

Corrosion of metal parts and devices in swimming pools



Correction in case of a too low saturation index

In case of a negative saturation index, below -0.3, a correction is recommended. The saturation index must be increased. This can be realised by increasing the sum of factors, by increasing one or more parameter values.

The measuring values are

- pH-value up to max. 7,6
- Alkalinity up to max. 300 mg CaCO₃/l
- Calcium hardness up to max. 200 mg CaCO₃/l

pH-value

An increase of the pH value with caustic soda or soda can be used as a short-time solution. For a good disinfection result a pH value between 7.1 and 7.3 is the best.

Alkalinity

The increase of alkalinity can be achieved by increasing the hydrogen carbonate content of the water with the help of sodium bicarbonate. If a too low hydrogen carbonate content is the case, it might be caused by a low HCO₃⁻ content or by regular loss of the carbonic acid compounds as consequence of water movement or air geysers, you should add a solution of sodium bicarbonate with a dosing system.

The formula is as follows: pH + TF + AF + CF - 12,1

pH The measured pH-value of the pool water

TF The influence of the water temperature in the formula

AF The influence of the alkalinity in the formula (measured as hydrogen carbonate HCO₃⁻ - or as calcium carbonate CaCO₃)

CF The influence of the hardness of calcium (measured as calcium carbonate)

°C	TF	CaCO ₃ MG/L	TF	CF
0	0,0	25	1,4	1,0
3	0,1	50	1,7	1,3
8	0,2	75	1,9	1,5
12	0,3	100	2,0	1,6
16	0,4	150	2,2	1,8
19	0,5	200	2,3	1,9
24,5	0,6	300	2,5	2,1
29	0,7	400	2,6	2,2
34,5	0,8	800	2,9	2,5
40,5	0,9	1000	3,0	2,6

According to this calculation, water in balance should be within the range of -0.3 and +0.3.

Values below -0.3 indicate corrosive water.

Values above +0.3 indicate lime precipitating water.

PARAMETER	MEASURING VALUE	FACTOR
pH-value	7,4	7,4
Temperature	28	0,7
Total alkalinity	150mg/l CaCO ₃	2,2
Calcium hardness	150mg/l CaCO ₃	1,8
Sum of factors		12,1

$$\text{pH} + \text{TF} + \text{AF} + \text{CF} - 12,1$$

$$(7,4 + 0,7 + 2,2 + 1,8) - 12,1 = 0,0$$

Water is in balance,

no correction necessary

PARAMETER	MEASURING VALUE	FACTOR
pH-value	7,8	7,8
Temperature	29	0,7
Total alkalinity	195mg/l	2,3
Calcium hardness	127mg/l	1,7
Sum of factors		12,5

$$\text{pH} + \text{TF} + \text{AF} + \text{CF} - 12,1$$

$$(7,8 + 0,7 + 2,3 + 1,7) - 12,1 = 0,4$$

Water is lime precipitating,

correction is necessary

Calcium Hardness

Tap water with a low hardness often lack carbonic acid compounds, besides low calcium- and magnesium compounds. As a result a negative saturation index might occur. The concentration of calcium compounds in the water can be increased by adding calcium chloride to the water.

Correction of a too high saturation index

In case of a positive saturation content of more than +0.3, the saturation index has to be reduced to the value preferred. In contrast to the increase of the saturation factor, the possibility of reduction is more restricted. The reduction of the HCO₃⁻ content is possible by intensive aeration in combination with an automatic pH-correction. The reduction of the calcium hardness is only possible through total or partial water softening with a water softener.

In case of extreme low values for hydrogen carbonate there is a present danger that pH values sink under 5.0. In case of such a value, "chlorine" in the water will be partly available as chlorine gas. Chlorine gases in the water might lead to serious poisoning!

PARAMETER	MEASURING VALUE	FACTOR
pH-value	7,1	7,1
Temperature	30	0,7
Total alkalinity	100mg/l	2
Calcium hardness	150mg/l	1,8
Sum of factors		11,6

$$\text{pH} + \text{TF} + \text{AF} + \text{CF} - 12,1$$

$$(7,1 + 0,7 + 2 + 1,8) - 12,1 = -0,5$$

Water is corrosive,

correction is necessary