

Water Quality **Guidebook**

Pool Monitor

Understanding the Basics of Water Testing

Contents

Introduction	01
Essential Guidelines for Pool Opening	01
General Steps for Pool Preparation	02
Pool Water Quality Standards	03
Pool Water Testing & Maintenance	07
Smart Pool Monitor Features & Benefits	13
Pool Water Quality Parameters	18
At The End	27

Introduction

Swimming is the fourth most popular sport in the United States and an excellent way to engage in regular aerobic physical activity. Just two and a half hours of aerobic exercise per week, such as swimming, bicycling, or running, can reduce the risk of chronic illnesses. It can also improve health outcomes for individuals with diabetes and heart disease.



Swimmers have approximately half the mortality risk compared to inactive people. Additionally, people report greater enjoyment from water-based exercise than land-based exercise, and they can exercise longer in water without increased effort or joint and muscle pain.

Essential Guidelines for Pool Opening

Proper pool opening is critical for safe summer use and extending the pool's service life. It involves several key steps. First, ensure structural integrity by avoiding improper draining especially in high water table regions to prevent severe damage. Second, maintain chemical balance by checking the filtration system and water composition. Third, keep the appropriate water level to ensure uniform chemical distribution. Professional water testing

helps adjust water parameters accurately and reduces chemical and energy usage. The best opening time is when daily temperatures consistently reach 70°F or higher, after pollen release and when sun intensity is manageable to protect chlorine effectiveness.



General Steps for Pool Preparation

To prepare a pool for use follow these simple steps.

1. Clear debris around the pool, inspect all facilities, and do not fully drain the pool unless necessary.
2. Prepare chemicals and the Smart Pool Monitor, assemble the filtration system, and chemically treat the water with the cover on.
3. Check and repair equipment, clean surface stains, fill the pool to the standard level, and clean the pool bottom.
4. Run the filtration system until the water is clear, then remove and clean the cover, and vacuum any remaining debris.
5. Run the filter for 12–24 hours, test water quality, and balance chemicals properly.
6. Perform regular maintenance: weekly water tests and monthly professional analysis, and keep necessary chemicals on hand to maintain balanced, safe water.

Pool Water Quality Standards

Overview of Pool Water Quality Standards

In the United States, there are no federal pool safety standards. But the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) give useful recommendations for pool owners. Some states and counties require pool owners to keep their pools clean. Some regions even have special rules for private pools.

Internationally, the WHO makes guidelines for safe swimming pool standards. In the US, the CDC releases the Model Aquatic Health Code (MAHC) every two years. This code tells public swimming pools the recommended standards they should follow. If you buy a home with a pool and worry about its water quality, you must have it inspected first.

Key Water Quality Parameters and Their Ranges

Frequently Used Terms

Chlorine (Free, Combined, Total)

Free chlorine refers to the form of chlorine available for sanitizing and oxidizing pool water. Combined chlorine is produced when free chlorine is consumed through reactions with contaminants. Total chlorine is the sum of free chlorine and combined chlorine.

Cyanuric Acid (CYA)

Cyanuric acid is a chemical primarily used in outdoor pools as a stabilizer for free chlorine. It prevents chlorine from degrading under ultraviolet light.

pH

pH is a measure of the acidity or alkalinity of a solution. The pH

scale ranges from 0 to 14, with a pH of approximately 7 considered neutral. A pH greater than 7 is classified as basic (alkaline), while a pH less than 7 is acidic.

ORP

ORP, or oxidation-reduction potential, measures the tendency of a solution to gain or lose electrons when in contact with another chemical. A properly treated and balanced pool should have an ORP of at least 700 millivolts.



Alkalinity

Alkalinity is a measure of water's buffering capacity against pH changes. Higher alkalinity means the water is more resistant to fluctuations in pH.

Hardness

Hardness is a water parameter that measures the quantity of scale-forming ions in solution. Total hardness is the sum of calcium and magnesium ions, whereas calcium hardness refers exclusively to calcium ions.

Total Dissolved Solids (TDS)

TDS is a measure of all solids dissolved in water. For saltwater pools, TDS includes the salt content.

Their Ranges

Disinfectant residue is very important. Free Available Chlorine is a main disinfectant. The MAHC suggests it stays between 1 ppm

and 4 ppm. Some states use 1 ppm to 3 ppm, but the MAHC raised the top limit to 4 ppm to make fewer harmful byproducts. Combined Chlorine, or chloramine, must be 0.4 ppm or less. Too much chloramine irritates eyes and lungs. It also causes the pool smell.

