

Proper Spa Water Chemistry

Total Dissolved Solids (TDS) – include chlorine, iron, salt, calcium, magnesium, phosphates, nitrates, body oil, body waste, suntan lotion, sweat, etc. Too high a TDS level makes balancing the water chemistry difficult. The water tests will be erratic and unreliable. Iron removal can stabilize the TDS level if the TDS level is below 3000 ppm, however, if the TDS level is above 3000 ppm, then the only is to dilute the spa water by draining some water out and adding new water to the spa.

Note: If you have the optional ozone/chlorine generator installed, you need to monitor the salt level in the spa water as well as the TDS level. The ozone/chlorine generator requires salt be added to the water to generate chlorine. The salt in the water is part of the TDS level. With the ozone/chlorine generator installed, the true TDS level is the measured TDS level minus the salt level. Example: The TDS reading is 4,800 ppm and the salt level is 2,300 ppm. The true TDS level is $4,800 - 2,300 = 2,500$ ppm.

TDS:	Min	Ideal	Max
	300 ppm	1000-2000 ppm	3000 ppm

Note: When adding water to your spa, the new water should be checked before introducing it into the spa. The new water (municipal, well, etc.) may have a high TDS level (due to iron, magnesium, salt, etc. naturally occurring). If the new water's TDS level is high, a filter to remove iron should be used to reduce the new water's TDS level. These filters can attach to a garden hose and are available at most hardware and home improvement stores.

Chlorine Level – The chlorine level in the water is measured in two parts, the Total Chlorine and the Free Chlorine. The Total Chlorine is the total amount of chlorine in the water and is measured in parts-per-million (ppm). The Free Chlorine is the portion of the Total Chlorine that is loose in the water and can react with contaminants to clean the water. The rest of the Total Chlorine in the water is bound up and not available for cleaning.

Total Chlorine:	Min	Ideal	Max
	1 ppm	3-4 ppm	5 ppm
Free Chlorine:	Min	Ideal	Max
	1 ppm	3 ppm	5 ppm

Water Conditioner – Water conditioner (cyanuric acid) helps protect the free chlorine in the water. It acts like sunscreen for the chlorine. Proper levels of conditioner helps maintain chlorine levels and keeps the chlorine in the water longer. If the conditioner level is too low, small amounts of cyanuric acid can be added to increase the level. If the conditioner level is too high, the only way to reduce the level is to dilute the spa water by draining some water out and adding new water to the spa.

Water conditioner:	Min 30 ppm	Ideal 50 ppm	Max 150 ppm
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pH – The pH level is the single most important value to monitor and maintain. pH plays two major roles in water chemistry, it buffers acidic disinfectants added to clean the water and it plays the most significant role in balancing the water chemistry. pH is a numerical value that indicates whether water is acid, neutral, or base. Water with a pH of 7.0 is neutral, lower than 7.0 is more acidic, greater than 7.0 is more base. Optimum spa water pH should be 7.2 to 7.6. If the pH is low, add chlorine. If the pH is high, add sodium bisulfate or muriatic acid.

pH:	Min 7.2	Ideal 7.4-7.6	Max 7.8
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Total Alkalinity –The total alkalinity is the measure of the water’s resistance to change in pH. A proper range in Total Alkalinity (TA) helps prevent wide swings in pH when small amounts of chlorine or acid are added. Without control of the TA, the pH will rise and fall abruptly. When the TA is too low, it becomes difficult to maintain proper pH and can lead to corrosive water which can damage equipment. When the TA is too high it can cause “pH Lock,” which is what happens when the pH gets stuck at a certain level and becomes difficult to change. If the TA level is low, add sodium bisulfate or baking soda. If the TA level is high, add muriatic acid.

TA:	Min 60 ppm	Ideal 80-100 ppm	Max 180 ppm
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Salt Level – If you have the optional ozone/chlorine generator installed in your spa then you need to also monitor the salt level in the spa water. The salt is used by the ozone/chlorine generator to create the chlorine that cleans the spa water. The salt is measured in parts per million (ppm) and is part of the TDS level in the spa water. A proper range is required to maintain the chlorine level as well as the pH. When the salt level is too low, the chlorine level and the pH are too low. When the salt level is too high, the chlorine level may actually drop because the ozone/chlorine generator's chlorine generator cell may become clogged and unable to produce chlorine. The salt level can be measured separately by many water chemistry meters, and remember that the salt level is part of the TDS level.

Salt Level:	Min	Ideal	Max
	1200 ppm	1400 ppm	2500 ppm

Calcium Hardness –The calcium hardness is the measure of how “hard” or “soft” the water is. A proper range in Calcium Hardness prevents the water from leaching calcium out of the equipment (when the water is too “soft”), or from depositing calcium scale on the pipes and spa (when the water is too “hard”). If the calcium level is low, add calcium chloride. If the calcium level is high, either add a calcium reducer to reduce the level or dilute the spa water by draining some water out and adding new water (with a lower calcium content) to the spa.

Calcium Hardness:	Min	Ideal	Max
	100 ppm	120 ppm	200 ppm

Water Chemistry
Quick Reference Table

Measurement	Minimum	Ideal	Maximum
Total Dissolved Solids (TDS)	300 ppm	1000-2000 ppm	3000 ppm
Chlorine Level	1 ppm	3 ppm	5 ppm
Water conditioner	30 ppm	50 ppm	180 ppm
pH	7.2	7.4-7.6	7.8
Total Alkalinity	60 ppm	80-100 ppm	180 ppm
Salt Level	1200 ppm	1400 ppm	2500 ppm
Calcium Hardness	100 ppm	120 ppm	200 ppm