining your tub's free chlorine residual level at 3 ppm, another important maintenance step is a weekly superchlorination (or "shock treatment") of 10 ppm free chlorine residual.

A weekly superchlorination is useful for removing chloramines, which are substances chemically combined with chlorine ("combined chlorine"). Chloramines are undesirable because they prevent the chlorine from disinfecting properly, and they also cause burning of the eyes and foul odors.

These symptoms are often taken as signs of too much chlorine, but they are actually signs of not enough free chlorine residual. Smell is caused by chloramines, not by free chlorine residual.

The weekly 10 ppm superchlorination will help remove the chloramines. After the superchlorination, allow the chlorine level to drop down to between 3-6 ppm before using the hot tub. (Note: check with your pool and spa store to determine the correct amount of chlorine to add to reach 10 ppm; this will depend on the size of your hot tub. For example, 1 ounce by weight of granular chlorine, such as Dichlor, in 500 gallons of water is equivalent to 10 ppm free chlorine residual in the absence of any chlorine demand.) Use a chlorine product without a stabilizer (such as cyanuric acid) for shock treatment. Your pool and spa retailer may also have other products for this purpose.



**Weekly "shock treatments" help keep water clean.**

## Other Disinfectants

There are a variety of chemicals and devices which are advertised as hot tub water disinfectants. Although we strongly recommend the use of chlorine for disinfecting water, some private hot tub and spa owners have used alternative methods. Whichever method you choose, it is very important that you carefully follow the manufacturer's instructions and check with your pool/spa retailer if you have any questions.

Methods of disinfection other than chlorine include: bromine, iodine, ozone, ionization, and ultraviolet light, if you choose to use one of these alternative methods, be sure to ask your pool/spa retailer how to measure and maintain an adequate residual of an effective disinfectant in the water (see page 9 for description of "free chlorine residual").

Bromine is more popular in spas than in pools. It's related to chlorine and works in a similar way. Bromine combines with organic substances in the spa to form bromamines. Bromamines don't smell like chloramines do, and they do have disinfecting action, which chloramines don't. Too much bromine can result in skin rashes, so be sure to measure the bromine level in your spa.

Ozone is becoming popular for home spas. Ozone is an excellent oxidizer and will kill bacteria and viruses on contact. There is no residual action with ozone. It "cleans" the water that goes through the ozonator, but then the "clean" water goes back in with the "dirty." You'll need to use a disinfectant such as chlorine or bromine in addition to the ozone so that there is a residual in the water at all times. Although ozone should reduce the amount of other disinfectant that you use, it can't be substituted entirely. You'll still need to run tests of your chlorine or bromine, just as you would if you weren't using ozone.

## Chemical Balance

Maintaining a proper chemical balance will reward you with clear, clean, fresh-smelling hot tub water. Chemically balanced water depends primarily upon the pH of the water (explained below), the chemicals which help maintain the pH (acid and alkaline chemicals), and water hardness (primarily minerals such as calcium). Soft water may have to be made "harder." Your pool and spa store can advise you about this.



Maintain pH at  
7.2 - 7.6

The acidity of water is expressed as a pH value. The pH range extends from 0 to 14; 0 is the most acid and 14 is the most alkaline (or "basic"). Seven is neutral, neither acid or alkaline. The optimum pH of a hot tub is 7.4, with an acceptable range of 7.2-7.6.

Maintaining proper pH balance is important for several reasons. If the pH is too low, it causes skin and eye irritation, staining of the tub's inside surface, and corrosion of metal in the equipment. Too high a pH also causes skin and eye irritation as well as cloudy water. Chlorine is also much more effective in the proper pH range of 7.2-7.6.

Depending on the acidity or alkalinity of the water used to fill the tub and your disinfectant, you may need to adjust your water's pH level by adding an acid or alkaline chemical. For example, adding soda ash or sodium bicarbonate will raise pH. Adding hydrochloric acid or muriatic acid will lower pH. Your pool and spa store can sell you these chemicals and can advise you how to use these products properly.

In addition to the acidity/alkalinity of the water, other measures you may need to adjust are calcium hardness, total alkalinity, and total dissolved solids. Your test kit (see page 14) should measure total alkalinity and will show your tub's level compared to the recommended range show in the chart on page 23.

