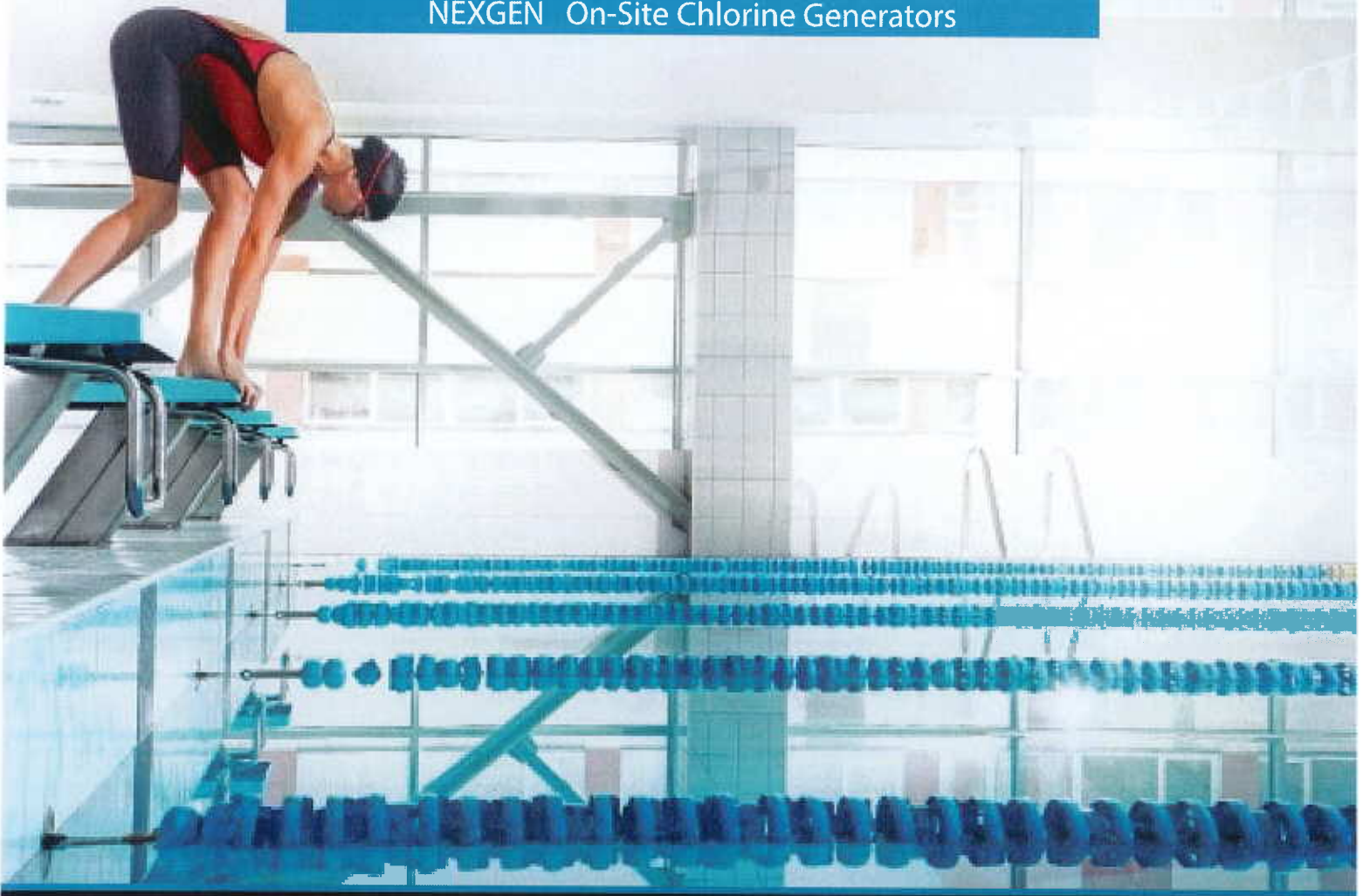


— Safer water through smarter technology —

NEXGEN On-Site Chlorine Generators



Make Your Water As Incredible As Your Pool.