If you use bromine instead, it should be between 2 ppm and 6 ppm.

pH level matters for disinfection and comfort. It should be between 7.2 and 7.8. The best range is 7.4 to 7.6. A pH above 7.8 makes chlorine work much worse. A pH below 7.2 damages equipment and irritates skin.

ORP shows how well disinfection works. Most pools need at least 650 mV. It does not measure chlorine directly. It measures how well water kills bacteria. Sunlight and organic matter lower ORP.



CYA helps keep chlorine stable and protects it from sunlight. For outdoor pools, it must be 100 ppm or less. The MAHC says it should be even lower. Indoor pools should have no CYA, 0 ppm is best. Too much CYA makes chlorine useless, even if readings are high.

Water clarity (turbidity) must be 0.5 NTU or less. You must clearly see the pool floor drain lines or a 6-inch black disk anywhere on the pool floor.

Water temperature affects disinfectant use and bacteria growth. Regular pools should be 25 °C to 30 °C. Therapy or spa pools are

warmer, usually 36°C to 40°C. They need more water changes because heat uses up chlorine faster and helps bacteria grow.

Other important chemical levels: Total alkalinity should be 60 to 80 ppm to keep pH stable. Calcium hardness needs to be 200 to 400 ppm to protect concrete. Total dissolved solids must be 1500 ppm or less. Change water if it is higher, especially for seawater or mineral pools.

Key Water Quality Parameters and Their Ranges

MAHC - state standards

WATER QUALITY PARAMETER	RANGE/IDEAL VALUE	KEY NOTES
Free Available Chlorine	1 ppm - 4 ppm (MAHC); 1 ppm - 3 ppm (some states)	Main disinfectant; MAHC raised upper limit to 4 ppm to reduce harmful byproducts
Combined Chlorine (Chloramine)	≤ 0.4 ppm	Too much irritates eyes and lungs, causes pool smell
Bromine (if used)	2 ppm - 6 ppm	Alternative disinfectant to chlorine
pH Level	7.2 - 7.8; Ideal: 7.4 - 7.6	Affects disinfection and comfort, too high/low reduces chlorine effect or damages equipment
ORP	≥ 650 mV (most pools)	Shows disinfection effect, not direct chlorine measurement, sunlight and organics lower it
CYA (Chlorine Stabilizer)	Outdoor: ≤ 100 ppm (MAHC suggests lower); Indoor: 6 ppm (best)	Protects chlorine from sunlight, too much makes chlorine useless
Turbidity (Water Clarity)	≤ 0.5 NTU	Must see pool floor drain lines or 5-inch black disk anywhere on pool floor
Water Temperature	Regular pools: 25°C - 30°C; Therapy/spa pools: 36°C - 40°C	Affects disinfectant use and bacteria growth, warmer pools need more water changes
Total Alkalinity	80 ppm - 80 ppm	Keeps pH level stable
Calcium Hardness	200 ppm - 400 ppm	Protects concrete from corrosion or scaling
Total Dissolved Solids	≤ 1500 ppm	Change water if higher, especially for seawater or mineral pools

Pool Water Testing & Maintenance

Pool Chemical Testing Best Practices

Checking the chemical levels of pools and spas is an important practice. Pool owners and operators often overlook it. Swimming pool chemical testing is critical. It verifies water quality and determines the necessary chemical dosages to correct water chemistry issues.

If your pool's water chemistry is unbalanced, it can lead to corrosive or scale-forming conditions. These conditions can be extremely costly to repair if left unaddressed for an extended period. Accurate chemical testing is essential for calibrating automatic pool chemical control systems.



Safe Storage and Handling of Pool Chemicals

To avoid injury and damage when dealing with pool chemicals and reagents, follow these guidelines:

1. Store them in a cool, dry and sun-protected location within the specified temperature range. Do not allow reagents to freeze. Use older reagents first, discard expired ones, tighten caps after use and rinse testing containers. Keep all chemicals out of reach of children and pets.

2. Read package instructions before handling. Use chemicals in their original labeled containers and avoid smoking or open flames near chemicals.

