CHLORINE GUIDE

Every swimming pool in Thailand pool has a different requirement. Recommendations, suggestions or statements made here are intended for the assistance of our customers. They are based upon our experience and judgement and on California state and Australian state laws for school, public, and commercial pools and spas, but must not be regarded as amounting to a legal warranty or as involving any liability on our part and must be read in conjunction with and subject to our conditions of sale.

TABLE OF CONTENTS

Introduction	2
Chlorine demand and free chlorine residual	2
Powder	3
Granules	3
Tablets	3
Dosing systems for tablets	3
Filling a new pool	4
Dosing	4
What is the right level of chlorine?	4
Testing the chlorine level	4
Super chlorination - 'shocking'	5
Cyanuric acid chlorinestabiliser	6
Further information, support, and contact	6

INTRODUCTION

Most swimming pools in Thailand are sanitised by using chlorine. Chlorine eliminates bacteria and algae by **disinfecting** (killing) action, it also **oxidizes** (chemically destroys) other materials such as dirt and chloramines.

If the pH level is not correct, chlorine just won't work. The recommended pH is from 7.2 –to 7.6. Maintain at 7.2 for best performance when using a salt water chlorinator
To lower the pH, use ***pH Minus***; to raise it use ***pH Plus.***

At temperatures above 25.5°C (78°F) chlorine dissipates faster, algae grows faster, and the formation of scale (calcium carbonate deposits) is more likely to occur.

When chlorine (in any form, including by salt water chlorinators) is added to water, a weak acid called Hypochlorous Acid is produced. It is this acid, not the chlorine, which gives water its ability to oxidize and disinfect. Proper chlorination and filtration give pool water its clear, sparkling appearance.

Chlorine exists as a solid, a liquid and a gas. The strength of each type is determined by the amount of chlorine within the material that is effective both as a disinfectant and an oxidizer.

1. **Liquid chlorine:** (sodium hypochlorite) contains 12–16% available chlorine. (By contrast, household bleach generally contains about 5% available chlorine.) Liquid chlorine is not stabilized and is not recommended for use in swimming pools.

2. **Solid chlorine:** Trichloroisocyanuric acid. (powder, granules, tablets) Chlorinated Isocyanurate– varying percentages of available chlorine such as 90% T.C.C.A (stabilised chlorine for pools (90%).

3. **Solid Chlorine:** Calcium Hypochlorite– 65–75% available chlorine

4. **Solid chlorine:** Lithium Hypochlorite – 30–35% available chlorine

5. **Gaseous Chlorine:** contains 100% available chlorine. Produced by saltwater chlorination systems. This substance is highly toxic and therefore requires special procedures when it is used. .

CHLORINE DEMAND and FREE CHLORINE RESIDUAL

As chlorine is introduced into pool water, a portion is always consumed during the processes of disinfection and oxidation. That portion of available chlorine consumed is referred to as chlorine demand.

The hypochlorous acid left after the chlorine demand has been satisfied is referred to as the free chlorine residual. US and Australian laws require that the free chlorine residual be at least 1.0 ppm throughout the pool at all times (1.5 ppm if stabilized chlorine is used). It is recommended that a residual of 1.5 – 2.5 be maintained with unstabilized chlorine; 2.0 – 2.5 with stabilized chlorine. (See *Cyanuric Acid*).

Note that basic chlorine test kits only show the Total (combined) Chlorine level. This is the total of both the free chlorine and the spent chlorine but it is generally sufficient for most domestic situations.

POWDER

Our PoolChlor brand chlorine powder is the best quality and value currently available in Thailand.(see 'other brands' below). Available in 5Kg, 20Kg, 50Kg.

Powder dissolves quickly and is used quickly. Best for use in emergencies and when filling or refilling a pool.

GRANULES

Our PoolChlor brand granulated chlorine is the best quality and value currently available in Thailand.(see 'other brands' below). Available in 5Kg, 20Kg, 50Kg.