Chlorking NEXGEN_{pH} onsite chlorine generators are leading the way to better, safer water. Their unique, forward-thinking design generates HOCl (hypochlorous acid) from salt that is stored on site. NEXGEN_{pH} eliminates the costs, risks and smell associated with shipping and storing traditional chlorine. And it pays for itself through lower cost of operation and a longer lasting system. Most often used for commercial pools and water parks, the system can be also fully customized to meet your needs. See what a difference NEXGEN_{pH} could make for your water.



NEXGEN_{pH}: Advanced On-Site Chlorine Generators

ChlorKing® NEXGEN_{pH} forward-thinking designs were created specifically for commercial swimming pool applications. Ranging in sizes from 10 – 120 lbs per day, these generators are ideally suited for all commercial swimming pools and water parks. The unique design, simplicity and ease of use make this line of generators the most viable alternative to traditional chlorine available on the market today.

Why generate Chlorine on-site?

With fuel costs continuing to rise and bulk storage of chlorine becoming an ever-increasing problem, many pool operators are seeking safer, more cost effective solutions for the sanitization of commercial swimming pools. On-site production of chlorine as a solution of hypochlorous acid alleviates those

unnecessary risks and puts an end to ever increasing chlorine prices and storage issues. The only raw material, salt, is an inert, safe compound that is stored in a feeder on-site and used as required by the chlorine generator.

pH neutral chlorine (HOCl): The innovator.

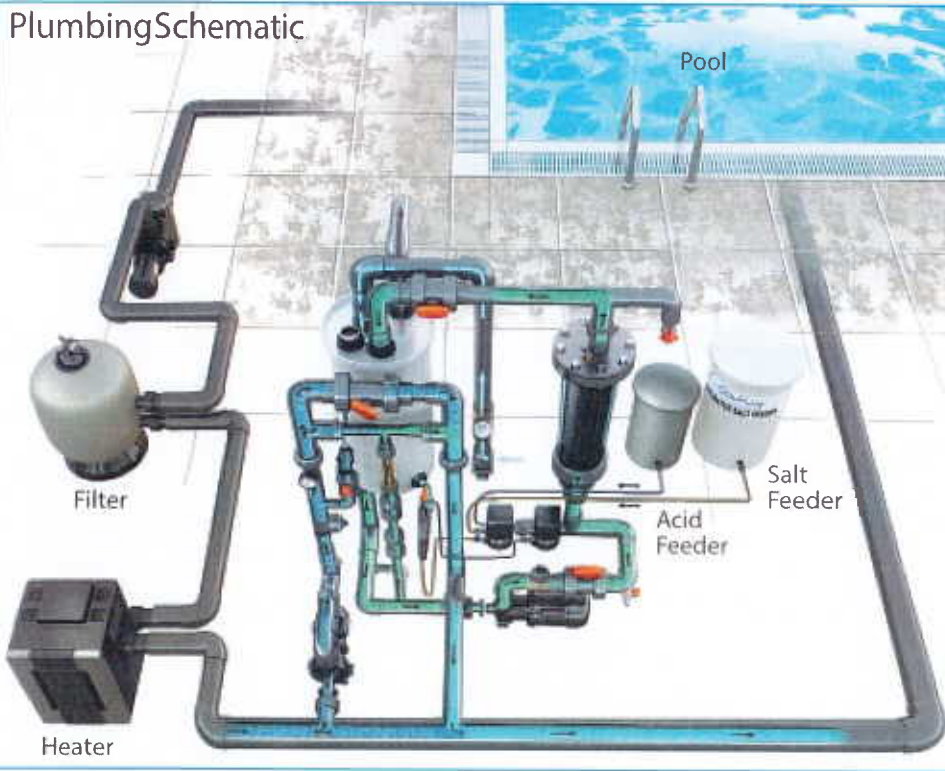
The first of its kind in the swimming pool industry, ChlorKing® NEXGEN_{pH} systems are designed to control the pH of the chlorine during the manufacturing process at a range of 7-8 (user adjustable). This unique design produces HOCl which is the primary sanitizer in bleach, and can be used for not only your pool, but sanitizing your facility as well.

