

# CO<sub>2</sub> – pH control in pools



## Water disinfection and the importance of pH

Pool water can be a vehicle for the transmission of diseases. That is why it needs to be treated with a product that ensures disinfection, while not reacting aggressively with pool users and the environment.

Chlorination using sodium hypochlorite is one of the most widely used methods for disinfecting pools. The pH value of the pool water (a measure of the water acidity or alkalinity) should be between 7.2 and 7.6. Outside of these limits, the water can cause eyes, skin and mucous membranes irritation.

Furthermore, below 7.2, water is corrosive to pool's equipments, while above 7.6 it causes incrustations that cloud the water and block filters, pumps and pipes. Disinfectant consumption is also affected (+25% hypochlorite), as it becomes less effective at high pH levels.

## Carbon Dioxide for pH correction

One clean and safe alternative for the pH correction of pools water is carbon dioxide (CO<sub>2</sub>), as it eliminates the need for mineral acids. When dissolved in water, CO<sub>2</sub> reacts to form carbonic acid, a weak acid capable to reduce the pH to the desired value and which has the same neutralizing capacity as strong acids such as hydrochloric (HCl) and sulfuric acid (H<sub>2</sub>SO<sub>4</sub>).

## Benefits of Using CO<sub>2</sub> as a pH-reducing Agent

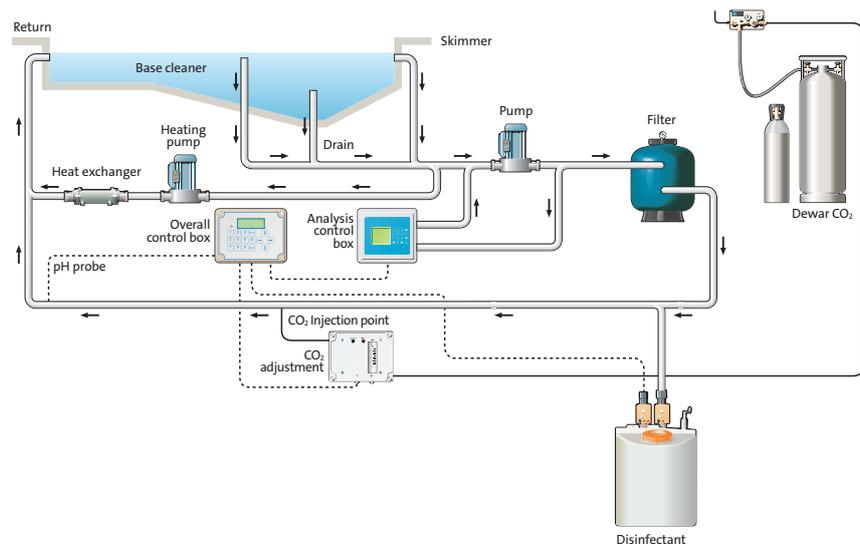
- The risk of chlorine gas fumes produced by an accidental reaction between a strong acid and hypochlorite is eliminated.
- The risk inherent in handling strong acids is eliminated. Lower maintenance costs as no corrosion is caused by strong acids.
- The risk of over-acidification is eliminated as the reduction in pH is more gradual than with mineral acids, enabling more precise control of the pH.
- Chloramines generation is reduced:
  - There is a 30% reduction in oxidant levels, which is especially important at the water surface level.
  - There is a 46% reduction in the amount of chlorine generated.
- It has a lower environmental impact:
  - It reduces greenhouse gas emissions (as quantified by a study assessing the environmental impact of using CO<sub>2</sub> as a pH neutralizer in comparison with strong acids).
  - It does not change the water's electrical conductivity, so living organisms are not affected when the pool water is returned to the environment as waste water.
  - The need to store and handle containers of mineral acids and the need to manage their effective disposal are eliminated.



## Equipment

The equipment needed to supply and dose the CO<sub>2</sub> is not complex and consists of:

- CO<sub>2</sub> tanks (bottles, dewars, etc.)
- A CO<sub>2</sub> pressure and flow regulation system
- Automated pH control
- CO<sub>2</sub> diffusion system
- Pipes from the CO<sub>2</sub> storage to the injection point.



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