

SWIMMING POOLS	THE RULES¹	SPAS
	Water Quality and Testing	
At least 1.0 ppm	Free Chlorine Residual Required	At least 2.0 ppm
Less than 0.5 ppm or exceeds 8.0 ppm	Free Chlorine Residual Resulting in Pool Closure	Less than 1.5 ppm or exceeds 8.0 ppm
At least 2.0 ppm	Total Bromine Residual Required	At least 4.0 ppm
Less than 1.0 ppm or exceeds 18.0 ppm	Bromine Residual Resulting in Pool Closure	Less than 3.0 ppm or exceeds 18.0 ppm
At least 700 mV	Required ORP (controller equipped pool or spa)	Same
Less than 650 mV or exceeds 880 mV	ORP Measurements Resulting in Pool Closure	Same
7.2-7.8 if Chlorine Chemical 7.2-8.4 if Bromine Chemical	Required pH of Water	Same
Every 4 hours minimum	Facility staff must test for free chlorine (or bromine) and pH. Results must be recorded.	Every 2 hours minimum
Yes	Closure results when the grate openings are not visible from the deck.	Yes (agitation system must be off to check)
The swimming pool is closed and superchlorinated.	If coliform or <i>Pseudomonas aeruginosa</i> (spas only) are detected in a sample.	The spa is closed, drained, cleaned, and disinfected.
	Filtration and Recirculation	
Yes (except a fill and drain wading pool)	Recirculation pumps, filters, and disinfection equipment must be operated continuously except for backwashing and servicing.	Yes
Yes	A pool shall be closed if critical equipment (recirculation pump, filter, disinfection equipment) is inoperable.	Yes
	Safety	
Yes	No treatment chemical that is toxic or irritating to human beings may be added to the water while the swimming pool is in use.	Yes
N/A	Water temperature shall not exceed 104°F	Yes
Yes (also in pool water treatment areas)	Each electrical outlet on the deck and shower room must be equipped with a properly installed ground fault circuit interrupter at the outlet or at the breaker serving the outlet.	Yes (also in recirculation equipment room)
Yes	Artificial lighting shall be provided for use at night or if there is not adequate natural lighting so that the bottom and main drain and all other portions may be clearly seen.	Yes
Yes	A pool must be fenced or enclosed. The fence must be at least 4 ft. high. Horizontal supports accessible from outside the pool area must be at least 45 in. apart. No opening, except for a gate or door, may pass a four-inch sphere.	Yes
Yes	Each drain shall be covered with a grate or other approved cover that is designed to prevent human entrapment. Each drain cover shall be securely fastened so that it cannot be removed without the use of tools.	Yes
Yes	Lifeguards required at city, school pools and some other large pools.	N/A
Yes	"No Lifeguards" signs required for pools that do not have lifeguards.	N/A
Yes (except for wading pools)	A minimum of one unit of lifesaving equipment shall be provided for each 1500 ft ² of water surface area or fraction thereof.	N/A
Yes	First-aid kit and emergency telephone must be available.	Yes (telephone only)
Yes	Water depth must be marked on the deck or posted (wading pools and spas only).	Yes
Yes	The rules for the facility shall be located in a conspicuous location.	Yes
	Records	
Yes	The operator of a swimming pool/spa shall have the operational records for the previous 12 months at the facility and shall make records available upon request of a pool/spa inspector.	Yes

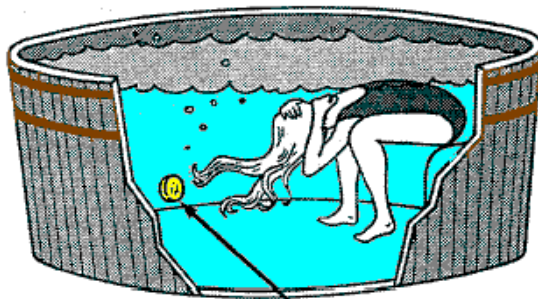
Safety Hazards from Spas and Swimming Pools²

- Drowning

- The main hazard from hot tubs and spas is the same as that from pools - drowning. Since 1980, CPSC (Consumer Product Safety Commission) has reports of more than 700 deaths in spas and hot tubs. About one-third of those were drownings of children under age five.
- Drowning is the second leading cause of injury-related death for children (aged 1-14 years), accounting for 940 deaths in 1998.³
- Consumers should keep a locked safety cover on the spa whenever it is not in use and keep children away unless there is constant adult supervision.
- Pool submersions involving children happen quickly. A child can drown in the time it takes to answer a phone. The U.S. Consumer Product Safety Commission studied drowning and submersion incidents involving children under 5 years old in Arizona, California, and Florida. Seventy-seven percent of the victims had been missing from sight for 5 minutes or less.