Granules dissolve slightly slower than powder. Usually used for regular dosing but tablets in a fixed tablet dispenser would be a better option for any pools with a volume over 20m^3

TABLETS

Our PoolChlor brand tablets are the best quality and value currently available in Thailand. They contain no unnecessary binders or fillers. Available in 1Kg, 5Kg, 20Kg, 50Kg. Packed in 1Kg PVC tubes inside the buckets or barrels

Generally, as powders and granules dissolve very quickly, they are not used for the regular twice weekly addition of chlorine to maintain the correct level. Tablets dissolved at a carefully designed rate, releasing chlorine slowly in order to maintain he correct level over a longer period. Typically, a 3-inch pool chlorine tablet is designed to chlorinate from 28m^3 to 38m^3 (7,500 to 10,000 gallons US) of water per week (typically about 4 x 6m to 4 x 9m small dip pool), meaning it will take about seven days to dissolve. Water moving over chlorine tablets, as happens in a chlorinator or with tablets designed to be placed in the skimmer, causes them to dissolve more quickly.

To use the right number of tablets, always round your pool volume up to the nearest unit of 5,000 gallons. For instance, your pool has a capacity of 75m^3 (20,000 gallons,) you would add four chlorine tablets. But if your pool holds just 60m^3 (16,000 gallons,) you'd still use four, three-inch chlorine tablets. Slow dissolving chlorine systems and automated chlorine dispensing systems will only work when the pool water is already boosted to the correct levels of both chlorine and pH. In other words, tablets and auto systems maintain what is already there.

Tablets are obviously slightly more expensive than powder or granulated chlorine, but the value is in their convenience and ease of use once the pool water is set up correctly.

DOSING SYSTEMS for tablets

Floating dispenser for tablets

Permanet installed chlorine tablet dispensers

Tablets can be placed in the skimmer basket but the fast passage of water over them can cause them to dissolve too quickly. In very small pools and spas a floating chlorine dispenser is a very economical solution. For larger pools, specially designed chlorine tablet dispensers are not expensive and can easily be plumbed into the system in the pump house.

FILLING A NEW POOL

To get a new pool or a new fill of water up to the correct level in just 24 - 48 hours, we recommend using chlorine powder which will dissolve very quickly. Whatever the method of chlorination, a pool should aways be shock chlorinated once a month.

DOSING

At SwimmingPoolsThailand we sell only the high quality Poolchlor™ and the premium Nissan™ brands. These are superior to most other brands found in Thailand. Our prices may reflect this better quality but are nevertheless highly competitive.

Chlorine dosage should be between 1.5 and 2 mg of chlorine / liter.
Thus, for a 40m³ pool or 40 000 liters, must be permanently chlorine 80g or at least one or two 200gr tablet every 7 days.

Always calculate the volume to include the volume of the balance tank in overflow pools.

What is the right level of chlorine?

Regardless of how frequently or what system you use to add chlorine to the water, the chlorine level should stay between **1.0 and 3.0 parts per million (ppm)** to maintain a healthy pool. Any higher will make you to run the risk of red eyes and swimmers itch.

For pools using stabilized chlorine (based on cyanuric acid) T.C.C.A 90%:
- Free chlorine preferably 2 mg / l
- Combined chlorine not exceeding 0.6 mg / l total chlorine.
- Maintain a pH between 7.2 (preferred), and 7.6.
- Ideal isocyanuric acid levels of 20 to 30 mg / l (acceptable 30 to 60 mg / l, overbased saturated and above 75 mg / l). Chlorine dosage: 5 gr per m3 (1,000 l) per day

Examples of daily dosage
32 m³ (4 x 8, 2 x 10,etc) = 160gr/day
40 m³ (8 x 5, 4 x 10, etc.) = 200 gr/day
70 m³ (6 x 12, etc) = 350 gr/day
100 m³ (6 x 18 etc.) = 500 gr/day
200 m³ (10 x 20 etc.) = 1,000 gr (1 kg)/day
300 m³ (12 x 25 etc.) = 1,500 gr (1.5 kg)/day
400 m³ (20 x20 etc.) = 2,000 gr (2 kg)/day

Testing the chlorine level

Free chlorine is the amount of chlorine available to clean your pool water. It's present when you add chlorine directly to your water, or when it's created by a salt water chlorinator. *Combined chlorine* is the amount of chlorine that's been used up. *Total chlorine* is the sum of free and combined chlorine.Two methods are commonly available. Generally an inexpensive colorimetric titration method test is part of the standard Test Kit which also includes a test for pH, is sufficient for smaller domestic pools and will show the Total Chlorine. More expensive testers are available with a digital read out and are available for Total Chlorine and Free Chlorine. ORP (Oxydation Reduction Potential) digital readers are available but they are quite expensive and require the use of conversion tables.

