

## Description

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Consistently maintaining proper water quality readings will keep your pool crystal clear and inviting. It will also prevent the occurrence, severity, and frequency of unwanted water quality issues. The following document highlights the important water quality parameters and serves as a "How To" instruction set for dosing, adjusting levels, and troubleshooting.

## Chemical Safety

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**When using chemicals, read the labels carefully and follow the directions precisely. Failure to do so could result in damage to your pool and/or injury.**

**Though chemicals protect you and your Endless™ Pools product, when used correctly, they can be hazardous in concentrated form. Always observe the following guidelines:**

- Allow only a qualified person to handle pool chemicals.
- Keep chemicals out of the reach of children and pets.
- Accurately measure the exact quantities specified, never more.
- Handle all chemicals with care. Store in a cool, dry, well, ventilated space.
- Always keep chemical containers closed when not in use. Replace caps on their proper containers.
- Never mix chemicals.
- Do not inhale fumes, or allow chemicals to come in contact with your eyes, nose, mouth. Wash your hands immediately after use.
- In case of accidental contact, please follow the emergency advice on the product label. Please contact a doctor or the local Poison Control Center if the chemical is swallowed.
- Do not let chemicals get on surrounding surfaces or landscaping. Do not use vacuum cleaner to clean up chemical spills.
- Never smoke around chemicals. Some fumes can be highly flammable.

## Chemical Overview

PARAMETER	WHAT IS IT AND WHY IT'S IMPORTANT
CHLORINE	<p>Chlorine is the chemical that prevents the growth of algae and any single-celled organisms. It acts as both a sanitizer and an oxidizer. When chlorine is added to the water it is called "free" or "available" chlorine which will kill any pathogen it comes in contact with (sanitizing) and burn up or remove any organic compound (oxidizing).</p> <p>For indoor pools, we recommend liquid chlorine or household bleach (Sodium Hypochlorite) with no additives. Do not use any form of bleach that is labeled as "splash-less." For outdoor pools, we recommend a granular stabilized chlorine (Sodium Dichlor).</p> <p>If the chlorine is too low, it can result in cloudy water and can allow microbes to grow and thrive in the pool water, making your pool unhealthy and unsanitary. If the chlorine is too high, it can break down the liner color/pattern and it can leave deposits on the liner and components in the pool.</p>
pH	<p>The pH is the measure of the acidity or alkalinity of the water which is one of the most important elements of the water chemistry. The ideal pH is 7.5 (acceptable being between 7.4 - 7.8).</p> <p>A low pH can cause corrosion to pool equipment such as pumps, heaters, grab bars, fasteners, etc. In addition, a low pH can result in eye and skin irritation. A high pH can cause any free chlorine in the pool to be less effective resulting in cloudy water. Many minerals come out of the water as the pH rises, leading to deposits that can build up on surfaces.</p>
TOTAL ALKALINITY	<p>The pH and total alkalinity are closely related. Alkalinity is the measurement of alkaline substances in the water. This translates into the measurement of the water's ability to resist a change in pH.</p> <p>A low total alkalinity level will cause pH bounce; which is pH being overly susceptible to changing quickly and drastically. A high total alkalinity level is associated with high pH and the water will be resistant to a change in the pH levels.</p>
CALCIUM HARDNESS	<p>Calcium hardness is the measurement of the calcium ion in the water. If the calcium level is too low, the water will be considered soft. Soft water will try to leach calcium from anything it touches which can shorten the lifespan of the pool equipment, especially the liner. If the calcium level is too high, the water will be considered hard. Hard water can cause scaling and cloudy water.</p> <p>It is important to test a sample of the source water prior to filling the pool to determine if the water is "soft" or "hard." The calcium hardness can be raised but not lowered without draining and refilling with fresh water that is within the acceptable hardness range.</p>
CYANURIC ACID	<p>Cyanuric Acid (CYA) is known as chlorine stabilizer which reduces the sun's impact on chlorine loss for outdoor pools. When using a "stabilized" chlorine, CYA levels can build up over-time which can reduce the effectiveness of the chlorine. There are also health concerns if CYA is too high.</p>
TOTAL DISSOLVED SOLIDS	<p>Total Dissolved Solids (TDS) is the measure of all substances dissolved in the water. TDS will naturally build up over-time which can impact the effectiveness of other chemicals in the pool. When TDS levels are above 2500ppm, it's recommended to do a partial drain and refill.</p>

## Chemical Balancing Tips

Maintaining the water quality is the responsibility of the user. Keeping the water balanced, per the recommendations, prolongs the life of the equipment. Keeping accurate logs of the water quality readings can aid in correcting any issues that do arise. The last two pages of this document can be used to keep a log of your readings.