- Hair Entanglement

- Since 1978, CPSC has reports of 49 incidents (including 13 deaths) in which people's hair was sucked into the suction fitting of a spa, hot tub, or whirlpool, causing the victim's head to be held under water.
- Hair entanglement occurs when a bather's hair becomes entangled in a drain cover as the water and hair are drawn through the drain. In some incidents, children were playing a "hold your breath the longest" game. Permitting their long hair to be sucked into the drain.
- If a drain cover is missing or broken, shut down the spa until the cover is replaced.



Drain Cover

- Evisceration/Disembowelment

- Fifteen incidents of disembowelment were reported to CPSC between 1980 and 1996.
- The typical scenario leading to disembowelment involves a young child, 2 to 6 years old, who sits on the uncovered drain of a public wading pool. The incidents occur primarily in public wading pools where a floor drain cover is broken or missing.

- Body Entrapment

- The CPSC knows of 18 incidents since 1980 in which parts of the body have been entrapped by the strong suction of the drain of pools, wading pools, spas, and hot tubs.
- These incidents primarily involve older children (8 to 16 years of age), with an average age of about 10 years. In some of the cases, it appears that the child was playing with the open drain, including inserting a hand or foot into the pipe, and then became trapped by the resulting suction.
- Consumers with older spas should have new drain covers installed and may want to consider getting a spa with two drains. This reduces the powerful suction if one drain is blocked.

- Spa Temperatures

- High temperatures can cause drowsiness, which may lead to unconsciousness, resulting in drowning. In addition, raised body temperature can lead to heat stroke and death.
- Spa water temperatures should never exceed 104 degrees Fahrenheit. Pregnant women and young children should not use a spa before consulting a physician.

- Storage and handling of Pool Chemicals⁴

- Pool chemicals may become a hazard when they become wetted by a small quantity of water or when they are improperly mixed, such as with other chemicals or reactive materials.
- A number of pool chemicals, especially those exhibiting oxidation properties, can potentially be highly reactive and capable of generating high temperatures, as well as releasing toxic vapors if improperly handled or stored.
- Pool chemicals involved in fire or toxic vapor release are likely to include those that add chlorine or a chlorine ion to the pool water for bacterial control. Chemicals that release chlorine are among the group of chemicals that are classified as oxidizers.

Microbial Pathogens Found in Whirlpools and Spas

- Legionella⁵
 - Legionella is the causative agent of Legionnaires' disease and Pontiac fever. Both syndromes are characterized initially by anorexia (lack of appetite), malaise (a general feeling of discomfort), myalgia (inflammation and tenderness of the muscles) and headache.
 - Within 24 hours a fever and chills ensue. A nonproductive cough may occur and abdominal pain and diarrhea are seen with many patients. Respiratory failure is also possible, with a 15 percent fatality rate in hospitalized cases. Pontiac fever most commonly occurs in healthy persons and is a much milder form of the disease with no pneumonia or death. The infection is self-limiting in 2-5 days.
 - Legionella may be present in high numbers in waters as hot as 40°C (105°F), and transmission is thought to be via aerosol inhalation.
- Pseudomonas aeruginosa⁵
 - Pseudomonas cause significant illnesses, including pneumonia, urinary tract infections, and surgical and burn wound infections.
 - Persons at greatest risk in the community are those that have cystic fibrosis where lung infections are often fatal.
 - While most infections are nosocomial (acquired in a hospital), milder forms of disease including swimmer's ear and skin infections are frequently associated with recreational water breaks. Corneal infections and urinary tract infections have been documented following exposure to whirlpool baths and spas.
 - A survey of 17 whirlpool baths in from 16 nursing homes in two health districts in the U.S. showed that Pseudomonas aeruginosa was present in all after agitation.
- Fecal Coliform⁶
 - Coliform is a family of bacteria common in soils, plants, and animal that is made up of several groups. One of these groups is the fecal coliform group, which is found in the intestinal tracts of warm-blooded animals including humans.
 - The presence of fecal coliform at a swimming site is evidence that human or animal waste has been or is present. This is cause for concern because many diseases can be spread through fecal transmission.
 - Health symptoms related to swallowing water contaminated with bacteria generally range from no ill effects to cramps and diarrhea.