3. Wear elbow-length gloves and safety goggles when handling, then wash hands and arms thoroughly afterward. Add chemicals to water and never mix them. Clean spills promptly and dispose of unused chemicals properly via local waste management.

Take Deep Water Samples

A swimming pool is a large body of water. Its chemical composition can vary in different areas. For example, evaporation and other factors can cause the water at the pool's surface to have a slightly different composition than the water at the bottom.



For the most accurate results, it is recommended that you take a sample from the center of the pool. It is preferably near the surface.

Regardless of the method you choose, collect the water sample for analysis from a depth of approximately 18 inches below the surface. Keep it away from any return inlets.

This ensures that the sample is representative of the pool water as a whole. Water from return inlets may have higher chemical concentrations. The highest concentration of contaminants is typically at the surface.

Water Quality Testing Methods

There are various swimming pool chemical test methods available on the market today. Each has its own advantages and disadvantages. Below are some of the most common methods:

Dip-and-Read Test Strips

Dip strips are convenient for residential pool and spa use. This is due to their ease of operation and affordability. Chemically treated reagent pads are attached to plastic strips. These strips are dipped into the water sample. After the specified time, the pads change color. You must compare them to the standard color chart printed on the container.

Dip-and-read strips are generally not as accurate as other methods. They are not recommended for commercial facilities.

Photometric Tests

Photometers emit a specific wavelength of light through a reagent-treated sample. They compare the amount of light absorbed to that of a blank (untreated) sample. Some photometric tests require a waiting period. This allows the chemical reaction between the reagent and the sample to complete.



When performed correctly, photometric testing can produce some of the most accurate and reliable results.

Electronic Tests

Electronic testing is used continuously in most automated chemical controllers. It is also available in handheld meters. If you choose this method, note that electronic meters require frequent calibration and probe cleaning. This maintains accurate readings.

Advantages of the Smart Pool Monitor for Swimming Pool Water Quality Testing

Set maximum and minimum values for measurements. Set high/low thresholds for CL (Chlorine), pH, Salinity, ORP, EC and TDS. Receive notifications via phone call or text message if results fall outside the set range. The display turns red for easy identification.

Our smart pool probes have undergone continuous enhancements. They deliver stable and accurate swimming pool water quality data. Please ensure to remove the protective caps from both probes before use.

Parameter Table of Water Quality Data Tested by the Smart Pool Monitor (for reference only)

Parameters	Recommended Range	Pool
pH	7.2-7.8	Freshwater & Saltwater Pool
CL (Free Chlorine)	1-3 ppm	Freshwater & Saltwater Pool
Temperature	75 - 86°F	Freshwater & Saltwater Pool
ORP	650 - 750 mV	Freshwater & Saltwater Pool
EC	200-1000µS/cm (1 ms/cm=1000 us/cm)	Freshwater
	2500-6000µS/cm	Saltwater Pool
SALT	0% - 0.15%	Freshwater
	0.25% - 0.4%	Saltwater Pool
TDS	300 - 2000 ppm	Freshwater
	3000 - 6000 ppm	Saltwater Pool

Test strips are convenient, but liquid test kits offer greater precision and detailed level readings. They also show how much chemicals are needed for adjustments, even though they cost more. Knowing your pool's water volume helps ensure accuracy. Always follow the manufacturer's instructions, as they vary by product. For cost-effective and reliable testing, choose the Smart Pool Monitor for worry-free pool enjoyment.

Test Regularly

Once you begin testing your pool water, you will become familiar with your pool. You will know how to keep it in optimal condition. This will make it easier to plan for events that can affect the water's balance, chemistry and cleanliness.

Consider testing chlorine levels a few times a week. Be sure to test pH at the same time. After establishing a routine for adding chemicals on a loose schedule, you will be able to test less frequently.



Remember that certain times of the pool season require more frequent testing. Plan to test your pool water anytime:

You open the pool for the season.

A major storm adds rainwater to the pool.

After a period of heavy pool use.

Anytime young children, pets or other sources of organic contamination are in the water.

When you close the pool for the season.

Essential Pool Maintenance Measures

Owning a pool is a luxury, but it requires significant effort to keep it clean and well-maintained. Pool maintenance involves vacuuming, cleaning tiles, water filtration, sanitation, chemical balancing, and much more. If not properly maintained, a pool can become a breeding ground for germs, bacteria, and associated health hazards. To avoid these issues, it is essential to follow a regular maintenance schedule.