Monitor chlorine levels at least once a week, or twice weekly in more heavily used pools.

CHLORINE DOSING SYSTEMS

Saltwater chlorinators are a very popular and accurate method of introducing chlorine to a pool. Because they only use inexpensive salt (which turns back to salt in the pool after the chlorine is used), they are far more economical than buying chlorine although they are relatively expensive to buy and the replacement titanium electrodes every 3 years can be costly. Installation can be carried out very easily. Liquid chlorine is only used in commercial systems with expensive computerized ORP controlled dosing systems.

SUPERCHLORINATION ("Shocking")

Some of the available chlorine will react with nitrogen–containing compounds to form chloramines (combined chlorine). A common source of nitrogen is ammonia, produced from perspiration and urine. Chloramines give off a strong chlorine odor and are irritating to the eyes. The presence of these two conditions leads many people to believe that there is too much chlorine in the water; actually just the opposite is true. In order to eliminate the chloramines the pool operator must raise the chlorine residual to 5 to 10 times the normal level. This procedure, called superchlorination or "shocking", oxidizes the chloramines, leaving only the free chlorine. Depending on swimmer loads, it is recommended that a pool be superchlorinated as often as once a week in hot weather and once a month otherwise, in order to control the formation of chloramines. (Note: bathing should be prohibited until normal levels are restored.)

Calcium hypochlorite $Ca(ClO)_2$ is a non-stabilised (no CYA) fast-acting and commonly used to sanitize public swimming pools and disinfect drinking water. Generally the commercial substance is sold with a purity of a 65 to 73% with other chemicals present, such as calcium chloride and calcium carbonate, resulting from the manufacturing process. Non stabilised - use if you do not want to increase the CYA level. Best for shocking pools that are manually chlorinated with T.C.C.A powder, granules, or tablets, **NOTE**: Frequent use of Cal Hypo will increase the Calcium Hardness of the water.

Sodium dichloroisocyanurate is a chemical compound widely used as a cleansing agent and disinfectant. Ideal for for shocking pool with salt water chlorinators, or starting a new pool or a newly filled pool. It is mainly used as a disinfectant, biocide and industrial deodorant. It is found in some modern water purification tablets/filters. In these applications, it is a slow-release source of chlorine in low concentrations at a relatively constant rate. As a disinfectant, it is used to sterilize drinking water, swimming pools, tableware and air, and to fight against infectious diseases as a routine disinfection agent.

CYANURIC ACID (CYA) chlorine stabilizer

Cyanuric acid is used as a chlorine stabilizer in swimming pools. It binds to free chlorine and releases it slowly, extending the time needed to deplete each dose of sanitizer by preventing chlorine 'burn off' by the sun's UV rays.

Particularly important in outdoor pools in tropical climates, most chlorine products sold for pools, 90% T.C.C.A. in powder, granule, or tablet form, already include it. That's why its chemical name is *Trichloroisocyanuric Acid*.

Bacteria in the presence of cyanuric acid are destroyed at a slower rate. Therefore, when a pool has been stabilized the free chlorine residual must be maintained above 1.5– ppm minimum to offset this phenomenon.

CYA is not in the chlorine produced by saltwater chlorinators. It must be added manually. However, only very small quantities are required.

Using T.C.C.A over a period of time will build up the level of CYA, and hence increase the pH. CYA does not get used up, it stays in the pool water. Above a certain level, CYA will actually block the function of chlorine. The recommended maximum level is 50ppm. If levels rise above 100ppm, a portion of the pool water must be removed and fresh water added; there are normally no other means of reducing the cyanuric acid in a pool, but here in Thailand, heavy rain showers will do this quickly enough.

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We provide pool water correctional and maintenance services, on-site repairs, and the installation of new equipment purchased through our online store or through our regional shops and agents

For further questions about using our chemicals, don't hesitate to mail us at sales@swimmingpoolsthailand.com

or call us at, SwimmingPoolsThailand, we speak English, French, German, Swedish, and Thai

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