RECOMMENDED LEVELS			
PARAMETER	TARGET	MIN - MAX RANGE	
CHLORINE	1 ppm	.5 ppm	3 ppm
pH	7.5	7.4	7.8
ALKALINITY	100 ppm	80 ppm	120 ppm
HARDNESS	180 ppm	180 ppm	250 ppm
CYA	30	20	50

\* TDS should be less than 2500 ppm (3000 ppm) MAX

TESTING SCHEDULE			
PARAMETER	EVERY USE	WEEKLY	EVERY MONTH
CHLORINE	X		
pH	X		
ALKALINITY		X	
HARDNESS			X
CYA			X

\* TDS should be tested initially and annually

PARAMETER	HOW TO DOSE/ADJUST	WHAT TO DO IF...
CHLORINE	<p><b>To raise the chlorine:</b> For indoor pools, use liquid chlorine or non splash-less household bleach (Sodium Hypochlorite). For outdoor pools, use a granular stabilized chlorine (Sodium Dichlor).</p> <p><b>To lower the chlorine:</b> Allow the pool to naturally remove the chlorine without adding more or "use up" the available free chlorine by using the pool.</p> <p><b>When dosing:</b> Starting with small amount, pour chlorine into the swim current (if present) or in front of the eyeball return fitting. Wait a few hours and retest chlorine. Add chlorine if necessary.</p>	<p><b>The chlorine level is consistently low:</b> If you have an outdoor pool, make sure you're using a stabilized chlorine which protects the chlorine from being burned up by the sun's UV rays. If you have an indoor pool, it's possible that you have a high chlorine demand as a result of a high bather load. Every time you use the pool you will "use up" the available chlorine.</p> <p><b>The chlorine level is consistently high with minimal chlorine addition:</b> Try alternating days or skipping a few days before adding more chlorine. Make sure to continue to take daily tests to monitor the levels.</p>
pH	<p><b>To raise the pH:</b> Use pH increaser (Sodium Carbonate).</p> <p><b>To lower the pH:</b> Use pH decreaser (Sodium Bisulfate) or liquid acid (Muriatic Acid).</p> <p><b>When dosing:</b> Dissolve chemical, in amounts directed by the instructions on the container, into a bucket of pool water. Then pour chemical into the swim current (if present) or in front of the eyeball return fitting. Wait a few hours and retest pH. Adjust levels if necessary.</p>	<p><b>The pH is consistently low:</b> You may be using a sanitation with a low pH such as Trichlor (not recommended) or Bromine which will drive the pH down. pH increaser must be used to combat the low pH level of the sanitation.</p> <p><b>The pH is consistently high:</b> You may be using a sanitation with a high pH such as household bleach which will drive the pH up. pH decreaser must be used to combat the high pH level of the bleach.</p> <p><b>The pH is hard to maintain or is stagnant:</b> If alkalinity is too low, your pH can fluctuate at the slightest addition of an acid or base and will be very hard to control. If alkalinity is too high, your pH will be almost impossible to change. Make sure the alkalinity is within the recommended range prior to adjusting the pH.</p>

PARAMETER	HOW TO DOSE/ADJUST	WHAT TO DO IF...
TOTAL ALKALINITY	<p><b>To raise the total alkalinity:</b> Use alkalinity increaser or Baking Soda (Sodium Bicarbonate).</p> <p><b>To lower the total alkalinity:</b> Use pH deceiver (Sodium Bisulfate) or liquid acid (Muriatic Acid).</p> <p><b>When dosing:</b> Dissolve chemical, in amounts directed by the instructions on the container, into a bucket of pool water. Then pour chemical into the swim current (if present) or in front of the eyeball return fitting. Wait a few hours and retest alkalinity and adjust as necessary.</p>	<p><b>The total alkalinity level is rising over time:</b> It is not uncommon to see your alkalinity rise over-time if you're using a sanitation with a high pH level, such as household bleach. As your pH level rises, your alkalinity level will follow. The only way to prevent the alkalinity from rising is to prevent the pH from rising. Use pH deceiver or liquid acid to maintain pH and alkalinity levels when using a sanitation with a high pH.</p> <p><b>Lowering the total alkalinity lowers the pH:</b> Alkalinity and pH are closely related. It is true to an extent that lowering one will always eventually lower the other. Adjust the alkalinity to the recommended range with the expectation that the pH will also be impacted. Once the alkalinity is set, raise your pH to the recommended level using pH increaser. This should not impact alkalinity level.</p> <p><b>Total alkalinity is slightly high but pH is in proper range:</b> Some water has this combination of values. Leave the alkalinity high and continue to monitor pH. Attempting to lower alkalinity will likely reduce the pH too much.</p>
CALCIUM HARDNESS	<p><b>To raise the calcium hardness:</b> Use calcium hardness increaser (Calcium Chloride).</p> <p><b>To lower the calcium hardness:</b> Use water containing less calcium (softened water) to dilute the hard water.</p>	<p><b>Calcium hardness is below the recommended range:</b> Add calcium hardness increaser in small doses until you reach recommended levels.</p> <p><b>Calcium hardness is above the recommended range:</b> There is no chemical to lower the calcium hardness level. Doing a partial drain (halfway) and refilling with softened water is recommended. Always test the source water prior to filling the pool. If the water is too hard, consider trucking in softened water or installing a water softener.</p>
CYANURIC ACID	<p>Cyanuric acid (CYA) is only added manually if your pool is outdoors and you are using a non-stabilized chlorine. Otherwise it is already present in granular chlorine that is made for outdoor use, such as Sodium Dichlor.</p>	<p><b>Your pool is indoors:</b> CYA is not needed or recommended for indoor pools.</p> <p><b>Your pool is outdoors:</b> It is recommended to use stabilized chlorine which contains CYA.</p> <p><b>The CYA is above 50ppm:</b> You will need to partially drain and refill the pool. Drain the pool halfway down and refill with fresh water.</p>
TOTAL DISSOLVED SOLIDS	<p>You do not need to raise TDS, it will slowly rise over-time as you add other chemicals and use the pool.</p>	<p><b>TDS is over 2500ppm:</b> When TDS levels are above 2500ppm, drain the pool halfway down and refill with fresh water.</p>

