

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* which can 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, such as rotavirus and norovirus

These germs can be controlled by maintaining the correct disinfectant and temperature levels and ensuring adequate filtration and recirculation of the 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 or 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 germs. However, their effectiveness is dependent on many factors such as concentration, water temperature, pH and contact time between the disinfectant and germs. 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 will help to avoid the introduction of dirt, sand or organic material into the pool, which will reduce the formation of disinfection byproducts. This will also help to

reduce the amount of disinfection chemicals needed.

You should not go in a pool or hot tub with open sores or bandages. If you are experiencing cold or flu-like symptoms, 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 can use stabilized chlorine products (such as chlorine cyanurate) or add a stabilizer separately (such as cyanuric acid) to prevent chlorine breakdown from sun exposure. Too much cyanuric acid can create "chlorine lock", which means the chlorine disinfection effectiveness is reduced. Cyanuric acid should not be used in indoor pools in most situations.

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. 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 daily, especially during periods of high use. 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. Test kits should be maintained and replaced in accordance with the manufacturer's recommendations. Take appropriate action whenever pool test results are outside of the recommended range.

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 4.0 PPM	5.0 PPM
Chlorine cyanurate	1.0 PPM	2.0 PPM	NA	5.0 PPM
Bromine	1.5 PPM	2.5 PPM	2.0 to 4.0 PPM	5.0 PPM
pH	7.2	7.2	7.2 to 7.6	7.8
Total alkalinity	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	NA	5.0 PPM
Bromine	2.5 PPM	4.0 to 6.0 PPM	8.0 PPM
pH	7.2	7.2 to 7.6	7.8
Total alkalinity	80 PPM	80 to 120 PPM	120 PPM

* Temperature should be no more than 40°C

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 add chemicals to water and not water to 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's 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 10 times 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's 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.

The importance of maintaining adequate circulation

- Pool pumps should continue to operate 24 hours a day because uncirculated water can become stagnant and lead to growth of bacteria and fungi
- It's possible to reduce energy consumption of the circulation system when pools are unoccupied. Recirculation systems should not

be turned down more than 25% to ensure there are no risks to bathers

- 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's used. At 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, please visit [HealthLinkBC File #27a Residential hot tubs and pools: Health and safety tips](#).