Total dissolved solids, as the name implies, is the level of dissolved substances in the water. This should remain below the recommended maximum of 1500 ppm as long as you maintain proper chlorination, pH, and filtration time, except possibly during heavy use, when you may need to dilute or replace the water if dissolved solids build up too high. Testing of total dissolved solids can be done through a pool maintenance service or private laboratory.



**Add fresh water to maintain tub's water level.**

Add fresh water to your tub if splashing or evaporation reduces the amount of water in the tub. Large amounts of water loss by evaporation may cause the remaining water to cloud up since the chemicals and other substances in the water are becoming more concentrated. If this cloudiness does not clear up with the addition of fresh water, chlorine and pH adjustment, and filtration, you may need to drain and refill your tub.

Check with your pool/spa retailer before using scents, salts, or soaps in your hot tub. Scents can hide telltale odors of combined chlorine. This smell should be detectable so you can tell if you need to superchlorinate your tub. Some scents and salts have dyes, which can color your cartridge filter and prevent you from seeing if it's dirty and therefore in need of cleaning. Also, some scents and salts can interfere with the chlorine or may soften the water and upset the water's chemical balance.

## Filters, Pumps and Covers

The purpose of your filter is to remove unwanted substances which are suspended in the water, such as algae, dirt, body oils, etc. The filter does not remove all suspended material, but it does remove most of it, and it works with the disinfectant (chlorine) to keep the water clean and clear.



Filter cartridges can be reused if cleaned regularly.

The two major types of filters found with most private hot tubs are: dacron-polyester cartridge filters and diatomaceous earth filters. Most private hot tubs come equipped with cartridge filters because they are easier to use and maintain by the non-professional.

The cartridge is disposable but if kept thoroughly clean it can be reused over several months before being replaced, according to the manufacturer's or seller's instructions (see page 17 for cartridge cleaning guidelines).

Operate the filter (with the pump) for at least 3-4 hours a day for the first 7-10 days you run your hot tub, or until the water remains clear for more than 48 hours. After that point, the amount of filtration time will depend upon the size of your tub, pump, and filter, the amount of use, and the manufacturer's instructions. If the water does not remain clear, try increasing the length of filtration time. However, some pumps have two or more speeds so that the pump can be left on at the lower speed to provide constant filtration.

Constant filter operation is important for diatomaceous earth filters because when the water flow is shut off, the diatomaceous earth will fall off the filter leaves (complete instructions on using diatomaceous earth filters should be obtained from your pool and spa store).

You should make sure the water in your hot tub is completely recirculated frequently: e.g., at least every 30 minutes while the tub is being used. (If you do not leave your pump on all the time for constant filtration, turn it on before using to allow the water to recirculate once or twice.) If you are a prospective buyer, make sure the pump you buy is appropriately sized for this purpose, as well as for the number of aeration jets. This way contamination is being constantly removed (although it may not sound pleasant, you should realize that "contaminants" are being introduced into the water every time someone gets into your hot tub).

Do not operate the pump or heater unless the hot tub is filled up to the recommended operating level, if the tub has a skimmer, the minimum water level should be 1" over the bottom of the skimmer opening.

If your hot tub is exposed to freezing temperatures:

- the pump should remain operating in low speed during the time that the tub, piping, or support equipment is below freezing temperatures;
- during prolonged periods of freezing temperatures when the tub is not being used, we recommend that tub, piping, and equipment (pump, filter, heater, etc.) be thoroughly drained according to the manufacturer's instructions to prevent damage.

A floating cover is a good investment for your hot tub because it reduces water evaporation and helps maintain the water temperature (which saves you energy costs). A well-fitting cover also prevents dust and debris from getting into the water, helping to keep the water clear and clean. Floating covers are often an insulating foam product, and if you have an outdoor hot tub, it can be used together with a hard cover to further reduce water and heat loss. A locking hard cover is also a good safety feature, since it prevents children and pets from falling in. You can purchase inexpensive but effective spa cover locks if your cover is not already so equipped. For safety, always remove the cover completely before using your hot tub.