How is NEXGEN_{pH} different than a

salt chlorinator?

The ChlorKing® line of traditional salt chlorinators, as with all salt chlorinators available on the market, require salt to be added to the pool and maintained between 3,000 – 5,000 ppm. Salt needs to be added to the pool on a consistent basis due to water loss from backwashing, rainfall and leaks. The ChlorKing® NEXGEN_{pH} line of products does not require salt in the pool, and you never add salt and never test salt levels. The NEXGEN_{pH} system simply makes HOCl from salt that is stored in a vat in the pump room. If your pool leaks, has heavy use or dilution, or you simply don't want a salt pool, but still want the benefits of producing chlorine right on-site, then NEXGEN_{pH} is for you.

Plumbing Schematic



NEXGEN_{pH} On-Site Chlorine Generator MODELS

NEXGEN_{pH} 10
12 lbs/day

NEXGEN_{pH} 20
24 lbs/day

NEXGEN_{pH} 40
48 lbs/day

NEXGEN_{pH} 50
60 lbs/day

NEXGEN_{pH} 60
72 lbs/day

NEXGEN_{pH} 80
96 lbs/day

NEXGEN_{pH} 100
120 lbs/day



Safer water through smarter technology.

ChlorKing pioneered on-site chlorine generating technology in the 1970s. Realizing the potential for swimming pools and commercial applications, the company began generating "ultimate water" with simple, yet highly advanced technology. Today, ChlorKing® leads the way in commercial saline chlorination and is consistently seeking new frontiers in sanitizing solutions including ultraviolet light technology and their NEXGEN_{pH} onsite chlorine generators. These environmentally friendly solutions are changing the way we treat H₂O.



03-2013

Salt Chlorination Systems • Ultraviolet Light Systems • Mixed Oxidant Systems



Bulk delivered sodium hypochlorite

Chemistry:

- pH: 12-13
- Concentration: 12% (120,000ppm)
- NACl: approx. 2lbs. / 1 gallon

Storage recommendations to reduce formation of chlorates and perchlorates:

- Dilute stored hypochlorite solutions upon delivery.
- Reduce temperature of stored hypochlorite.
- Control pH between 11-13
- Use fresh hypochlorite solutions whenever possible

Handling

- Hypochlorite solutions are corrosive to eyes, skin and mucous membranes.
- Care should be taken and protective clothing should be worn at all times around solutions.

Negative risks associated with stored hypochlorite

- Emergency shower and eyewash facility should be in close proximity
- Insure adequate ventilation
- Avoid breathing fumes
- Avoid contact with skin, eyes and clothing
- DO NOT mix with acids, ammonia, heavy metals, ethers or reducing agents to avoid releasing hazardous gas.
- Restricted by OSHA and EPA regulations.
- Double containment required in case of spills.
- Accidentally injecting acid and hypochlorite at the same time can result in hazardous gassing from return line of swimming pool resulting in injury to bathers.

Positives

- High concentration allows for rapid increase of ppm in the swimming pool.

NEXGEN on-site produced sodium hypochlorite

Chemistry

- pH: 9.3 produced, adjusted to 7.5
- Concentration: .25% (2,500ppm)
- NACl: approx. 2lbs. / 1lb

Storage recommendations:

- None (produced on-demand)

Handling

- None (closed loop system)

Negatives

- Diluted solution requires longer run time of equipment (correct upfront sizing of system is essential).

Positives

- Diluted solution allows for injection of muriatic acid into production tank to lower pH to 7.5 without any chance of gassing off. Approx 50% less muriatic acid used than stored hypochlorite.
- Diluted solution has no OSHA or EPA regulations.
- Producing on demand means limited storage and no formation of chlorates and perchlorates.
- Pool controllers can feed chlorine and acid at the same time without chance of gassing off.
- Swimming pool water used for sodium hypochlorite production which reduces fresh water needed, saving water.

