

BACO



A solution for water and environmental pollution

Electrochemical Disinfection Systems

General Catalogue 2020



Water, Sanitation and Health

We design, manufacture and install electrochemical disinfection systems worldwide.

Disinfection of water is important everywhere.

A very high share of diseases is caused by unsafe drinking water, inadequate sanitation and poor hygiene: 2018 *WHO estimated 502 000 diarrheal deaths each year in addition to cholera, dysentery, typhoid and polio.*



Water Disinfection

Water disinfection means removal, deactivation or killing of pathogenic microorganisms and organic contaminants.

Our disinfectants not only kill the microorganisms, they have also a residual effect, which means that they remain active in the water after disinfection.

The system is inexpensive and safe: With the electrolyzing reactor (fed by water and salt) the reactor produces an eco-friendly disinfectant solution with no residual and waste.

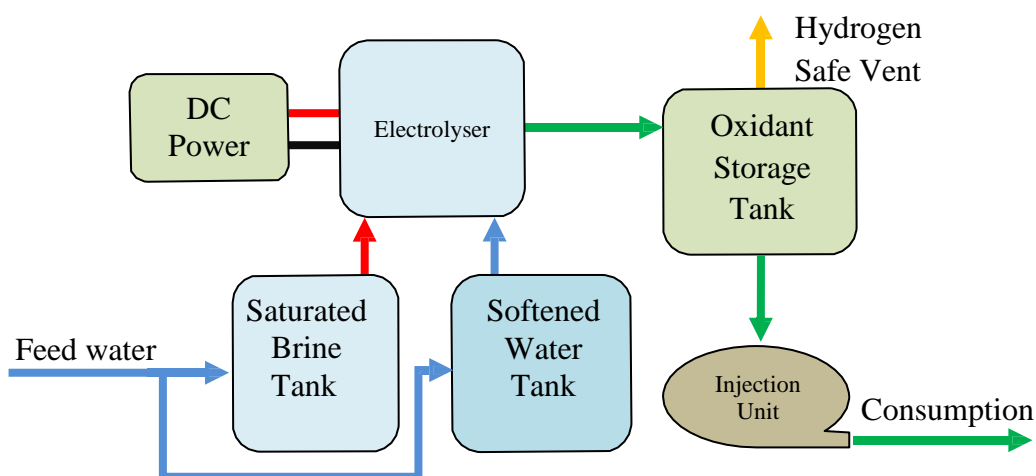
We use very special titanium electrodes (anode/cathode) which are titanium dioxide coated and very long lasting.

According to the different applications the dosing of the mixed oxidants is 2-200 ppm (the value is similar to free available chlorine).



How does BACO SYSTEM work?

Feed water after softening splits into two lines. One is used to feed a saturated brine storage tank, creating saturated brine and another line enters the softened water storage tank. Two streams will be mixed and a brine solution with specific concentration will be made prior to the Electrolyser. Using DC electrical current, the oxidants solution is produced after electrolyzing the diluted brine. The product is stored in an oxidant solution storage tank. Stored oxidant solution will be used based on the consumers need. It could be diluted for direct uses or injected into the water stream or water storage tanks. Injection could be done by different devices such as chemical metering or centrifugal pump, venturi injectors or a combination of them. The Hydrogen gas that produced during the electrolyzing process will be vented safely from the oxidants storage tank. All the process will be done automatically with a Programmable Logic Controller (PLC) and the operator should pour salt into the saturated brine storage tank and do some check-ups a day.



Disinfection Applications

- Potable and sanitized water treatment
- Process water in industrial application
- Cooling towers and boilers
- Swimming pools and ponds
- Wastewater treatment and effluent plant
- Food industry, food washing
- Indoor cleaning and disinfection

Advantages

- Highly stable during the storage
- High stability in distribution networks
- Stable concentration of free residual chlorine
- Decreasing water odor and improving its taste
- Without chlorine odor during its production and storage
- Highly effective in biofilm removal due to chlorine dioxide



Applications and References

➤ Potable and Sanitized Water

All potable and sanitized water must be cleaned without any microbial pollution which is easily accessible by the BACO system.



**Potable Water Disinfection Plant
Shehne-Yazd -2018
Capacity: 2000 l/s**



**Potable Water Disinfection Plant
Borazjan-Booshehr -2018
Capacity: 400 l/s**



➤ Water in Industrial Application

Water microorganisms are the source of problems in the industry. Water circulation in the cooling towers and also the water used in boilers should be free of microorganisms which can be removed by mixed oxidants solution.

Furthermore, the available oxidants in the BACO system solution may be utilized in some chemical processes of the industries.