Swimming Pool Maintenance Methods

The primary goal of pool care is to enhance the swimming experience. While pool water may appear clean and sparkling at times, this is not always an indicator of good quality. Unhealthy or unsightly water can result from chemical imbalances, foul odors, bad taste, and more. The following tips provide insights into healthy and eco-friendly pool care. Effective pool maintenance relies on several key practices.

1. Consider chlorine-free pool sanitation systems such as copper ionization, which releases copper ions to inhibit algae growth and reduce reliance on traditional chlorine.
2. Clean pool filters periodically and ensure daily water circulation, adjusting cleaning or backwashing frequency based on pressure changes.



3. Regularly test your swimming pool water with the Smart Pool Monitor to maintain a clean and safe pool. View real-time data via 2.4GHz Wi-Fi, check daily, weekly, and monthly records on the mobile app, and share information with others.
4. Clean pool tiles using suitable household products based on stain type, and rebalance the pool's pH if needed after cleaning.
5. Remove oil from pool water using absorbent materials like tennis balls or sponge, or use enzyme products to break down oily residues.

6.Perform periodic pool water aeration through water features or oxidation treatments to maintain clear water when paired with proper filtration.

Smart Pool Monitor Features & Benefits

Presentation

A Smart Swimming Pool Water Quality Monitor measures pH, chlorine, temperature and salinity, providing real-time data for safe swimming. Its market outlook is positive with growing demand. There are fixed (permanent, continuous) and portable (lightweight, periodic) types to maintain optimal water conditions.

Disadvantages of Traditional Environmental Monitoring Systems

Water quality monitoring is vital for public health, with various methods available. It helps understand water conditions for watershed characterization or emergency response. Common methods include regular or selected site sampling and fully automated integrated systems. A key question for many institutions and private users is how smart water monitoring systems outperform traditional methods.

Traditional water quality assessment methods have several limitations.

High Monitoring Costs

First, they require expensive specialized equipment and trained expert personnel, which increases the overall monitoring cost significantly for users. Many small institutions or private pool owners cannot afford such high costs.

Easy Human Error

Second, human error is easy to occur in the process of sampling, testing and recording. This can lead to data loss, inaccurate data results or wrong records, which affect the judgment of water quality.

Inability to Predict Water Quality Trends

Third, these methods cannot predict future water quality trends, as collected data is analyzed manually rather than by machines. This makes it hard to take preventive measures in advance, and people can only deal with problems after they occur.

Deviations Caused by Sample Transportation

Furthermore, the sample transportation process may cause deviations in water properties. Water is easily affected by external temperature and environment during transportation, so the test results of the transported samples may not reflect the actual water quality on site.



Lack of Continuous Monitoring

As a result, it is difficult to continuously monitor water quality using traditional measurement methods. The monitoring data can only reflect the water quality status at a single time point, and it is impossible to know the real-time changes of water quality.

Lagging Monitoring Results

A major challenge of traditional quality monitoring systems relying on manual input and output is the lack of real-time data. Slow manual processing leads to lagging results that fail to reflect real-time water quality changes, potentially missing the best time to address issues and worsening situations. Automated solutions resolve this by processing data independently, offering unique insights and customizable detail levels. Some users need raw data, while others only require conclusions, and a low-cost sensor network enables this customization.



Restricted Data Access

In addition, data access may be restricted by storage methods and transmission channels. Traditional data is usually stored in paper documents or local devices, which are not easy to access and share. This further hinders the accurate interpretation of water quality conditions.

Importance of Using a Pool Care Water Monitor

When pool water experiences chemical imbalances, it can lead to issues such as algae growth, scaling, discoloration, cloudiness, and skin irritation. With pool monitors like our Smart Pool Monitor, you can detect imbalances immediately, allowing you to take appropriate action before significant changes in water quality occur.

Check Chlorine Levels

Chlorine is the most common method for maintaining high swimming pool water quality. Pool chlorine breaks down bacteria and algae to keep the pool clean and fresh. You should regularly test your pool water quality to monitor pH and check chlorine levels.

In public pools, the chlorine concentration should be 2-4 parts per million (ppm). Before adding chlorine to your pool, you can use pool test strips to analyze the existing chlorine levels. For private pools, the recommended chlorine level is 1-3 ppm.

