

Taylor's Water Balance Calculators

INTRODUCTION

To prevent conditions that lead to damage in pools and spas, several water chemistry parameters must be kept in harmony or "balanced": primarily **pH**, **total alkalinity**, and **calcium hardness**, but also **water temperature** and **total dissolved solids**. Operators and service professionals routinely measure the first three with Taylor's liquid-reagent tests and occasionally check the TDS level with a Myron L meter (available from Taylor) or the simple drop-count titration we offer. When the water has been treated with one of the stabilized chlorines, a sixth parameter—**cyanuric acid**—is also monitored because it makes an unwanted contribution to the total alkalinity reading and must be accounted for.

Once these values have been determined, they are plugged into a complicated mathematical formula to calculate the water's **Saturation Index**:

$$SI = \text{pH} + \text{TF} + \log\text{CH} + \log\text{ALK} - \text{Constant}$$

where SI is the Saturation Index, pH is the measured pH, TF is the temperature factor, CH is the measured calcium hardness, ALK is the measured total alkalinity minus any cyanurate alkalinity, and the Constant is a combined factor for temperature and ionic strength correction, plus concentration conversions.

Water is "ideally balanced" when the SI is zero. It is considered "balanced" when the SI is within the range of -0.3 to +0.5. (Some authorities recommend -0.3 to +0.3.) When the SI is lower, corrosion of the vessel's surfaces and fixtures is likely to occur. Metals dissolve and stain walls. Plaster etches, concrete pits, grout dissolves. When the SI is higher, calcium carbonate comes out of solution, first causing cloudy water and then forming unsightly scale (rough patches) on surfaces and plugging the filter and circulation piping. Heaters are particularly susceptible to corrosion and scaling.

SI CALCULATION MADE EASY

All but the mathletes among us find the Saturation Index calculation daunting. To simplify the process, many years ago Taylor developed a circular kind of slide rule to do the number crunching. We called it the **Watergram® Water Balance Calculator**. Originally, it was composed of two interlocking disks. In 2008 we improved the functionality of the circular Watergram by adding a third disk, and we also introduced an electronic version.



Manage pool chemistry with the aid of Taylor's Watergram Water Balance Calculator, available in a circular or electronic version.

The circular Watergram Water Balance Calculator is included in 2000 Series™ kits with the routine tests for water balance and in our countertop laboratories. It also can be purchased by itself (part #6026) or in a replacement pack (K-2004) that contains our waterproof testing and treatment guide, *Pool & Spa Water Chemistry*.

The electronic Watergram Water Balance Calculator, part #6028, is about the size of a credit card. It will perform basic arithmetic (addition, subtraction, multiplication, and division) plus determine the Saturation Index. It is included in Professional Series™ kits or you can purchase one to upgrade your present kit or water analysis center.

CIRCULAR WATERGRAM FEATURES

- Now does the final subtraction for you—just line up your test results and read the SI.
- Easier to play with different treatment adjustment scenarios to see which factor(s) make the most sense to change.
- Celsius equivalents make it friendly for users outside the U.S.
- Waterproof.
- Handy size.



the most trusted name in water testing

Taylor Technologies, Inc.
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800-TEST KIT (837-8548)
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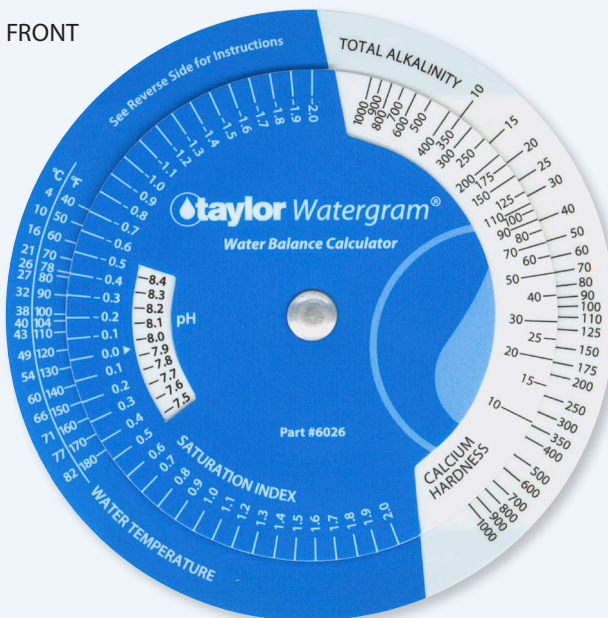
ISO 9001:2008 Certified