## The Test Kit and Chemicals

A test kit is absolutely essential to you for maintaining your hot tub. The test kit allows you to test the water for chlorine levels, pH, and other measures such as total alkalinity.

Test your tub water often enough to help you maintain proper chemical balance. Factors influencing chemical balance include "bather load" (how many bathers use the tub) and, for outside tubs, weather conditions.

The best kit to have is the "DPD" kind, because it can measure the free chlorine residual in your hot tub water. We recommend a test kit with at least four functions, which can measure free chlorine residual, combined chlorine, pH, and total alkalinity. These 4-function DPD kits are made by several manufacturers, and your spa and pool store can help you select one.



Use a DPD test kit to test your tub water.

Many kits sold to the public are the "orthotolidine" ("OTO") kind and do not give accurate readings at the temperature of the hot tub, and the chemicals (reagents) deteriorate relatively quickly. Most "OTO" kits are 2-function kits, which measure only chlorine and pH. They do not measure free chlorine residual, which is the measurement you need. (Total chlorine is the sum of free chlorine residual plus combined chlorine. Measurement of total chlorine is not the amount available for disinfecting; see page 9).

Supplemental test kits are available which measure water hardness. Ask your pool/spa retailer if one is recommended for your area. In soft water areas, keep water hardness high enough to prevent copper pipe corrosion (see page 23 for calcium hardness levels).



**Free chlorine residual is the important chlorine measurement.**

The instructions with the test kit should describe how to evaluate the water properly. Test the water before adding tub chemicals to avoid false readings. When mixing tub water and test kit reagents in the kit vial, use the plastic cap (not your finger) to cover the opening. Skin oils from your finger may influence the test results. Read your results immediately after mixing the water sample with test solutions.

Your DPD test kit will probably be set up to measure from 0.2 to 3.0 ppm free chlorine residual. In order to measure chlorine levels above 3.0 ppm, the chlorine scale on the test kit chamber can be multiplied by diluting the test sample of tub water with tap water. For example, fill the test kit chamber half full with sample water, half with tap water; this multiplies the test kit scale by 2. (Therefore, multiply by 2 the reading you see on the test kit to get the actual result.) Since the top level most kits can measure is 3 ppm, anything 3 ppm or above will look the same on the color chart, if you get a measurement of 3 ppm, always run a dilution, since the number could be much higher. If the levels are too high, usually somewhere around 10, you will get no color at all because the chlorine will bleach out the color, if you know you have put in chlorine, and/or you see a flash of pink, run some dilutions. You may actually have a high level that the kit can't measure.

If you use a disinfectant other than chlorine, make sure you ask your pool/spa retailer how to accurately measure your tub's water chemistry.

## Adding Chlorine and Chemicals to Your Tub

Self-controlled chemical feeders are available that use a sensor to automatically add the appropriate chemical when needed. This can effectively maintain the appropriate levels of chlorine and other chemicals in your tub water although this can be expensive equipment. Most people intentionally "hand feed" chemicals, using a test kit to measure what the water needs. As long as you are attentive, this will work perfectly well. Somewhat less desirable is a "robot feeder" that adds chemicals at a fixed rate, such as a feed pump or erosion tablets or sticks. Robot feeders do not sense what chemicals the water needs, and depending upon water temperature and how heavily the tub is being used, the standard rate may not be adequate.



**Pour measured liquid hot tub chemicals in carefully.**

When hand feeding more than one kind of chemical to your hot tub, do not mix the concentrated chemicals together. Add chemicals to the hot tub separately and allow several minutes between additions and use the pump, jets and filter to help dissolve chemicals. After adding chemicals, allow at least 30 minutes for all chemicals to dissolve and disperse before using the tub.

Hot tub chemicals in liquid form may be added directly to the tub water; measured amounts can be poured in slowly just above the water level to avoid splashing. Dry chemicals should be dissolved and diluted first. (Pre-dissolving chemicals is particularly important for wood and gel-coated fiberglass hot tubs.) Dip a clean plastic bucket of water out of the hot tub, and add the proper amount of dry chemical to the water in the bucket, mixing well until completely dissolved. Then lower the bucket back into the hot tub, pouring the diluted chemical without splashing. Always add chemicals to water, not water to chemicals.