By tracking chlorine levels, you can better maintain the appropriate concentration in your pool. This prevents chlorine levels from becoming too high (which can irritate swimmers' skin) or too low (which fails to adequately sanitize the water).



You can calculate the exact amount of chlorine your pool needs by multiplying the number of gallons of water by 0.00013. Swimming pool chemicals can be dangerous, so exercise caution when handling and storing them.

Ensure pool chlorine is stored away from direct sunlight in a tightly sealed container. It should also be kept in a dry place out of the reach of children.

Maintain a Healthy pH

A Smart Swimming Pool Water Quality Monitor measures pH, chlorine, temperature and salinity, providing real-time data for safe swimming. Its market outlook is positive with growing demand. There are fixed, permanent and continuous, and portable, lightweight and periodic, types to maintain optimal water conditions.

Pool water pH (7.2-7.8 recommended) is key for balanced pools. Deviations cause skin irritation, equipment damage and cloudy water. pH fluctuates due to rainfall, swimmers etc., so regular testing, aided by pool monitors, keeps it non-corrosive.



Monitor TDS

Total Dissolved Solids (TDS) measures the total amount of dissolved materials in water. The TDS level in a pool is influenced by many factors: chemicals added to adjust pH, chlorine, water hardness, and alkalinity, as well as dust and dirt, all increase the TDS level in pool water.

The maximum acceptable TDS level for non-salt chlorine-generated swimming pools is 1,500 ppm. Above this value, you may begin to notice staining in the pool. High TDS levels also reduce the effectiveness of added chemicals, preventing them from performing their intended functions. There is also a high likelihood that the water will become cloudy. You

can keep TDS at proper levels by tracking it with your smart pool monitor.

Benefits of Smart Pool Monitoring Systems

Smart pool monitors offer great advantages. They bring ultimate peace of mind with Wi-Fi connectivity, fast installation, accurate measurements, mobile compatibility, in-app reporting, cloud storage, on-demand measurements and real-time monitoring anytime, anywhere. They also provide maximum return on investment by prolonging pool lifespan, enhancing visual appeal, ensuring safer swimming, extending equipment life, maintaining sanitary water and reducing maintenance costs.

Pool Water Quality Parameters

Maintaining proper water quality is a critical task for pool management.

pH

Ideal Target Range

Freshwater & Saltwater Pool: 7.2–7.8

Why Test?

High or low pH can damage pool surfaces and equipment, irritate swimmers, and lead to algae growth.

pH measures water acidity, ranging from 0 to 14 with 7 as neutral. Below 7, water is acidic and corrosive, above 7, it is basic and prone to scaling. Water stays balanced only if pH, total alkalinity and hardness are in ideal ranges. Minerals, location and temperature (warmer water accelerates scale from calcium

carbonate) affect balance. For example, 60°F pool water needs pH ~7.6, 80°F needs ~7.3. A professional pool retailer can calculate the saturation index for your ideal pH.

Note: High pH levels (above 7.8) reduce the efficiency of free chlorine in sanitizing water and promote algae growth. If your fill water (from a well or city supply) has a high pH, the type of chlorine you choose can help lower it. (For example: If your fill water has a pH of 8.2, you may want to use Trichlor, which has a pH of 3.0). For bather comfort, the ideal pH of pool or spa water is 7.2-7.8.



What to do?

Use acids to lower pH and bases to raise pH levels.

If pH is too low (Acidic):

Corrosion of pool equipment and staining

Swimmer eye irritation

Etching of plaster pool surfaces

Rapid chlorine dissipation

If pH is too high (Basic):

Scale accumulation on pool equipment

Cloudy, turbid water

Weakened sanitizing power of chlorine

Swimmer eye irritation

Free Chlorine

Ideal Target Range (ppm)

Freshwater & Saltwater Pool: 1.0–3.0

Why Test?

Low chlorine levels allow bacteria and algae to grow. High levels can irritate swimmers and discolor clothing and hair. Note that high pH levels reduce chlorine effectiveness.

Pool sanitizers act quickly to keep water safe, prevent bather infections and inhibit algae growth. They also oxidize and destroy water contaminants. Chlorine is the most common (bromine for spas). Some alternative sanitizers use little or no chlorine, but most public pools require chlorine for heavy bather loads. Adding chlorine to water forms active free chlorine. Reacting with contaminants (e.g., bather perspiration, urine) creates slower-acting combined chlorine, which causes odors and eye irritation. To measure it, test free and total residual chlorine, then subtract free chlorine from total.

