blue devil™ Pool & Spa Accessories

POOL & SPA DELUXE TEST KIT

INFORMATION BOOKLET

Table of Contents

INTRODUCTION

We highly recommend reading this entire booklet before you use the kit to test your water.

A test kit is one of the most important tools for the proper care of your pool or spa. It will aid you in maintaining the hygienic conditions of the water, and help prevent problems which can damage your pool or spa and related equipment. This booklet is designed to help you understand basic chemical management and the reasons for testing.

Your pool supply store is the best source of advice on the variety of chemicals available, and their proper use in your type of pool or spa.

Your test kit will serve you faithfully for many years if you:

1. Store it in a cool, dark place when not in use.
2. Always use fresh test solutions when starting your season of use. Refill solutions are relatively inexpensive, and should be available at your pool supply store.

The solutions in the test kit each have a label which warns of hazard for careless or improper use. In all cases, handle the solutions with care and keep test solutions out of reach of children.

DETERMINING POOL OR SPA TOTAL WATER CAPACITY

It is important to know the water capacity of your pool or spa so you can determine the proper amount of chemicals you will need to add to the water.

Circular Shape - diameter x diameter x average depth x 5.9* = _____Total Gallons
Oval Shape - length x width x average depth x 5.9* = _____Total Gallons
Rectangular or Square Shape - length x width x average depth x 7.5*=_____Total Gallons

Free Form Shape - if possible use combinations of the above shapes to compute total gallons. Or calculate, as close as possible, the square footage of the surface area x average depth x 7.5* to determine total gallons.

Note: If the sides are sloping, multiply the total gallons you have determined above by x 0.85

Total Gallons in Pool _____ Total Gallons in Spa _____

*** For metric conversion (using meters for dimensions) substitute 831 for 5.9 and 1,000 for 7.5 to obtain total liters.**

TEST RELATED DEFINITIONS

The brief definitions which follow will be expanded, for the most part, in the text which follows these definitions. The terms will be more meaningful as they directly apply to each subject category.

Acid/pH Decreaser - a chemical additive which is used to lower the pH (acidity-alkalinity balance) of the water.

Acid/Base Demand - a test result which indicates how much acid or soda ash/pH increaser (if any) should be added to the water to provide a balanced proportion of acid to alkaline materials.

Algae - plant-like organisms which grow in water. These organisms are particularly active in growth during warm weather, warm water conditions, and where the disinfectant level is too low to destroy them. Algae may be green, brown or black in color.

Alkalinity - a combination of natural minerals in the water. The opposite of acidity on a measurement of pH.

Bacteria - undesirable organisms with the potential to cause disease if not controlled by disinfectant additives.

Bromine - a chemical disinfectant, similar to chlorine which is used to control bacteria and algae.

Chlorine - a chemical disinfectant, which is used to control bacteria and algae.

Chlorine Demand - the amount of chlorine (if any) that should be added to the water to provide proper bacteria and algae control.

Chlorine Residual - the amount of chlorine left over after the "demand" has been met.

Combined Chlorine - weak chlorine which is combined with the contaminants in the water.

Free Chlorine - active chlorine in the water with the potency to destroy contaminants.

pH - the measure of acid to alkaline proportions in the pool or spa water.

Hardness - dissolved minerals, generally calcium and magnesium present in pool or spa water.

PPM - parts per million. Some test kit numerical readings (chlorine and total alkalinity) indicating the parts per chemical type in a million parts water.

Scale - a visible mineral buildup on pool or spa surfaces as a result of pH being too high.

Shock Treatment - the removal by means of oxidation of those materials that have a chlorine or bromine demand.

Soda Ash - an additive which is used to raise the pH of the water.

Sodium Bicarbonate - an additive which is used to increase the total alkalinity or pH of the water.

Superchlorination - an extra large amount of chlorine added to the water.

Total Alkalinity - the indicator of how stable the pH will be over a period of time.

DISINFECTANTS

Chlorine and Bromine are effective disinfectants for use against bacteria and algae problems in your pool or spa water. These contaminants arrive in your pool or spa in a number of ways, and become more of a problem as temperatures rise. Chlorine and Bromine are available in a number of forms. Each form has its own particular application. The best source of information on the proper disinfectant for your specific need is your pool supply store.

Chlorine demand or bromine demand refers to the quantity of chlorine and bromine consumed in the process of destroying bacteria, algae and other oxidizable material in pool or spa water. The demand will change as a result of pool or spa usage, weather condtions, and by the pH of the water. For proper dosages of disinfectants you must know the water capacity of your pool or spa. Instructions on page 2 will help you determine total water capacity.

Chlorine residual or bromine residual is the term used for the amount of disinfectant in your pool or spa at the time it is tested. Chlorine residual is made up of free chlorine and combined chlorine.