Producing sodium hypochlorite on-site in a NEXGEN system is far safer for both operators and bathers. The risk associated with transporting and storing solutions is removed with this technology improving the "green footprint" of the facility.

Risk management is also reduced by not storing sodium hypochlorite and muriatic acid together.

NEXGEN Savings Calculations

Operation & Maintenance Savings

Liquid Chlorine Savings Per Year

Hypochlorite Generation Savings = (Current Treatment Usage (Gal/yr) – Post Installation Usage (Gal/yr)) × Chlorine Cost ($\frac{\$}{gal}$)

- Current treatment usage (gallons of chlorine per year): 6,205
- Post installation usage (gallons of chlorine per year): 310
- 5% of current usage for safety factor
- Liquid chlorine cost (\$/gal): \$3.55
- Liquid chlorine savings per year: \$20,947

Acid Savings Per Year

Acid – pH Savings = (Current Treatment Usage ($\frac{Gal}{yr}$) – Post Installation Usage ($\frac{Gal}{yr}$)) ×

Acid pH Cost ($\frac{\$}{gal}$)

- Current treatment usage (gallons of acid per year): 3,103
- Post installation usage (gallons of acid per year): 1,551
- Rate of acid to chlorine with current treatment: 50%
- Rate of acid to NEXGEN post installation: 25%
- Acid pH cost (\$/gal): \$4.48
- Acid savings per year: \$6,950

NEXGEN Machine Maintenance Cost Per Year:

- NEXGEN electric cost per year: **(\$3,040)**
- Electronic cells cost per year: **(\$3,237)**
- Salt cost per year: **(\$473)**
- Water dilution savings: \$1,239
- Machine maintenance cost per year: **(\$5,511)**

Overall O&M Savings per Year: \$22,386

Electric Savings

Electric Savings = (Current Pool Pump Motor Usage ($\frac{kWh}{yr}$) – Post Installation Usage ($\frac{kWh}{yr}$)) ×

Electric Blended Rate ($\frac{\$}{kWh}$)

- Current pool pump motor usage per Year: 80,282 kWh
- Post installation new motor and pump usage per year: 39,185 kWh
- Electricity cost per kWh: \$0.16
- New motor and VFD savings per year: \$6,578

Natural Gas Savings

Natural Gas Savings ($\frac{\$}{yr}$) = (Current Natural Gas Usage ($\frac{therms}{yr}$) – Post Installation Usage ($\frac{therms}{yr}$)) ×

Natural Gas Cost ($\frac{\$}{therm}$)

- Current natural gas usage: 1,282 therms
- Post installation natural gas usage: 64 therms
- Natural gas cost per therm: \$1.27
- Natural gas savings per year: \$1,543

SALINAS Teren (ENGIE North America)

From: Shawn Hunsberger <shawn.hunsberger@aquaengineering.org>
Sent: Wednesday, April 6, 2022 8:03 AM
To: SALINAS Teren (ENGIE North America); GOERING Jacob (ENGIE North America); ARIMOTO Rylan (ENGIE North America)
Cc: Doug d'Heilly
Subject: ⚠ Salt vs Sodium Hypo
Attachments: Salt vs NEXGEN.pdf

NEXGEN produces Sodium Hypochlorite in exactly the same way and a Salt system does (electrolysis). The only difference is that a traditional salt system requires an elevated salt level in the pool, where NEXGEN doesn't require any salt in the pool.

With a Saline system - Inline Salt System, The salt is put into the pool directly and most systems require 3,000 – 5,000 ppm. You have to test for the salinity level in the pool daily. As fresh water is added to replenish water lost from evaporation, splash-out, and backwashing, you have to keep adding more salt to keep the proper salt ppm level. For outdoor pools you also have to add more salt after rain since that also dilutes the salt ppm level.

Since you are putting salt into the pool, you are making your pool a brine pit and using that water to pass through the cell to make chlorine. The salt content over a period of 2-3 years will start eroding any metal components in your pool such as pump motors, and heaters.