Salinity

Ideal Target Range (0.1% = 1000 ppm)

Freshwater Pool: 0%–0.15%

Saltwater Pool: 0.25%–0.4%

Why Test?

Salinity refers to the saltiness of a body of water. Understanding water salinity is important for maintaining proper water chemistry. If you are considering installing a pool in your backyard, a popular alternative to traditional chlorine pools is saltwater pools, which have higher salinity levels.



Maintaining proper salinity is essential for ensuring the comfort of a saltwater pool. When salinity is kept at the ideal level of 3,000 ppm, a saltwater pool can even provide health benefits for individuals with asthma or certain allergies. However, if the salt

content in pool water is too high or too low, it can have side effects on you and other swimmers.

Risks of High Salinity: While excessive salt in pool water has few harmful effects, salt levels above 6,000 ppm can become corrosive, damaging metallic pool equipment such as handrails and ladders. It is also important to note that some saltwater generators will not turn on if the pool water salinity is not between 3,000–4,000 ppm, making it difficult to maintain proper salinity levels.



Maintaining proper pool salt levels is important because saltwater pools offer many benefits when salinity is optimal. For instance, water in a saltwater pool typically feels softer than water in a standard chlorine pool. Saltwater also produces its own chlorine, eliminating the need to store this chemical. When using an electrical conductivity sensor for your saltwater pool, you may need to take action if the salt levels fall below 3,000 ppm or exceed 6,000 ppm.

TDS (Total Dissolved Solids)

Ideal Target Range (ppm)

Freshwater Pool: 300–2000 ppm

Saltwater Pool: 3000–6000 ppm

Why Test?

One of the most overlooked aspects of pool water chemistry is the measurement of total dissolved solids. Your TDS value is the sum of all substances dissolved in your pool water. Freshwater swimming pools should have a maximum TDS value of approximately 1,500 to 2,000 ppm. For comparison, the EPA recommends a maximum TDS value of 500 ppm for drinking water.

Virtually everything added to the pool increases the TDS value, including chlorine, shock treatments, algaecides, clarifiers, pH adjustment products, and more. Even bather-introduced contaminants—such as hair care products, body lotions, deodorants, sweat, and urine—can significantly raise TDS levels. For outdoor facilities, another TDS concern is lawn care or landscaping chemicals that may accidentally enter the pool. Over time, evaporation of pure water from the pool also increases the concentration of TDS.



Chlorides and sulfates in TDS can cause problems such as reduced chlorine efficacy, dull water clarity, and algae blooms. High levels of phosphates and nitrates can consume chlorine and also promote algae growth.

High TDS Indications: If you repeatedly struggle to maintain proper chlorine levels, water clarity, or if your pool water has a salty taste—even when properly balanced, sanitized, and filtered—you may have a TDS problem. High TDS levels from

dissolved metals can also cause staining of pool surfaces.

High calcium-based TDS can lead to scaling on both pool surfaces and pump room equipment, shortening their service life and resulting in costly repairs. As TDS levels exceed 2000 ppm, the risk of galvanic corrosion also increases due to the concentration of dissimilar metals in the system.

What to do?

Generally speaking, TDS levels should not exceed 1000 ppm above the mains water TDS level. For example, if the mains water TDS level is 500 ppm, the pool TDS level should not exceed 1499 ppm.



Higher levels may cause:

Cloudy or hazy water

Difficulty maintaining water balance

Reduced sanitizer activity

Foaming

The TDS Solution: Conventional pool maintenance wisdom states that the only way to reduce TDS is by draining and refilling the pool, which is partially true. However, other methods can remove large amounts of TDS from water, such as reverse osmosis and microfiltration using membrane filters. While these methods are preferred over water replacement in some areas due to water restrictions, they are very costly and time-consuming and still generate a large volume of wastewater.

Water Temperature

Ideal Target Range (°F)

Freshwater & Saltwater Pool: 75°F – 86°F

Why Test?

Temperature affects pool water chemistry because it directly impacts chlorine breakdown. The lower the temperature, the less effective chlorine is as a disinfectant. Conversely, if the water temperature is too high, it can lead to scale formation. The recommended temperature range is 75°F to 86°F.