Free bromine is immediately available as a disinfectant and sanitizer; no difference is noted between free and combined bromine. Chlorine however exists in two types; free and combined as explained below.

- **Free chlorine** is the fully potent amount of chemical which is immediately available in the water to actively attack and destroy in coming bacteria and algae. If the water contains no free chlorine, then only the chlorine in the water is combined chlorine.
- **Combined chlorine** is a weak, ineffective form that develops as chlorine combines with certain contaminants in the water. This combined chlorine (sometimes called chloramines) is only 1/15th the strength of free chlorine and has little disinfection or algaecidal capability.

Your test kit will indicate both free and combined chlorine. The free chlorine residing is indicated in the first part of the test, and total chlorine (free and combined) in the second part. Subtract the free chlorine reading from the total chlorine reading to obtain the combined chlorine reading. The card accompanying your test kit provides step-by-step instructions for the chlorine test. A free chlorine reading between 1.0 and 1.5 indicates the ideal content of pool water and 3.0 to 5.0 for spas. If the test indicates a higher reading, your friends and family may experience discomfort - the pool or spa should not be used above these readings. If the test indicates a reading below 1.0 for pools , or 3.0 for spas you should add chlorine in the proper dosage to bring the water into the ideal range.

NOTE: For bromine use, the recommended levels are: pools 2.5 to 4.5 and spas 3.5 to 6.8.

The best time to add a disinfectant is in the evening. It will work overnight without being dissipated by the sun. Additionally, chlorine is most effective when the pH is in balance.

SUPERCHLORINATION/SHOCK TREATMENT

From time to time you should superchlorinate or shock treat your pool or spa water. This is accomplished by adding an extra large dose of chlorine, or a non-chlorine shock treatment compound to the water. Superchlorination or shock treatment is used to destroy the organic contaminants in the water. Superchlorination will prohibit the use of your pool or spa for a period of time, while a non-chlorine shock treatment will not.

There are two basic reasons for superchlorinating. One - if algae gets out of control, you need a heavy concentration of free chlorine to bring it under control. Two - when it is desirable to break the contaminants out of the combined chlorine. You should discuss proper application of chemicals for your particular pool or spa with your pool supply store.

Non-chlorine oxidizers are also used to break contaminants out of combined chlorine without raising the concentration of chlorine. Their use should be discussed with your pool supply store.

Stabilizers/Conditioners are terms given to a compound which, when added to water, acts as a sort of sun shield. The sun hastens the dissipation of chlorine. Stabilizers/conditioners slow down this dissipation. Chlorine is then present in the water for a longer period of time. Discuss their use with your pool supply store.

pH

pH is the proportion of acid to alkaline content in the water of your pool or spa. pH can change by reason of rainfall, dust, refill water and by the additives you use. The proportions of acid to alkaline content of your water can be determined by testing, and can be adjusted by chemical additives. It is essential, before using additives, that you know the total water capacity of your pool or spa. The information on page 2 will be helpful in determining this. Be sure to follow the chemical manufacturer's recommendations for dosage as applied to the total water capacity of your pool or spa. When acid/alkaline proportions are adjusted for pool or spa use, pH is "in balance."

Water can be either alkaline or acidic. The degree of concentration of alkaline materials will vary by geographical location. A heavy concentration of alkaline material (high pH) in the water will result in:

- Scale or hard deposit buildup on pool or spa surfaces, coils of heating systems, and blocking of the filtration system
- Inability of disinfectant to destroy bacteria and algae

Adding acid to the water reduces its alkaline content in a proportional manner. Acid must be added in a controlled amount. If too much acid is added to the water, or the pH is too low for any reason it can result in:

- Eye and nose irritation
- Etching (eating into) plaster or lining surfaces of the pool or spa
- Corrosion of metal such as ladders, recirculation and filtration equipment
- Rapid dissipation of disinfectant

Use acid additives to counteract a high pH condition, and soda ash or sodium bicarbonate to counteract a low pH condition.

Consult your pool supply store for the proper chemicals and the proper form of the chemical which is best suited for use in your pool or spa.

The measurement of pH is in numerical terms. Strongly acidic = 0, while strongly alkaline = 14. pH "in balance" for pool and spas should be between a 7.2 and 7.8 reading. Your test kit numerical readings cover 6.8 to 8.2 with associated color matching strips. Corrective instructions are shown with the numerical values.

pH related chemicals should not be added to pool or spa water at the same time as disinfectant related chemicals. pH related chemicals are best added in the morning - disinfectants in the evening. You will find a guide to pH adjustment dosages on the last pages of this booklet.

TOTAL ALKALINITY

This test indicates the pool water's ability to resist abrupt changes in the pH. The ideal range is 80-120 PPM for plaster finished pools, or 120-150 PPM for painted or fiberglass pools. If it is high, the pH will "bounce" up quickly. If it is too low, the pH can drop to a corrosive state easily.