**Check chlorine levels when tub gets heavy use.**

If you use your hot tub over a long period, such as when numerous guests go in and out of the tub over an evening, check the chlorine and other chemical levels at least hourly, then add chlorine or chemicals as needed. High "bather load" can use up chlorine rapidly. Keep bathers out of the tub while adding chemicals and until chemicals are fully dissolved, as described above.

Since hot tub chemicals can burn or poison, store them in their original containers and out of reach of children. Chemicals should be stored in a clean, cool, dry location, away from the hot tub heater. Never store or mix chemicals together; do not even mix different kinds of chlorine together (mixing tablets and granular chlorine products together can cause an explosion); store oxidizers away from organics. Do not smoke around the chemicals, and avoid direct skin contact, e.g., use rubber gloves. Use only clean utensils to handle chemicals; use a separate clean utensil for each chemical.

## Cleaning

Your hot tub should be drained about every two months (or according to the size, manufacturer's instructions, and how often the tub is used), cleaned, and refilled with fresh water, due to the buildup of minerals and other substances in the water. Measure and readjust the chlorine level and chemical balance before using the hot tub again.



**Regularly tub cleaning is a good idea.**

Some spa and tub manufacturers recommend adding an emulsifier to your tub's water prior to draining it. This breaks up and dissolves oils for easier removal.

To clean your tub, drain it and scrub it out with a 50 ppm (approximately) chlorine solution (1/4 teaspoon Dichlor in 5 gallons of water will yield approximately 50

ppm; mix in a clean plastic pail). Use rubber gloves and long-handled brushes, and be careful to protect your skin and eyes. Avoid inhaling any chemical fumes.

Your cartridge filter should be cleaned monthly, or more often if needed. Depending on the piping arrangement for your tub's filter system, there are one or more indications that the filter needs cleaning:

1. Jet action in the tub will be reduced;
2. Water in the tub will remain cloudy after proper disinfection, and dirt or skin oils may remain on the surface of the water after using the tub;
3. If your filter tank has a pressure gauge, the pressure reading will be 5 psi or higher than the reading when a clean filter is started when the jets are used.

Disassemble the filter and scrub out the filter housing with the 50 ppm chlorine solution. If you have a cartridge filter, you can clean it in the following manner unless it is due for replacing anyway:

1. Thoroughly rinse down the cartridge with a high-pressure nozzle on a garden hose. Do not clean the cartridge with a brush, because brushing can imbed the dirt more deeply, or even harm the filter fabric.
2. Soak the cartridge for several hours in an oil-cutting solution, such as trisodium phosphate, or whatever your pool and spa store recommends. Thoroughly rinse the cartridge after soaking. (Trisodium phosphate can burn; follow the label instructions.)
3. Test the cartridge for mineral buildup. Apply a few drops of muriatic acid to the cartridge fabric; if it foams, assume the acid is dissolving minerals (these minerals can plug the filter). To remove the mineral buildup, soak the cartridge in a solution of 1 part muriatic acid to 10 parts water for 2-4 hours. Several cleanings may be necessary for heavy mineral buildup. Rinse well after soaking.
4. Finally, soak the cartridge for several hours in a 50 ppm chlorine solution to thoroughly disinfect it. After soaking, rinse well.



**Use caution with  
cleansers when  
cleaning tub  
equipment.**

For proper disposal of these cleaning solutions please consult your local sewer district or agency. (In King County, call the Local Hazardous Waste Line - see page 25.) For example, if local regulations allow you to dispose of these solutions in the sewer, dilute them with plenty of water as they are being poured down the drain.

**NOTE:** If you are on a septic tank system, do not dispose of these solutions in your septic tank. Call your local health department for advice on proper disposal.

**CAUTION:** These concentrated solutions can burn, so use rubber gloves and goggles and make sure there is good ventilation so you do not breathe the fumes. Rinse off well if splashed on the skin; if splashed in the eye, thoroughly rinse with large quantities of water for at least 15 minutes, and contact your local emergency medical personnel. Keep flushing your eyes with water until assistance arrives.