ORP (Oxidation Reduction Potential)

Ideal Target Range (mV)

Freshwater & Saltwater Pool: 650-750 mV

Why Test?

ORP (also known as Redox) is the ability of water to maintain a safe swimming environment, thereby minimizing the risk of illness for swimmers. A healthy swimming pool must have a sufficiently high ORP level.

ORP measures the potential of a disinfectant to destroy microorganisms and oxidize organic matter. The higher the

millivolt (mV) reading, the greater the pool water's ability to oxidize and sanitize.

lopool offers the EcO monitor, which analyzes ORP rather than just chlorine levels. This is because ORP provides a measure of active chlorine, offering a better picture of the water's sanitizing capacity. A concentration between 650 and 750 millivolts (mV) is ideal for maintaining a healthy pool.

To understand the importance of ORP (Oxidation Reduction Potential) in pool and spa water, it is essential to understand the effects of pH and the different types of chlorine compounds. By considering ORP, pH, and chlorine type, one can determine the effectiveness of chlorine. Free chlorine exists in two forms: HOCl and OCl^- . HOCl is much more effective at killing organisms than OCl^- (up to 250 times more effective). Combined chlorine is formed when free chlorine reacts with organic matter and various other contaminants during sanitization. It is important to maintain



both the proper amount and form of free chlorine in a pool to ensure the most effective sanitation. The primary factor influencing chlorine formation is pH. The ideal pH for swimming pools is 7.2 to 7.8, as this range maintains the highest proportion of chlorine as HOCl. ORP indicates the rate of the reaction between free chlorine and organic matter—i.e., it measures the oxidizing properties of the sanitizer (free chlorine) in the water. It is important to understand the reaction being measured and be aware of how strongly ORP depends on pH. ORP does not provide the exact ppm level of chlorine in the tested water. However, with the help of a pH/ORP chart, you can determine the form of chlorine and assess sanitizer effectiveness.

EC (Electrical Conductivity)

Ideal Target Range ($1 \text{ ms/cm} = 1000 \text{ }\mu\text{s/cm}$)

Freshwater Pool: $200 - 1000 \text{ }\mu\text{s/cm}$

Saltwater Pool: $2500 - 6000 \text{ }\mu\text{s/cm}$

Why Test?

Conductivity is a vital parameter for determining water quality. As salinity and temperature increase, conductivity also increases, which can negatively affect water quality. This is because higher conductivity indicates a higher concentration of impurities (dissolved substances, chemicals, and minerals) in the water.

Conductivity is one of the most useful and frequently tested parameters for assessing water quality. It is important across a range of industries and applications, such as measuring drinking water quality and monitoring aquaculture systems.

Conductivity measures a solution's ability to conduct electricity. Conductivity values depend on the ionic strength of the solution, the types of ions present, and their concentration.



When salts and other inorganic chemicals dissolve in water, they break down into ions. The presence of ions and dissolved salts increases water's ability to conduct electricity; therefore, as water salinity increases, so does electrical conductivity (EC). Pure (distilled) water is a poor conductor because it contains no dissolved salts to provide ions for electrical conduction.

Water contains various elements and chemicals that affect its quality, including sodium, magnesium, calcium, and chloride. Since salinity and temperature influence conductivity, it is also important to measure these parameters: as salinity and temperature increase, conductivity increases.

Conductivity depends on temperature and salinity, both of which play a role in water quality and the survival of aquatic life.

As water temperatures fluctuate daily, conductivity levels can also change. When water stratifies due to temperature-induced density differences, conductivity levels can vary at different depths.



As mentioned earlier, increased conductivity corresponds to higher salinity. Since salinity affects the solubility of dissolved oxygen (DO), it is critical to measure conductivity alongside salinity when assessing water quality. Higher salinity and conductivity levels result in lower DO levels, which can harm some aquatic plants and animals. It is also critical to monitor TDS levels in swimming pools, as high TDS levels can oversaturate the water, leading to water quality issues.

At The End

Whether you're new or experienced in pool care, this guide gives you the knowledge to balance chemicals effectively, ensuring safe, clear water and a longer-lasting pool. Understanding pool chemistry reduces hassle and creates a refreshing space for summer fun and gatherings. With the right tools and chemicals, you can maintain your pool like a pro year after year and enjoy a clean, inviting swimming oasis all season.

Water Testing Has Never Been Easier

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Made in China

