



# Testing Pool Water

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## Have you ever wondered what tests are required for swimming pools and how often?



### Testing for Chlorine

Test for chlorine a minimum of two times daily. There are three types of chlorine test readings: free, combined and total. Free chlorine plus combined chlorine equals total chlorine. Only the free chlorine is effective in killing bacteria or algae. The combined chlorine is bound with other elements (contaminants) and needs further chlorine additions (oxidizer) to release it. Orthotolidine testing (OTO) reveals only the amount of total chlorine found in the pool water and does not distinguish between free available and combined chlorine levels. If the amount of combined chlorine reads higher than that of the free chlorine, problems are present. Ideally the free chlorine level should be kept around 1.5. Any higher than that and water and air problems may be created. If you are using a UV system this reading may be decreased to .8. (Check with your state Department of Public Health, swimming pool division, for the requirements.)

### DPD Testing

Testing twice a week is recommended. The quality and type of test kits vary. DPD testing kits are used to test for free available chlorine (F.A.C.), combined available chlorine (C.A.C.) commonly called chloramines and total available chlorine (T.A.C.). If there is a chloramine problem or pH problem swimmers will complain of red, irritated eyes and strong odors. This is a very serious health hazard and must be immediately addressed.

NOTE: Liquid reagents have an eight month to one year shelf life. The accuracy of the test is likely to decrease if reagents are stored inaccurately or for long periods of time. Keep reagents in a cool dry place out of the sunlight.

### Testing pH

Test for pH twice a day. The pH of water is usually tested by matching reagent colors against a colorimetric standard. The reagent generally used for swimming pool water is phenol red, which has a pH range of 6.8 to 8.4 and a corresponding color range of yellow to red. There are two distinct types of phenol red: a "J" solution (residential) and a #4 solution (commercial). Knowing the pH of pool water is essential for properly controlling all the water chemistry parameters. Test pH at least daily, or two times a day when the disinfectant residual is checked. Confirm that the pH is within the desired 7.3 - 7.5 range. Take water samples from the pool for testing the pH, not from a pipe tap or in the equipment room. pH can be lowered with sodium bisulfate or muriatic acid. pH can be raised with soda ash or sodium bicarbonate.

### Testing for Calcium Hardness Levels

Test monthly. Total hardness is the measure of calcium (Ca) and magnesium (Mg) in the water. Excessive hardness, the combination of calcium (Ca) and magnesium (Mg), causes calcium scale to build up on the walls and floor of plaster finished pools and spas and also on liners, tile and fiberglass. It also leaves scale build-up in heaters, heat exchangers and other filtration components. Recognize that it is not the magnesium that forms the scale. Only the calcium forms scale. When the hardness level drops too low, the water becomes aggressive and will cause corrosion, pitting of plaster and dissolving grout. Control of scaling or aggressive water requires the calcium hardness level to be kept above 200 ppm and below 400 ppm. Calcium chloride (CaCl) is used to increase the hardness level.

### Testing for Total Alkalinity

Test monthly. Alkalinity in water represents the amount of bicarbonates, carbonates, hydroxide and sometimes borates, silicates and phosphates. Total alkalinity is the resistance of water to changes in pH. The higher the total alkalinity, the more difficult it is to change the pH with soda ash or acid. Testing for total alkalinity is essential to make proper determinations of the saturation index as well as for bather comfort and ease of pH control. Total alkalinity (calcium carbonate) should be kept between 80-120 ppm for pools with inert liners, and between 100 to 125 ppm for pools with plaster finished surfaces. Pools with alkalinity over 200 cannot use CO<sub>2</sub> for pH control.



### Total Dissolved Solids (TDS)

Test monthly. Total dissolved solids (TDS) is the measurement of all materials dissolved in the water, i.e. calcium, dissolved organic and inorganic materials, carbonates, salts from chlorine residue, swimmer waste, soluble hair and body lotion or anything placed in the pool that can be dissolved. The total dissolved solids (TDS) in a pool should not exceed 1,500 ppm. High TDS is common with spa water with high bather load, high chemical needs and a relatively small volume of water. TDS can only be corrected by dilution with water with low TDS or completely draining and refilling with fresh water. Testing for TDS levels requires a special test kit.

### Cyanuric Acid Testing

Test monthly. Cyanuric acid is commonly added to outdoor pools as a chlorine stabilizer or chlorine conditioner. The concentration of cyanuric acid must be monitored carefully to insure that the chlorine does not become over stabilized. **Cyanuric acid products are not recommended for indoor pools and spas, since the need for chlorine protection from the sun is not a concern** – however – many chemicals used in indoor pools and spas have small amounts of stabilizer (used as a binder or buffer in the manufacturer process) that can build up over time.. The acceptable range of cyanuric acid is generally between 30-80 ppm. Tests are based on turbidity (cloudiness) or metal fallout. Cyanuric acid is also called stabilizer, conditioner, and sun-screen. The only way to lower Cyanuric levels is to drain the pool or spa. Year round pools tend to have more challenges associated with iso-cyanurics than seasonal pool that drain their water and start fresh every year.

### Copper Testing

Test monthly. Copper found in pool water contributes to staining of pool walls, water discoloration and turns hair or nail cuticles of the pool users green or blue. Therefore, the recommended copper level is less than .02 ppm. If copper is present, maintaining a pH of 7.4 to 7.3 and a hardness of 350 ppm reduces the negative influences of copper.

### Iron Testing

Test monthly. Dissolved iron is responsible for staining and color problems in pool water and on pool surfaces. The addition of chlorine in an adequate concentration helps to precipitate out the iron and allows the DE filter to remove it. Sand filters will usually just keep recirculating the iron until it either ends up on the bottom of the pool or goes back into suspension. Products that claim to “hold the iron in suspension” are expensive and do not work well.

This information is provided by the IES Safety Committee