

# Swimming Pool and Spa Newsletter

Volume 1, Issue 1

July 2005

## Basic Swimming Pool and Spa Water Quality Parameters

The following table outlines the water quality parameters as set in the Ohio Public Swimming Pool, Spa and Special Use Pool Rules from the Ohio Administrative Code (OAC) Chapter 3701-31-01 to 08.

	Swimming Pool	Spa	Wading Pool
<b>Free Chlorine</b>	≥ 1.0ppm	≥ 2.0ppm	≥ 1.0ppm
<b>Bromine</b>	≥ 2.0ppm	≥ 2.0ppm	≥ 2.0ppm
<b>Combined Chlorine</b>	≤ 0.2ppm	≤ 0.2ppm	≤ 0.2ppm
<b>pH</b>	7.2 - 7.8	7.2 - 7.8	7.2 - 7.8
<b>Total Alkalinity</b>	≥ 60ppm	≥ 60ppm	≥ 60ppm
<b>Temperature</b>	≤ 90°F	≤ 104°F	≤ 90°F
<b>Turnover rate</b>	8 hours	30 minutes	2 hours
<b>Cyanuric Acid</b>	≤ 100ppm	≤ 100ppm	≤ 100ppm
<b>Total Dissolved Solids</b>	< 3000ppm	< 3000ppm	< 3000ppm

## What is Combined Chlorine?

The most common problem with indoor and outdoor pools is the level of combined chlorine. Rarely, during a pool inspection, is the combined chlorine level below 0.2ppm. So, what is this and what can you do about it?

### Combined Chlorine

Combined chlorine is chlorine that has reacted with nitrogen-containing compounds in perspiration and urine to form a group of compounds called chloramines.

It is not desirable because chloramines have very little bactericidal action, cause severe eye irritation, and have a strong chlorine-like smell.

### How do you determine the amount of combined chlorine?

The amount of combined chlorine present is determined with a common DPD test kit by subtracting the amount of free chlorine present from the amount of total chlorine present. The DPD titration kits measure free chlorine and combined chlorine, thus eliminating the math. The titration kits are more precise because they can measure the amount of chlorine in smaller increments. Color match kits are also subjective to the users color perception while titration kits are not.

### How can you get rid of combined chlorine?

To get rid of combined chlorine the pool is superchlorinated or shocked. When superchlorinating a pool it raises the level of the chlorine to 8 or 10ppm (or a level 10 times the level of combined chlorine). The chloramines are then converted to a gaseous substance that is dissipated into the air. The pH may need to be adjusted after superchlorination, and the pool should be closed through this process, until the chlorine level returns to normal. Superchlorination is also beneficial because it is a preventative form of algae control and will help to reduce other organic contaminants that may be present.

There is also a form of non-chlorine shock treatment in which a soluble, powdered oxidizer is added to the pool. This oxidizer converts chloramines and releases the free chlorine. The pH is not greatly affected and the pool may be open to the public within thirty minutes after application.



## Testing Pools and Spas

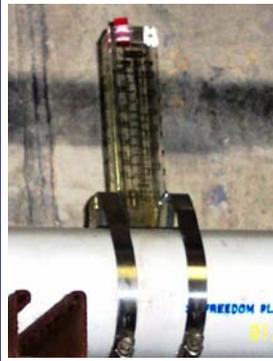
As many of you already know, an operator is responsible for testing the pool before opening and once every four hours during operation. If auto controllers are used then the initial test must be from a test kit and any additional readings may come from the auto controller.

### Daily Records

These readings, along with other information, must be recorded and kept in a daily log. Log sheets provided by the Ohio Department of Health are available upon request through the Health Department. Other items that must be recorded include information on injuries and operational data. Operational data ranges from fecal accidents to chemicals added. These records must be available for review during inspections and when requested. The licensee must keep the records on file for not less than one year.

### Test Kits

A DPD test kit must be on hand to test the physical and chemical water parameters. The kit shall include a means of measuring the concentration of chlorine or bromine, pH, total alkalinity, cyanuric acid (as applicable), and water temperature.



## Flow meters

It is very important that your flow meter operates properly in order to check the pool's turnover rate. The flow meter should be cleaned regularly to keep it in proper working order and must be installed correctly. Improper flow can be a major safety issue and can also indicate equipment failure or maintenance.

Using the table below I will provide two examples of calculations for maintaining a pool.

To superchlorinate

The pool volume is 80,000 gallons and they want to raise the level of chlorine 10ppm. Calcium hypochlorite will be used for the example. Starting with the chart 2 oz is used in 10,000 gal of water, but we need 80,000 gal so multiply each by 8. 16 oz for 80,000 gal  
So in an 80,000 gal pool 16 oz raises 1ppm, but we need to raise 10ppm so multiply each by 10. 160 oz raises 10ppm

One more example (using the same pool volume)

To lower pH .4 using muriatic acid  
12 fluid oz for 10,000 gallons (multiply by 8)  
96 fluid oz for 80,000 gallons  
In an 80,000 gallon pool  
96 fluid oz lowers .2 (multiply by 2)  
192 fluid oz lowers .4

## Dosages Required to Chemically Treat 10,000 Gallons of Water

Function	Chemical	Amount Changed	Amount needed
Increase Free Available Chlorine	Calcium Hypochlorite	1.0ppm	2.0 oz.
	Sodium Hypochlorite		13 fluid oz.
	Trichlor		1.5 oz.
	Dichlor		2.5 oz.
Neutralize Free Available Chlorine	Sodium Thiosulfate	1.0ppm	1.0 oz.
Increase Total Alkalinity	Sodium Bicarbonate (Baking Soda)	10ppm	1.5 lbs or 6 oz.
Increase pH	Sodium Carbonate (Soda Ash)	0.2	6 oz.
Lower pH (also lowers total alkalinity 5ppm)	Muriatic Acid	0.2	12 fluid oz.