An alternative method to clean your cartridge is as follows:

1. Rinse the cartridge as described in Step 1 above to rinse loose material from the cartridge.
2. Run the filter through two cycles of your dishwasher. Do not use the heat-dry cycle. Use your regular amount of dishwasher detergent. Turn the filter over for the second wash. The combination of hot water and the caustic dishwasher detergent both sanitizes and removes body oils from the filter pleats. (Do not wash other items in the dishwasher at the same time as the filter.)

**NOTE:** Check your manufacturer's instructions to make sure this cleaning method is all right for your brand of filter. You may also check with your pool and spa retailer to see if they recommend this cleaning method.

After cleaning the cartridge, reassemble the filter and, if drained, refill the hot tub with fresh water, and apply a "shock treatment" of 10 ppm free chlorine residual for 10 hours. (Check the chlorine label or ask at your pool and spa store to determine how much chlorine to add to reach 50 ppm and 10 ppm.) Then before reusing the hot tub, carefully measure and adjust the chlorine and pH levels, as needed; make sure the chlorine level is between 3-6 ppm free chlorine residual before reusing.

Some hot tub owners find it helpful to have two filter cartridges; while one is being cleaned by a series of soaks, the other clean one can be in the system so you can enjoy using your tub.

We also recommend that you regularly clean your tub's skimmer (if you have one) of hair and debris after each use. This is important, because the skimmer bucket is an ideal breeding ground for bacteria.

In addition to this regular cleaning, if any bathers report skin rashes from using your hot tub, an additional thorough draining and cleaning of the tub will also be necessary. Follow the same cleaning guidelines just described. Discontinue the use of the hot tub as soon as any bathers report a skin rash or infection. (If you use bromine as a water disinfectant, check the bromine level in your hot tub. Bromine levels which are too high can cause rashes.)



**Clean,  
chlorinated  
water will help  
prevent "hot  
tub rash"**

The bathers should contact their doctor's office if the infection does not clear up within 7-10 days. We also recommend reporting the infection to your local health department; you can talk to a Health and Environmental Investigator about the proper operation and cleaning of your tub. Also, for a fee, some health department laboratories or private laboratories will test hot tub water samples you provide for possible sources of the infection. (This testing should be done before cleaning and rechlorinating the tub.) Call the

lab for instructions because the water should be collected in sterile bottles, or bottles the lab can provide, and water samples should be delivered to the lab as soon as possible after collection. Refrigerate the water samples since bacteria will continue to grow even at room temperature.

This entire process sounds involved, but some harmful bacteria are extremely hardy and this careful cleaning and disinfecting is necessary to remove harmful microorganisms. You should review your previous operation and maintenance procedures to identify the cause of the infection to prevent further infections and to save yourself the trouble of totally disinfecting the system more frequently than your normal maintenance schedule.

## Wood Hot Tubs

If you own a wood hot tub, you may notice that when you first fill your hot tub your water may look reddish brown for a few weeks, in this case, the water is leaching (drawing out) chemicals from the wood. The water should clear up with filtration, extra chlorination and pH adjustment to the appropriate 7.2-7.6 range. Water clarifying additives (sometimes called "polishers") are also available to help clear the water.

We recommend that you clear up this discoloration before using your tub.

Discolored water indicates that there is a "chlorine demand," so there would be a low free chlorine residual for effective sanitation. A new wood hot tub will use much more chlorine initially for this reason than it will later on.



**Wood hot tubs  
may require  
special  
attention  
initially.**

Foam may develop on the water the first few times you use your tub. Foam is an indication of oils or resins in the water. Chlorine will normally remove these substances, if necessary, add an emulsifier to help remove them. De-foaming products are available; these are oil-based substances. This oil, like body oils and lotions, can reduce the hot tub's filter efficiency, may require more frequent cleaning of the filter, and can promote bacterial growth.

In time, some wood hot tubs may develop a white, fibrous matting on the inside walls where the wood is in contact with the water. This matting is bleached and frayed wood fibers due to the chlorine in the water. This may indicate excessive chlorine and improper pH, although a properly maintained hot tub may also develop this matting. Ordinarily, this matting is not a health hazard as long as the surface of the wood remains smooth, and the pH and chlorine levels are maintained on the correct level. A clean, smooth surface will prevent splinters, and will prevent the formation of crevices or pockets to protect bacteria and algae from chlorine.