ELECTRONIC WATERGRAM FEATURES

- Fits in a pocket or wallet.
- Solar powered—no battery needed.
- Water resistant.
- Automatic shutoff.
- Automatic adjustment for cyanurate alkalinity.
- Fahrenheit and Celsius options.
- See the effect of changing any of the water balance factors instantly.
- Use for other basic math calculations.

#6026 (90% of actual size)

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Instructions for Use
See *Pool & Spa Water Chemistry* booklet (Part #2004B) for more information.

- Using test kit, determine pH, Calcium Hardness, and Total Alkalinity of sample water.
- Using *Watergram*® *Water Balance Calculator*, set **Calcium Hardness** opposite **Total Alkalinity**.
- Hold Calcium Hardness against Total Alkalinity and set arrow to measured **pH** in window.
- Read **Saturation Index** opposite **Water Temperature**.
Note: If temperature is not known, use 78°F for pools or 104°F for spas and hot tubs.
- If Saturation Index is **0.5 or greater**, water may become cloudy or deposit scale. If Saturation Index is **-0.3 or lower**, water may be corrosive to concrete, plaster, or metal surfaces. See Taylor treatment tables to adjust.

taylor Part #6026

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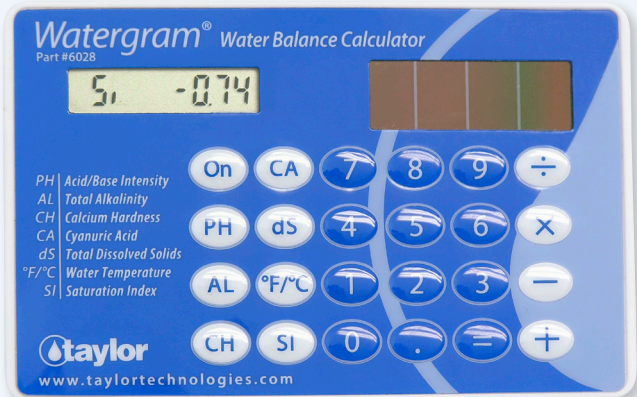
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ALSO AVAILABLE

- Complete line of professional-grade testing supplies.
- *Pool & Spa Water Chemistry: A Testing & Treatment Guide* (#2004B), a 64-page waterproof reference book.
- Pad of 25 Water Analysis Record sheets for tracking test results (#6615).
- Articles on water balance and other chemistry topics in the Learn More section of our website.
- **Video demonstrations** for new users posted on our website.
- Toll-free technical assistance at **800-TEST KIT**.

#6028 (actual size)

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How to use the Taylor Watergram®
(see also: Instruction #5019 and Guide #2004B)

- press **On** (can use for basic math calculations now)
- press **PH**; accept display OR enter new value; press =
- press **AL**; accept display OR enter new value; press =
- press **CH**; accept display OR enter new value; press =
- press **CA**; accept display (use 0 if unknown) OR enter new value; press =
- press **dS**; accept display (use 1000 if unknown) OR enter new value; press =
- press **°F/°C** for °F OR press **°F/°C** again for °C; accept display (use 78°F or 26°C if unknown) OR enter new value; press =
- press **SI** for Saturation Index result:
 $SI \geq 0.5$, water may cloud or deposit scale;
 $SI \leq -0.5$, water may corrode surfaces