If the total alkalinity is too high, acid should be added whenever the pH allows. To raise alkalinity add sodium bicarbonate (baking soda).

HARDNESS

(Dissolved Calcium and Magnesium in pool water)

Your water source will have a certain amount of natural hardness and through evaporation the hardness will build up in the pool water. A high level of hardness in the presence of high alkalinity can cause scale to form on pool walls and in heater pipes. Insufficient levels of hardness may promote corrosion. The recommended level is 200-400 PPM.

To reduce the hardness, drain a portion of your pool water and refill. If your hardness level is too low, consult your pool supply dealer for advice.

TESTING GUIDELINES

1. Test on a regular basis. Pools, and particularly spas, should be tested daily. It is especially important to run tests after heavy use, substantial rainfall, strong winds and any nearby fertilizing activity.

2. Test during daylight hours. Natural lighting provides the most accurate environment for test kit comparator color matching. Make your color comparisons in a shaded (not dark) area. The white side of the plastic card which slides into your test cell is an excellent background for your color comparison.

3. Care of your test cell unit. When not in use, always keep test cell in the test kit container. This will help ensure the integrity of the color indicators and protect the unit from being damaged. Keep your test kit in a cool, dark place when not in use. The test cell unit should be rinsed before and after use in your pool or spa water. Any other method of cleaning may result in inaccurate test results. Do not discard test chemicals in your pool or spa.

Test solutions lose strength and therefore should be replaced yearly.

Step-by-step instructions for each test are provided on an accompanying card.

BASE DEMAND/pH INCREASER CHART

OPTIONAL TEST NOT INCLUDED IN ALL DELUXE KITS

To increase pH using the base demand procedure, add the amounts of pH increaser/soda ash (sodium carbonate) as shown in the table below.

VOLUME IN GALLONS	NUMBER OF DROPS OF BASE DEMAND SOLUTION #6										VOLUME IN LITERS
	1	2	3	4	5	6	7	8	9	10	
2,500	1.25 oz.	2.5 oz.	3.75 oz.	5.0 oz.	6.25 oz.	7.5 oz.	8.75 oz.	10.0 oz.	11.25 oz.	12.5 oz.	10,000
5,000	2.5 oz.	5.0 oz.	7.5 oz.	10.0 oz.	12.5 oz.	15.0 oz.	1.1 lb	1.25 lb.	1.4 lb.	1.6 lb.	20,000
10,000	5.0 oz.	10.0 oz.	15.0 oz	1.25 lb.	1.6 lb.	2.0 lb.	2.25 lb.	2.5 lb.	2.8 lb.	3.2 lb.	40,000
15,000	7.5 oz.	15.0 oz.	1.4 lb.	1.8 lb.	2.3 lb.	2.8 lb.	3.3 lb.	3.8 lb.	4.2 lb.	4.8 lb.	60,000
20,000	10.0 oz.	1.25 lb.	1.8 lb.	2.5 lb	3.2 lb.	4.0 lb.	4.5 lb.	5.0 lb.	5.6 lb.	6.4 lb.	75,000
30,000	15.0 oz	1.9 lb.	3.0 lb.	3.75 lb.	4.8 lb.	6.0 lb.	6.75 lb.	7.5 lb.	8.4 lb.	9.6 lb.	115,000
50,000	1.6 lb.	3.2 lb.	4.8 lb.	6.25 lb.	8.0 lb.	10.0 lb.	11.5 lb.	13.0 lb.	14.5 lb.	16.0 lb.	190,000
100,000	3.2 lb	6.4 lb.	10.0 lb	13.0 lb.	16.0 lb.	20.0 lb.	23.0 lb.	26.0 lb.	29.0 lb.	32.0 lb	380,000
SPAS											
250	0.1 oz.	0.25 oz.	0.35 oz.	0.5 oz.	0.6 oz.	0.75 oz.	0.8 oz.	1.0 oz.	1.1 oz.	1.25 oz.	1,000
500	0.25 oz.	0.5 oz.	0.75 oz.	1.0 oz	1.25 oz.	1.5 oz.	1.75 oz.	2.0 oz.	2.25 oz	2.5 oz.	2,000

1 Heaping Tablespoon = 1 oz. - 1 Heaping Teaspoon = 1/4 oz.

ACID DEMAND CHART

LIQUID ACID/pH DECREASER REQUIREMENT

oz = ounce C = cup P = Pint Q = Quart 2Cups = 1Pint 2Pints = 1Quart 4Quarts = 1Gallon