## Basic Water Chemistry Troubleshooting

This section provides a basic guide to help diagnose and rectify some of the common water chemistry related problems.

PROBLEM	PROBABLE CAUSES	SOLUTIONS
CLOUDY WATER	<ul style="list-style-type: none"> <li>• Low sanitation</li> <li>• Dirty filter</li> <li>• Excessive oils/organic matter</li> <li>• Overused or old water</li> </ul>	<ul style="list-style-type: none"> <li>• Add sanitizer</li> <li>• Clean or replace filter</li> <li>• Shock pool (see procedure)</li> <li>• Partially drain and refill</li> </ul>
CHLORINE ODOR	<ul style="list-style-type: none"> <li>• Combined chlorine level too high</li> <li>• Low pH</li> </ul>	<ul style="list-style-type: none"> <li>• Shock pool (see procedure)</li> <li>• Adjust pH to recommended range</li> </ul>
GENERAL WATER ODOR	<ul style="list-style-type: none"> <li>• Excessive organics in water</li> <li>• Improper sanitation</li> <li>• Low pH</li> <li>• Bacteria or algae growth</li> </ul>	<ul style="list-style-type: none"> <li>• Shock pool (see procedure)</li> <li>• Add sanitizer</li> <li>• Adjust pH to recommended range</li> <li>• Shock pool or drain, clean, and refill</li> </ul>
SCUM RING ON LINER AROUND WATER LEVEL	<ul style="list-style-type: none"> <li>• Buildup of oils and dirt</li> </ul>	<ul style="list-style-type: none"> <li>• Wipe off scum ring using 1:1 ratio of chlorine bleach and warm water or an enzyme cleaner appropriate for vinyl liner</li> </ul>
ALGAE GROWTH	<ul style="list-style-type: none"> <li>• Insufficient filtration</li> <li>• High pH</li> <li>• Low sanitation</li> </ul>	<ul style="list-style-type: none"> <li>• Increase filtration</li> <li>• Shock pool (see procedure) and adjust pH to recommended range</li> <li>• Shock pool and maintain sanitizer level</li> </ul>
SCALE BUILDUP	<ul style="list-style-type: none"> <li>• High calcium levels</li> <li>• Alkalinity and pH too high</li> </ul>	<ul style="list-style-type: none"> <li>• Partially drain and refill with water that falls within the recommended hardness range</li> <li>• Adjust alkalinity and pH to recommended range</li> </ul>
EYE IRRITATION	<ul style="list-style-type: none"> <li>• Low pH</li> <li>• Combined chlorine level too high</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust pH to recommended range</li> <li>• Shock pool (see procedure)</li> </ul>
SKIN IRRITATION	<ul style="list-style-type: none"> <li>• Free chlorine level above 5ppm</li> <li>• Unsanitary Water</li> </ul>	<ul style="list-style-type: none"> <li>• Allow free chlorine level to drop below 5ppm before using pool</li> <li>• Shock pool (see procedure)</li> </ul>

### SHOCKING THE POOL:

Shocking the pool refers to the process of adding chlorine to the water in order to raise the free chlorine level to a point where contaminants, such as bacteria or algae, are destroyed. Raising the free chlorine level to 3-5ppm should achieve that.

Start by adding 1-2 cups of liquid chlorine (INDOOR) or 2-3 tablespoons of Sodium Dichlor (OUTDOOR). Test free chlorine level after 2 hours. Repeat until the free chlorine reaches 3-5ppm. Maintain level for 48-72 hours.