Superchlorination/Shock Treatment⁷

Superchlorination is required when the swimming pool becomes contaminated with substances that are not destroyed but dissolved. The chlorine combines with the contaminants to form odor-producing chloramines. You can also tell if the pool has chloramines if you experience some skin and eye irritation. But the most reliable way to tell is to look at the sanitizer readings.

Superchlorination is the practice of adding an extra large dose of chlorine to reach breakpoint and reduce chloramines. Breakpoint chlorination is achieved by adding free available chlorine to the pool at the rate of 10 times the amount of combined chlorine in the pool. Superchlorination is also used for control of algae and other organisms resistant to normal disinfectant levels. The pool or spa should not be used for 24 hours after shocking it with chlorine. Test the sanitizer levels before getting back into the water.

Making Disinfection More Efficient⁸

- While bathing, adults will typically shed a layer of dead skin cells, a pint or more of perspiration, a small amount of urine, and a few grams of oils and cosmetics.
- This organic matter may build up to become both a haven and a food source for microbes unless it is physically or chemically removed.
- The amount of organic material that makes it into the water can be reduced if users are required to take a quick shower before entering the pool or spa.
- The amount of buildup can also be limited if attention is paid to the number of bathers. A sudden influx of users in excess of safety or health codes may overwhelm the system's ability to provide sanitizer residuals.
- Clean pool surfaces also help to reduce the number of places where microbes can breed and feed. Scrubbing visible surfaces, cleaning skimmers and traps, and attending to filter cleaning on a regular basis will result in a more efficient use of sanitizing chemicals.

References:

- 1) Iowa Administrative Code 641-15
<http://www.legis.state.ia.us/Rules/2000/iac/641iac/64115/64115.pdf>
- 2) U.S. Consumer Product Safety Commission:
Pool and Spa Safety Publications
<http://www.cpsc.gov/cpsc/pub/pubs/chdrown.html>
- 3) National Center for Health Statistics (NCHS). National Mortality Data, 1998. Hyattsville (MD): NCHS 2000.
- 4) EPA:
Safe Storage and Handling of Swimming Pool Chemicals
<http://www.epa.gov/ceppo/pubs/spalert.pdf>
- 5) Microbial Infections Associated with Whirlpool Baths and Spas
<http://www.wcp.net/archive/aug00ontap.htm>
- 6) A Fact Sheet on Coliform Bacteria in Water
<http://www.healthyvermonters.info/hs/epi/idepi/coliform/coliform.shtml>
- 7) Chlorination of Pool Water
<http://www.pested.msu.edu/BullSlideNews/bulletins/pdf/2621/E2621chap7.pdf>
- 8) Water Quality and Health Council
http://www.waterandhealth.org/pool_spa/germ.html

Additional Resources:

- Division of Parasitic Diseases: Healthy Swimming 2002
www.cdc.gov/healthyswimming/
- National Center for Injury Prevention and Control:
Drowning Prevention
www.cdc.gov/ncipc/factsheets/drown.htm
- Oregon Department of Human Services:
Fecal Accidents/Protocol/Pools & Spas
<http://www.ohd.hr.state.or.us/esc/pool/fecalap.htm>
- Central District Health Department:
Swimming Pool Health and Safety
<http://www.cdhd.org/EnvironmentalHealth/pools/default.asp>
- National Environmental Health Forum:
Guidance on Water Quality for Heated Spas
<http://www.health.sa.gov.au/pehs/publications/monograph-heated-spas.pdf>
- Types of Chlorine
<http://connerspoolspa.com/types.html>
- Troubleshooting Guide for Pools:
National Spa and Pool Institute
<http://www.orlandosentinel.com/orl-homes-troubleguidepool,0,1562736.htmlstory>