

Residential Hot Tubs and Pools: Safe Water Quality

Health concerns of hot tubs and pools

Hot tubs and pools can provide an environment for pathogens (germs) to grow. Germs can make you sick and can include:

- *Legionella* that cause Legionnaires' Disease (can be fatal)
- *Pseudomonas* which can cause a number of serious infections, such as: severe skin rashes, eye and ear infections, or pneumonia
- Other germs, which can spread through feces or vomit, including rotavirus and norovirus

These germs can be controlled by maintaining the correct disinfectant and temperature levels of water in your hot tub or pool.

How can I make sure the water is safe?

Owners are responsible to ensure their hot tub or pool is clean and properly disinfected to prevent the spread of germs and disease. To make sure the water is clean and safe, maintain the proper levels of pH and disinfectant (generally chlorine and bromine). For more information see Table 1 for pools and Table 2 for hot tubs. Ensure that all chemicals are within the recommended range prior to using your pool or hot tub.

Disinfectants kill viruses and bacteria, however, their effectiveness is dependent on concentration and pH. Also, there is a time period required for disinfectants to work. This is why preventing contamination in the first place is so important.

Always shower or bathe with soap before using a hot tub or pool. This helps keep the water free of germs and body oils and will require less disinfectant. If you have diarrhea, have been vomiting, have an open wound, or any other infection or illness, you should not go in a pool or hot tub until you have been symptom-free for at least 48 hours.

If you have an outdoor pool or hot tub that is exposed to direct sunlight, you'll need to use stabilized chlorine products (e.g. chlorine cyanurate) or add a stabilizer separately (e.g. cyanuric acid). Stabilized chlorine prevents chlorine breakdown from sun exposure. You should also measure the amount of cyanuric acid. Too much cyanuric acid can create "chlorine lock", which means the chlorine does not disinfect very well.

If other disinfectants are used, like ozone or ultraviolet light (UV), they should be used in combination with chlorine or bromine to make sure a disinfectant residual is present in the pool. Special care should be taken with ozone because it can cause eye and lung damage if not removed from the water before the water reenters the pool or hot tub. Make sure no ozone bubbles are entering the bathing area and there is no ozone smell (chlorine odour with a more "metallic" smell). Always follow the manufacturer's instructions for your chemicals and disinfection equipment.

*Special note: chlorine pucks (with or without dispenser) are **not** to be used in skimmers as this is not an acceptable means to chlorinate pools or hot tubs. They can present an immediate chemical hazard to bathers and are an ineffective method of chlorination due to their inability to quickly respond to fluctuating chlorine demands.

To ensure effective disinfection, maintain your pH between 7.2 and 7.8 (ideal range). This will help reduce eye and skin irritations that can sometimes be caused by disinfectants.

How do I measure water chemistry?

The chemistry of your hot tub or pool water should be measured before and after use, or at least daily. Pool and hot tub owners should use a test kit that can measure, at minimum, the disinfectant used (free available chlorine, chlorine cyanurate or bromine) and pH. Take appropriate action whenever pool test results are outside of the recommended range.

Your hot tub or pool vendor or chemical supplier can help you with more advanced chemical analyses, can advise you on which chemicals to buy, and how and when to use them safely.

Table 1
Pools - Disinfectant and water quality levels

Parameter	Min (≤30°C)	Min (>30°C)	Ideal range	Max (do not exceed)
Free available chlorine	0.5 PPM	1.5 PPM	2.0 to 5.0 PPM	5.0 PPM
Chlorine cyanurate	1.0 PPM	2.0 PPM	2.5 to 3.0 PPM	5.0 PPM

Bromine	1.5 PPM	2.5 PPM	3.0 to 5.0 PPM	5.0 PPM
pH	7.2	7.2	7.2 to 7.6	7.8
Total alkalinity (CaCO ₃)	80 PPM	80 PPM	80 to 120 PPM	120 PPM
Stabilizer (Cyanuric acid, outdoor pools only)	30 PPM	30 PPM	30 to 50 PPM	80 PPM

Min = Minimum; Max = Maximum; PPM = Parts Per Million

Table 2
Hot Tubs* - Disinfectant and water quality levels

Parameter	Min	Ideal range	Max
Free available chlorine	1.5 PPM	3.0 to 5.0 PPM	5.0 PPM
Chlorine cyanurate	2.0 PPM	2.0 to 3.0 PPM	5.0 PPM
Bromine	2.5 PPM	5.0 to 8.0 PPM	8.0 PPM
pH	7.2	7.2 to 7.6	7.8
Total alkalinity (CaCO ₃)	80 PPM	80 to 120 PPM	120 PPM

* Temperature more than 30°C (86°F)

Min = Minimum; Max = Maximum; PPM = Parts Per Million

Always use and store your pool chemicals safely and keep out of reach of children. When pre-mixing chemicals, always pour water first before adding chemicals. Follow safety instructions on the product label and safety data sheets. Eye protection and gloves may be required.

Disinfectants react with organic material in the water including fecal matter, vomit, dirt, soap, shampoo, body oils, perspiration (sweat), food, and drinks. Chlorine that has reacted with organic material is known as “combined available chlorine” (CAC). It is less effective at disinfecting and produces unpleasant odours and eye irritation. Chlorine that has not reacted with any organic material is known as “free available chlorine” (FAC), and is an effective disinfectant.

Test kits will generally measure FAC and “total available chlorine” (TAC). To determine the “combined available chlorine” in the pool, use this formula: TAC – FAC = CAC. The more often hot tubs and pools are used, the faster the free available chlorine in the water turns into combined chlorine.

Regular shock treatment is recommended

Shock treatment is a process for getting rid of the combined available chlorine in a hot tub or pool, and can

be done by raising the chlorine level to 10x the normal concentration, and then letting it sit until the free chlorine levels drop back down to recommended ranges. The pool or hot tub should not be used until test results show that the chlorine level has dropped to within the required range.

In hot tubs, due to the relatively small volume of water, it is often easier to replace all of the water instead of doing a shock treatment.

Pool suppliers can provide chemicals that will do a non-chlorine shock treatment. The use of non-chlorine shock treatment can be effective; however, it may impact accuracy of chlorine test kits.

Keep the pump going 24 hours a day

Plumbing lines in hot tubs and pools can become stagnant (stop moving) and grow bacteria or fungus. You can prevent this by:

- Running a pump 24 hours a day to circulate water through all the pipes
- Setting a timer to turn the pump on for a few hours, at least twice a day, to flush out all the lines
- Making sure that all filters and pumps are maintained according to the manufacturer’s recommendations

Some hot tubs have secondary circulation pumps that run 24 hours a day. These systems may bypass some water lines and will leave water sitting stagnant in those lines. Always ask your vendor or pool supplier for advice and recommendations.

Clean your hot tub and pool regularly

Your cleaning schedule will vary depending upon how many people use your pool or hot tub and how often it is used. As a minimum, clean it as per the manufacturer’s instructions. You should also drain and clean your hot tub or pool if any of the following problems occur:

- Complaints of eye, ear or skin irritations after using the pool or hot tub
- A fecal or vomiting incident
- Proper disinfectant levels have not been maintained

For More Information

For more information on maintaining safe water quality in hot tubs and pools, contact your local environmental health office or your local pool and hot tub service provider.

For health and safety tips see [HealthLinkBC File #27a Residential Hot Tubs and Pools: Health and Safety Tips](#).