## **Other Kinds of Hot Tubs or Spas**

You will want to follow additional maintenance procedures for your hot tub which the manufacturer or seller recommends. This will depend on the material your hot tub is constructed of. The previous section, for example, describes several points for owners of wood hot tubs.

Acrylic and fiberglass hot tubs should be maintained according to the manufacturer's instructions, or scratching or blistering may result. For example, do not use abrasive cleaners to clean the surfaces of acrylic or fiberglass hot tubs, because this may damage the tub material. Gel coated fiberglass tubs will require regular waxing, especially if scratched, and you should use the special waxes sold for this purpose (do not use household wax.) Gelcoat is a porous surface, and waxing provides an impervious coating. Waxing can also be a regular maintenance step for acrylic tubs, and it helps to keep a nice luster. The gelcoat on fiberglass hot tubs also may need servicing if it becomes blistered; contact your pool and spa store or a fiberglass repair business for assistance if repairs are necessary.

The purpose of being careful with the maintenance of your tub's surface is to maintain a clean, fairly smooth surface so there are no scratches or pockets to protect bacteria and algae from chlorine.

Portable spas contain smaller quantities of water, which means that increased attention to mater maintenance is important. For example, buildups of combined chlorine tend to occur more rapidly in portable spas, and more frequent "shock treatments" will therefore be necessary.

## **If You are on a Septic System**

If you are on a septic tank system and are planning to put in a hot tub or spa, contact your local health department to see if any special regulations apply, if you have already installed your tub, this section describes some special procedures you should be aware of.

Do not drain most or all of your hot tub water into your septic system at one time. Large amounts of water suddenly emptied into a septic tank can "overwhelm" the system. This can cause sludge from the tank to wash into the drainfield, clogging the pipes, and water may back up into your home. (This does not apply to homes on a public sewer system, if your home is on a public sewer system, your hot tub should be hooked up to a drain into the sewer, not the yard.) If your local plumbing or health code requires your tub to be connected to your septic tank system, drain your tub water over a 3-5 day period, after allowing the chlorine level to drop to 0.5 ppm or below.



**Tubs on  
septic tanks  
need special  
draining  
procedures.**

If local codes permit, when you empty your hot tub for cleaning, or for other reasons, slowly and carefully drain the water onto land (e.g., onto a lawn or into shrubbery) as follows:

Chlorinate your hot tub to 1.0 ppm free chlorine residual and then let the water sit without use until the free chlorine residual level drops to 0.5 ppm or below, before draining the water onto the ground. As long as this water has been chlorinated, it is not harmful and can safely be emptied into your yard. Avoid draining the water around grass or shrubbery if the free chlorine residual is as high as 3.0 ppm. A high chlorine level can harm some plants. Also, it is easier on plants if the water is not hot, but allowed to cool to room (or outside) temperature. (Also be careful not to drain the water close to fish-bearing waterways, including storm drains and ditches which empty into streams, because chlorinated water will harm fish.)

If you do drain your tub's water in your yard be careful not to do so in your septic tank's drainfield area. The ground may become too wet to properly absorb the drainage from the pipes in the drainfield. (If you would like more information about the proper maintenance of septic tank systems, contact the Environmental Health Office in your local health department.

Water from backwashing a diatomaceous earth filter should be backwashed through a separation tank, which will prevent the diatomaceous earth from getting into the septic tank system and plugging it up. The earth can be thrown away in the garbage, and the water drained onto the ground. Backwash water of 3-5 gallons will not harm your septic tank system, but use care not to empty all of the hot tub water into the septic tank. (Most private hot tubs come equipped with a cartridge filter which does not require backwashing, so this procedure may not apply to you.)

