



Water Balance Fact Check

Many pool operators use water balance apps to calculate LSI, or Langelier Saturation Index, the most commonly used water balance index in the pool/spa industry. But apps can provide inconsistent values and even suggest potentially dangerous chemical dosages to correct a parameter without consideration of the effect on other parameters.

Certified Pool Operators and all service professionals **must** follow water balance according to ANSI/APSP/ICC-11 2019 *American National Standard for Water Quality in Public Pool and Spas*.

As every operator knows, water balance calculations help to determine the “tendency” for recreational water to be either corrosive, scale-forming, or neither (balanced). The calculated value is not an absolute guarantee of corrosion or scale formation.

Several chemical treatment manufacturers have developed their own water balance apps. These apps are convenient for pool operators and service technicians to use in the field, as many of them present chemical dosage amounts to correct the LSI, but caution is strongly advised in selecting and using the apps. Recent incidents have shown that some apps permit using individual water parameter values that are out of range so that the operator may achieve the desired LSI value. This is the incorrect method in managing recreational water and is not consistent with the requirements specified in ANSI/APSP/ICC-11 2019 and the *Pool & Spa Operator Handbook*.

Further, comparison testing using several different apps has shown inconsistencies in calculated dosages and computed LSI values. As of February 2024, several apps are using +0.3 instead of the current +0.5 as the upper value or using only 12.1 and 12.2 TDS correction factors instead of the currently accepted 12.1 to 12.5 depending on the measured TDS concentration.

LSI and the role of water balance indices are explained in ANSI/APSP/ICC-11 2019. There are other indices (e.g., Ryznar Index, Hamilton Index, etc.) but they are not commonly used. Proper calculation of the LSI is shown on pages 68-70 of the *Pool & Spa Operator Handbook* (2024 edition).

Per ANSI/APSP/ICC-11 2019, values for pH, total carbonate alkalinity, calcium hardness, and TDS must be maintained within specific ranges whenever the venue is open for use. All health departments require records on the sanitizer concentration and

pH, but most do not require records on alkalinity, hardness, TDS, and water balance calculations such as LSI, as these parameters are not indicators of human health and safety. All pool operators and service professionals should confirm record requirements with their local department of health.

All saturation indexes calculate a value that indicates the tendency for water to be either balanced, corrosive, or scale-forming. But the calculated LSI value is not an absolute determination, as there may be other factors that influence specific water balance parameters (e.g., the use of a saltwater chlorine generator (SWG), or scale inhibitors). On rare occasions it is possible to encounter situations where all water parameters are in range, but the LSI is out of range. A balanced LSI should ensure that all ranges meet the chemical parameters in ANSI/APSP/ICC-11 2019. The LSI range is a guideline whereas ranges for individual parameters are mandatory.

Certified Pool Operators and all service professionals are **encouraged** to follow water balance according to ANSI/APSP/ICC-11 2019. The current *Pool & Spa Operator Handbook* (2024 edition) is consistent with ANSI/APSP/ICC-11 2019. Pool operators should use correction factors and calculations used for pH, total carbonate alkalinity, calcium hardness, temperature, and TDS as shown on pages 68-70, Appendix B-5 (page 262), in the current *Pool & Spa Operator Handbook* (2024 edition) and summarized below.

Parameter	Permissible range	Ideal range
pH	7.2 – 7.8	7.4 – 7.6
Carbonate alkalinity	60 – 180	80 - 120*
Calcium hardness	150 – 1000*	200 – 400*
Temperature	78°F-82°F	80.5°F
TDS	<1,500 over start up	Not specified

*depending on venue type, See Appendix B-1 for details.

Regardless of the method of determining proper water balance values, it is important that water balance indices should never be used as the sole determinant of optimal water quality in a swimming pool, hot tub, or spa.

References:

- [ANSI/APSP/ICC-11 2019](#), *American National Standard for Water Quality in Public Pools and Spas*.
- [Pool & Spa Operator Handbook](#) (2024 edition)