

Hot Tubs: Safe Water Quality

What are the health concerns of hot tub use?

Hot tubs and whirlpool baths can provide a fertile breeding ground for a number of bacteria that cause infection or disease. This includes the *Legionella* bacteria that cause Legionnaires' Disease, which can be fatal. As well, the *Pseudomonas* bacteria can cause a number of serious infections, such as severe skin rashes, eye and ear infections, and pneumonia. These bacteria can be easily controlled and removed by maintaining the disinfectant level of the water.

How can I make sure the water is safe?

You can prevent illness from hot tub use by learning about and maintaining safe water quality in your hot tub. It is the owner's responsibility to ensure the hot tub is clean and the water is properly disinfected to prevent the spread of germs and disease.

It is important to maintain the proper level of disinfectant to ensure clean and safe water in hot tubs and pools. Chlorine is the most commonly used disinfectant. Some owners may use bromine instead of chlorine in hot tubs, but this must be used at higher levels to be effective. Both chlorine and bromine kill viruses and bacteria. However, they also react with other organic material in the water including dirt, soap, shampoo, body oils, perspiration, food and drinks. The more a hot tub is used, the faster the disinfectant in the water gets used. Always check the level of chlorine or other disinfectant in the water, and add more if required.

Measure Water Disinfectants

The level of disinfectant in your hot tub should be measured before and after use, or at least daily if not in use.

Many test kits available from pool equipment dealers can measure two different forms of

chlorine found in the water. It is recommended to measure *both* types of chlorine. One form of chlorine is *free residual chlorine*, which has not yet reacted with any organic material. The other form is *combined residual chlorine*, which has already reacted with organic material present in the hot tub; therefore, it is much less effective. This is calculated by subtracting the amount of free residual chlorine from the total residual chlorine measured by the test kit.

It is important to maintain the proper level of disinfectant. Free residual chlorine should be maintained at 3 ppm (parts per million) in hot tubs and not fall below 1 ppm. Bromine should be maintained at 4.5 ppm in hot tubs and not fall below 2 ppm.

Other Disinfectants

Ultraviolet (U.V.) or ozone treatment systems help control bacteria, but they are *not* a substitute for disinfection with chlorine or bromine because they do not leave left over disinfectant in the water. Ozone helps disinfection since it will destroy some of the material that uses up disinfectants. Special care should be taken with ozone because it can cause eye and lung damage. Make sure no ozone bubbles are entering the bathing area and there is no ozone smell.

Measure pH and Water Quality

It is very important to maintain the pH of the water in the 7.2 to 7.8 range. Pool water out of this range can lessen the disinfecting power of chlorine. It can also cause eye and mucous membrane irritation. Measure pH daily and maintain it in this range. Your pool supplier will carry test kits for pH, as well as chemicals to adjust the pH.

Other factors can affect the performance of disinfectants or lead to maintenance problems.

To avoid these problems, you should monitor the water quality. The following is a summary of recommended ranges of water quality measures.

Disinfectant	
Bromine	4.5 ppm (never less than 2.0 ppm)
Free Chlorine	3.0 ppm (never less than 1.0 ppm)
Combined Chlorine	0.1 - 0.5 ppm
PH	7.2 - 7.8 (Target 7.5)
Alkalinity	
CaCO ₃	80 - 100 ppm (50 - 180 ppm are extreme limits)
Calcium	
	200 - 400 ppm (150 – 1000 ppm Hardness are extreme limits)
Stabilizer	
Cyanuric Acid	30 – 50 ppm
Organic Load	
	There should be no visible particles; strainers and filters should be regularly cleaned.

Your dealer can help you with more advanced chemical analyses.

Remember to use and store your pool chemicals safely as they can be dangerous. Follow safety instructions on the product label and safety data sheets.

Regular shock treatment is recommended

When *combined residual chlorine* begins to accumulate in the water, it can lead to unwanted odors and eye irritation. Shock treatment is a process for getting rid of the combined residual chlorine in a hot tub or pool. Ideally, shock treatment is done before the combined residual chlorine exceeds 0.5 ppm.

Most pool suppliers can provide instructions or chemicals for shock treating a hot tub or pool. This helps clear the water and remove contaminants. Make sure the chlorine level is back to normal before you enter the tub.

Keep the pump going 24 hours a day

Between periods of use, water in the tub's plumbing lines can become stagnant and grow bacteria or fungus. You can prevent this by:

- Running a pump 24 hours a day to circulate water through *all* the pipes; or
- Setting a timer to turn the pump on for a few hours, at least twice a day, to flush out all the lines.

Some spas have *secondary* circulation pumps that run 24 hours a day. These systems may bypass some water lines and still leave water sitting stagnant in those lines. Ask your dealer for help.

Clean your hot tub regularly

Your hot tub should be cleaned and restarted every two months. You should also drain and clean your hot tub if any of the following problems occur:

- Complaints of eye, ear or skin irritations after using the hot tub;
- Proper disinfectant levels have not been maintained; or,
- The 'combined residual' chlorine level becomes more than half of the 'free' chlorine level.

For more information on maintaining safe water quality in hot tubs, contact your local public health inspector. See also HealthLink BC File [#27a Hot Tubs: Health and Safety Tips](#).

For more HealthLink BC File topics, visit www.HealthLinkBC.ca/healthfiles/index.stm or your local public health unit.

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