

# Water Chemistry Guidelines



CHLORINE: Free, Total, Combined...

*Q) What is the difference between Free, Total, and Combined chlorine?*

*A) When chlorine is added to your swim pool or spa, it is available as “free chlorine” which acts as a disinfectant. It is ready to attack and destroy bacteria, fungi and viruses that may be in the water.*

When **free chlorine** destroys bacteria in the swim pool or spa, it becomes known as “combined chlorine”. It is no longer available (free) to attack germs and disinfect the water.

The free chlorine plus the combined chlorine is called the “total chlorine”.

*How do I test for the different types of chlorine, and what results am I looking for?*

When you test for **free chlorine**, you are measuring the amount of chlorine that is available to act as a disinfectant. Take the **free chlorine** reading by following the instructions included in your kit.

- **Free chlorine** in a swim pool should always read 2.0ppm minimum--10ppm maximum. It's best between 3-5ppm
- **Free chlorine** in a spa or wading pool should read 3.ppm minimum--10ppm maximum. It's best around 4ppm

When you test for **combined chlorine**, you subtract the **free chlorine** reading from the **total chlorine** reading. This reading is important because combined chlorine is what causes possible skin irritation and burning discomfort to swimmer's eyes. When this happens, you must shock the pool (follow careful instructions). Shocking the pool and allowing the chlorine levels to come back down within acceptable range should rebalance the chlorine, making more available for use to disinfect.

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On the top of the "Daily Log Sheet", fill out the information pertaining to your facility. Write in the name of your facility, the address, check whether this log sheet is for a swim pool or spa, the name of the pool manager, the type of disinfectant used and the size of the pool. Use one sheet per pool and/or spa per month, recording the month and take daily reading, noting them on your log sheet. Also make sure to write down the year since you need to retain the records for at least three years.

## CHLORINE (in ppm)

*See below if you use Bromine* - The pool/spa should be checked routinely before opening, usually between 6A.M. and 9 A.M. Note the time you do this, even if you are very consistent.

The Free Chlorine residual is the amount of chlorine available to bond to and destroy bacteria, fungi and viruses. Follow the instruction included in your kit for Free Chlorine. The results and the time should be entered in the first column after the Date column.

The Combined Chlorine residual is the chlorine that combines with organics such as perspiration, urine, saliva and body oils. This combined form of chlorine, also called chloramines, is still a disinfectant but is 40 to 60% less effective than Free Chlorine.

To figure out the Combined Chlorine you must subtract the Free Chlorine residual from the Total Chlorine residual.

To find out the Total Chlorine residual follow the instructions included with your kit. *Note: There is no column set aside on the form to enter this test result-you may wish to alter the heading of one of the extra columns to provide this.* Once the liquid reagent has been mixed, observe the solution for any color change. It should never be lighter, but should always be either the same or darker in color.

If the color is the same, the Total Chlorine residual is the same as the Free Chlorine residual. Therefore your Combined Chlorine result is zero. For example, 1.0 ppm of Total Chlorine minus 1.0 ppm of Free Chlorine equals 0.0 ppm of Combined Chlorine. Using this example, you would enter 0.0 in the Combined Chlorine column for that day.

If the color is darker, the Total Chlorine residual is greater than the Free Chlorine residual. Therefore you have some Combined Chlorine. For example, 2.0 ppm of Total Chlorine minus 1.0 ppm of Free Chlorine equals 1.0 ppm of Combined

Chlorine. Using the results from this example, you would enter 1.0 ppm in the Combined Chlorine Column for that day.

**BROMINE** (in ppm) - *Cross out chlorine; write in bromine.* Follow the directions for your kit to find free bromine and record it in the former free chlorine column. With bromine there is no need to test for combined bromine, so leave that column empty.

**The pH column** (pH measurement is not followed by any descriptive unit.) Perform the pH test following your test kit directions; record the results in the pH column. If you take additional pH test during the same day, enter them in the "Miscellaneous Problems" column.

**Temperature column** (in degrees Fahrenheit)

Water temperature is important and needs to be recorded daily if you operate your pool or spa routinely above 95 degrees Fahrenheit. THE POOL OR SPA SHOULD NEVER BE ABOVE 104 DEGREES FAHRENHEIT!!

**Flow Rate** (in gallons per minute g.p.m.)

This reading is a visual one, usually from a clear plastic Lucite-type block installed on your circulation system piping. It is a good way to tell if something is seriously wrong with your pump system and it should be checked daily.

**Bather Load**-This column is used to estimate the number of users per day. The number of people using the pool is directly proportional to the amount of maintenance and chemicals needed to keep the pool/spa safely balanced. Since you are not there all day, an estimation is better than no data at all.

**Alkalinity**-Check the amount and record the results at least once every 7 days.

**Cyanuric Acid** (in ppm)

Excess cyanuric acid affects the effectiveness of chlorine. If you use any kind of "stabilized chlorine" such as di-chlor or tri-chlor type products for disinfecting, you need to test for and record the results at least once a week.

**Disinfectant column**

Here you will record how much and what type of disinfectant you added to the pool or spa. Note this on the corresponding date.

**Other Chemicals column**

Here you will record how much and what kind of "conditioner" algicides, calcium chloride, etc you added.

**Miscellaneous Problems**

Anything that you do or happens to the pool or spa that cannot be noted on any other column can go here.