The cell is installed in-line, meaning that it is plumbed into the circulation and filtration line. This results in two problems. One, since the pool water passes through the cell the calcium will precipitate on the cell. Calcium is a detriment to the electrolytic process. Once the cell is covered in calcium it does not work properly and damages the cell. It also requires constant acid washing to keep the cells as clean as possible. This cannot be avoided since you have to maintain proper calcium levels in the pool water. The second problem is the cell is in-line and you cannot make chlorine during the time it takes to dismantle the cell and complete the acid washing procedure or any time maintenance is needed or when the system is not working.

Another problem with these types of systems is that you are making chlorine and dispensing it directly into the pool as it is made, with no way of storing it when not needed. The cell will produce a certain amount of pounds per day of chlorine over a 24 hour period. The problem this presents for a commercial pool is that most of the chlorine consumption is during the daytime hours, not at night. Therefore, the generator cannot keep up with the bather demand during the day which then requires the use of adding purchased chlorine. This defeats the purpose of buying a generator. When you don't have many people in the water, and at night, the chlorine ppm level keeps rising unless the generator is manually shut off which is not a good solution since you will not be generating what your daily consumption requires over that 24 hour period.

[On-site Sodium HypoChlorite Generator \(NEXGEN\)](#)

The process begins with using the chemistry of the existing pool water.

The water flows to the brine tank. The salt the system requires is contained in the brine tank...not in the pool.

Once the water mixes with the salt in the tank, the brine water then flows to the cell which is located in a cabinet mounted on a skid (not in-line with the pool circulation and filtration system).

The cell is where the chlorine reactions are made and then the chlorine solution flows to a holding tank (oxidant tank) and stored. Once the tank is full the generator will stop producing chlorine and go into a **standby** mode automatically.

The oxidant tank has a level sensor that detects the volume level in the tank. As the tank volume decreases the generator will start up automatically and begin producing more chlorine to refill the oxidant tank. The chlorine is simply fed from the oxidant tank to the pool return line via chemical metering pumps or venturi systems as needed from swimmer demand.

The oxidant tank is sized for the entire demand of daily consumption therefore peak swimming times and moderate swim times can be accommodated without any adjustments to the chlorine generator.

Advantages of the on-site chlorine process for commercial facilities:

1. Salt is **not** added to the pool, therefore staff is **not** required to test for salt levels in the pool and **do not** have to add salt to the pool from water loss or dilution from rainwater. This also results in less salt usage since the amount of salt to operate the system is minimal compared to when put in to the pool. It is usually 65 – 80% less. There is also no corrosion of metals in the pool or in the pool area (indoor pools).
2. The brine water going into the cell does not have high calcium concentrations. This process results in longer cell life and less acid washing of the cell.
3. Since the cell is not installed in the circulation and filtration lines the chlorine made can be stored when not needed and the system does not have to run 24 hours.
4. The oxidant tank already holds the daily volume of chlorine therefore any system maintenance can be done without shutting down the pool circulation system since the chlorine can still be pumped in to the pool during that time period without the generator operating.
5. Safety for operators. The chlorine concentration produced at the cell and in the oxidant tank is **0.8%**. This is considered non-hazardous as hazardous chemical requirements begin at 1%. For example, commercial bleach (sodium hypochlorite) is delivered at 10 – 12%. Clorox is 5.25%.
6. Less chemical consumption for pH and TA adjustments. Commercial bleach is made at a pH of 13.0 and Calcium Hypochlorite is 11.8. The on-site chlorine generator produces chlorine at a pH of 7.0 – 8.0 therefore less acid is required for pH adjustments and less sodium bicarbonate (baking soda) will be required to maintain the Total Alkalinity in the pool water.
7. The on-site generator produces chlorine at a much lower pH than that of purchased sodium or calcium hypochlorite. This provides an improved inactivation of microorganisms and increases water quality by reduced disinfection byproducts. **As a result, Inorganic Chloramines go through the breakpoint mechanism quickly which eliminates the eye burning and skin irritations to swimmers and staff, and there are no odors in the water and/or around the pool area.**

Thanks,

Shawn Hunsberger

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