## Installing Your Hot Tub

if you have not yet installed your hot tub or spa, here are a few points to remember:

1. We recommend having all utility work (plumbing, gas electric) done by licensed workers under appropriate permits issued by your local government. This is the best way to assure safety and to prevent potential problems with incorrect piping or wiring. Additionally, many insurance policies will not cover mishaps unless the work has been done by a licensed worker under an appropriate permit. Consider the building codes and inspections have been developed for people's safety; therefore, use your permit as an opportunity to make sure your tub and equipment is being installed safely and correctly.
2. Arrange to drain your tub according to local regulations. We generally recommend that unless your plumbing is on a septic tank system (see page 27), plumb your tub to drain into the sewer, not the storm drains or into the yard. An acceptable alternative is to siphon or pump drain water into a sink which drains into the sewer. Drain water from the tub should be considered waste water, and should be treated in the sewage system. Never drain tub water in or near fish-bearing waterways.
3. Remember to look for a U.L. (Underwriters' Laboratory) listing on equipment you purchase, if you are purchasing a portable spa, the entire spa should bear the U.L. listing.
4. There should be a vacuum breaker installed in your equipment used to fill and drain your tub. This vacuum breaker (or "air gap") will prevent any back siphoning of tub water into your drinking water system. For more information, contact your pool or spa retailer or your local health department.



Install your tub in compliance with all local rules.

***Don't be overwhelmed by all of the advice in this brochure! You will find that once you become familiar with your own equipment, your maintenance routine will be fairly easy. The important thing to remember is that the proper operation and maintenance of your hot tub will add to your enjoyment and reduce the risk to health.***

## Quick Summary of Recommended Levels

	Recommended Level	Acceptable Range	Other Comments
<b>Chlorine</b> (Free Chlorine Residual)	3 ppm minimum	3-6 ppm	10 ppm weekly super-chlorination
<b>pH</b>	7.4 (approx.)	7.2 - 7.6	
<b>Water Temperature</b>	100°F for healthy adults, 15-20 minutes	104°F max. for healthy adults	Low temps and shorter soaks for children, pregnant women
<b>Total Alkalinity</b>			
wood tubs	80-125 ppm		
plaster & tile tubs/spas	80-125 ppm		
vinyl, painted & fiberglass tubs/spas	125-150 ppm		
<b>Calcium Hardness</b>			
wood tubs	150-200 ppm		
plaster & tile tubs/spas	150-200 ppm		
vinyl, painted & fiberglass tubs/spas	150-200 ppm		
<b>Total Dissolved Solids</b>	1500 ppm maximum		

## Ideal Conditions and Troubleshooting

	<b>Ideal</b>	<b>Problem</b>	<b>Action to fix problem</b>
<b>Odor</b>	Light, fresh clean odor	Foul smell or heavy chlorine odor; eye burning	Test for free chlorine residual level; adjust as necessary after a 10 ppm superchlorination to remove chloramines.
<b>Water Clarity</b>	Clear, clean water; light blue-green color	Cloudy or colored water; foaming	Increase filtration time; if you have tried that, clean your filter and filter equipment. Also, check pH and chlorine levels and adjust. If necessary, replace tub water.
<b>Water "Feel"</b>	Smooth, silky feel	Slimy or "hard" feel	Check pH, chlorine, and total alkalinity levels and adjust if necessary. Increase filtration time.

## Public Health Centers in Seattle-King County with Environmental Health Services

Health Department services are provided at Public Health Centers located in Seattle and King County. Contact the Center nearest you for more information about services. Not all services are offered at every Center.

Most Public Health Centers are open 8 am to 5 pm, Monday through Friday. If there is an urgent need for after-hours assistance from the Health Department, call (206) 682-7321.

Outside of King County, call your [local health department](#) for assistance.

- **Downtown Environmental Health Center**  
**(206) 263-9566**  
401 5<sup>th</sup> Ave, Suite 1100  
Seattle, WA 98104
- **Eastgate Environmental Health Center**  
**(206) 296-4932**  
14350 SE Eastgate Way  
Bellevue, WA 98007
- **Emergencies**  
If you have a life-threatening emergency,  
call **9-1-1**.
- **Local Hazardous Waste Hazards Line: (206) 296-4692**  
401 5<sup>th</sup> Ave, Suite 1100  
Seattle, WA 98104
- **General Information (Voice/TDD)**  
**(206) 296-4600**

*Public Health - Seattle & King County seeks to achieve and sustain healthy people and communities throughout Seattle and King County by providing public health services which promote health and prevent disease. Services available to all residents include food safety, and affordable health care for all ages.*

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