Pool Capacity in Gallons	NUMBER OF DROPS OF SOLUTION #3															Pool Capacity in Liters
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
250	1/5 oz.	2/5 oz.	3/5 oz.	4/5 oz.	1 oz.	1-1/5 oz.	1-2/5 oz.	1-3/5 oz.	1-4/5 oz.	2 oz.						1,000
500	2/5 oz.	4/5 oz.	1-1/5 oz.	1-3/5 oz.	2 oz.	2-2/5 oz.	2-4/5 oz.	3-1/5 oz.	3-3/5 oz.	4 oz.						2,000
1,000	4/5 oz.	1-3/5 oz.	2-2/5 oz.	3-1/5 oz.	4 oz.	4-4/5 oz.	5-3/5 oz.	6-2/5 oz.	7-1/5 oz.	8 oz.						4,000
2,500	1/4 C	1/2 C	3/4 C	1 C	1-1/4 C	1-1/2 C	1-3/4 C	2 C	2-1/4 C	2-1/2 C	2-3/4 C	3 C	3-1/4 C	3-1/2 C	3-3/4 C	10,000
5,000	1/2 C	1 C	1-1/2 C	1 P	2-1/2 C	3 C	3-1/2 C	2 P	2-1/4 P	2-1/2 P	2-3/4 P	3 P	3-1/4 P	3-1/2 P	2 Q	20,000
10,000	1 C	1 P	1-1/2 P	1 Q	2-1/2 P	3 P	3-1/2 P	2 Q	1-1/2 P	2-1/2 Q	5-1/2 P	3 Q	3-1/4 Q	3-1/2 Q	1 G	40,000
15,000	1-1/2 C	1-1/2 P	2-1/4 P	3 P	2 Q	2-1/4 Q	2-1/2 Q	3 Q	3-1/2 Q	1 G	1 G	4-1/2 Q	1-1/4 G	1-1/4 G	1-1/2 G	60,000
20,000	1 P	1 Q	3 P	2 Q	2-1/2 Q	3 Q	3-1/2 Q	1 G	4-1/2 Q	1-1/4 G	5-1/2 Q	1-1/2 G	1-1/2 G	1-3/4 G	2 G	75,000
25,000	1-1/4 P	2-1/2 P	2 Q	2-1/2 Q	3 Q	1 G	4-1/2 Q	1-1/4 G	1-1/2 G	1-1/2 G	1-3/4 G	2 G	2 G	2-1/4 G	2-1/4 G	95,000
30,000	1-1/2 P	3 P	2-1/4 Q	3 Q	1 G	4-1/2 Q	1-1/4 G	1-1/2 G	1-3/4 G	2 G	2 G	2-1/4 G	2-1/2 G	2-3/4 G	2-3/4 G	115,000
35,000	1-3/4 P	3-1/2 P	2-3/4 Q	3-1/2 Q	4-1/2 Q	1-1/4 G	1-1/2 G	1-3/4 G	2 G	2-1/4 G	2-1/2 G	2-3/4 G	2-3/4 G	3 G	3-1/4 G	135,000
40,000	1 Q	2 Q	3 Q	1 G	1-1/4 G	1-1/2 G	1-3/4 G	2 G	2-1/4 G	2-1/2 G	2-3/4 G	3 G	3-1/4 G	3-1/2 G	3-3/4 G	150,000
50,000	1-1/4 Q	2-1/2 Q	1 G	1-1/4 G	1-1/2 G	2 G	2-1/4 G	2-1/2 G	2-3/4 G	3 G	3-1/2 G	3-3/4 G	4 G	4-1/2 G	5 G	190,000

Dry Acid/pH Decreaser Equivalents

4/5 oz. Liquid Acid = 1 oz. Dry Acid
1 Cup Liquid Acid = 10 oz. Dry Acid
1 Quart Liquid Acid = 40 oz. Dry Acid

1 oz. Liquid Acid = 1-1/4 oz Dry Acid
1 Pint Liquid Acid = 20 oz. Dry Acid

Metric Conversion (liquids)

1 U.S. Gallon (128 oz.) = 3.785 Liters
1 U.S. Pint (16 oz.) = 473 milliliters
1 U.S. fluid oz = 30 milliliters
1 Liter = 4.2 Cups
1 Liter = 1.04 U.S. Quarts

1 U.S. Quart (32 oz.) = 946 milliliters
1 Cup (8 oz) = 236 milliliters
1 Liter = 33.3 fluid oz.
1 Liter = 2.1 U.S. Pints
1 Liter = 0.26 U.S. Gallons

Metric Conversion (dry weights)

1 U.S. Pound (16 oz) = 454 Grams
1 Kilogram = 2.2 pounds

1 U.S. oz = 28.3 Grams
1 Gram = .035 U.S. oz

B10251

blue devil Pool & Spa Accessories™

Valterra Products, LLC
15230 S.F. Mission Blvd., #107
Mission Hills, CA 91345
www.valterra.com

VALTERRA®