Industrial Water Disinfection Plant
RO Plant - Esfahan Oil Refining Co.-Esfahan -2020
Capacity: 80 kg FAC/d



Industrial Water Disinfection Plant
NajafAbad-Esfahan -2020
Capacity: 40 kg FAC/d



➤ Disinfection of wastewater Treatment Plant Effluent

The wastewater effluent can be sanitized using a BACO SYSTEM before disposing it in surface water or applying for agriculture. The BACO SYSTEM can cost-effectively disinfect the effluent of wastewater plants without generating harmful by-products.



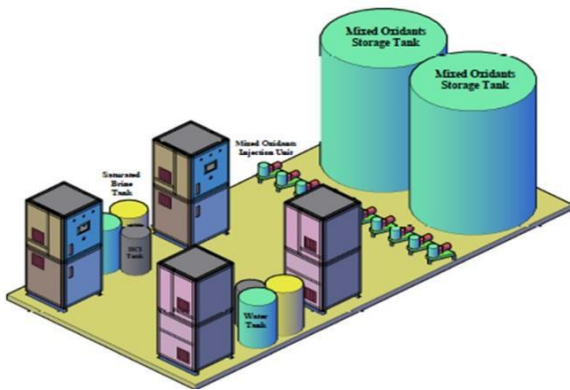
➤ Swimming pools and ponds

The chlorine disinfectant is common in all swimming pools and ponds and their facilities. The BACO system is not only providing the best disinfectant solution but also decrease the cost of sanitation operation for these facilities. Moreover, the combination of different oxidants decreases the chlorine odor, skin problems and irritations and the water chemicals and by-products.

Aqua Park and Swimming Pool Water Disinfection
Tehran Aqua Park - 2019
Capacity: 160 kg FAC/d



Aqua Park and Swimming Pool Water Disinfection
Tehran Medical University Swimming Pool - 2019
Capacity: 6 kg FAC/d



➤ Indoor Cleaning and Disinfection

The BACO SYSTEM can be utilized for indoor cleaning and disinfection such as operation rooms, hospitals, hotels, rest rooms, laundry rooms and so on as an efficient and cost effective disinfectant solution.



Specification and Sizing

Parameter/Model	BACO 3	BACO 5	BACO10	BACO15	BACO20	BACO30	BACO 40
Production Capacity as Free Available Chlorine	3 kg/d	5 kg/d	10 kg/d	15 kg/d	20 kg/d	30 kg/d	40 kg/d
Salt Consumption For Each kg of Free Available Chlorine	4 kg Salt/kg FAC						
Energy Consumption For Each kg of Free Available Chlorine	7 kW-hr/kg FAC						
Concentration of Disinfection Solution as Free Available Chlorine	7000 ± 1000 mg/l						
Flow Rate of Disinfection Solution (Feed Water Flow Rate)	429 lpd	714 lpd	1428 lpd	2143 lpd	2857 lpd	4285 lpd	5714 lpd
Nominal Energy to Electrolyser	21A DC 1.1 KVA	37A DC 1.8 KVA	73 A DC 3.6 KVA	109 A DC 5.5 KVA	146 A DC 7.3 KVA	218 A DC 10.9 KVA	292 A DC 14.6 KVA
Electrical Service Req.	380 VAC 3ph 1.6 A 50/60 Hz	380 VAC 3ph 1.8 A 50/60 Hz	380 VAC 3ph 5.5 A 50/60 Hz	380 VAC 3ph 8.3 A 50/60 Hz	380 VAC 3ph 11.1 A 50/60 Hz	380 VAC 3ph 16.6 A 50/60 Hz	380 VAC 3ph 22.2 A 50/60 Hz
Approx. Area for Installation Room	12 m ²	12 m ²	24 m ²	24 m ²	30 m ²	36 m ²	40 m ²
Ambient Required Temperature	10 to 40 °C						
Recommended Feed Water Temp	10 to 30 °C						
Allowable Feed Water Temp	5 to 35 °C						
Allowable Feed Water Pressure	0.5 to 3.0 kPa						



How to calculate the oxidants need

Generally dosage of solution to disinfect water or wastewater is calculated by measuring needs for chlorine. But standardly disinfection is applied by following dosage:

- Disinfection of process feed water	1-4 mg/L (ppm)
- Disinfection of boiler's make up water	1-4 mg/L (ppm)
- Disinfection of potable water	1-4 mg/L (ppm)
- Disinfection of wastewater treatment effluents	5-15 mg/L (ppm)
- Disinfection of cooling tower make up water	1-4 mg/L (ppm)
- Disinfection of tools and cleaning in place	150-200 mg/L (ppm)
- Disinfection and washing the bottle	150-200 mg/L (ppm)
- Disinfection and washing the process tools	150-200 mg/L (ppm)
- Disinfection and washing the fruits and vegetables	50-150 mg/l (ppm)

Examples

➤ Once Through Streams

Suppose that we have potable water with flow rate of 200 l/s in pipe line and 1 ppm as free available chlorine is required. Multiplying the flow rate (200l/s) by 86.4 the required free available chlorine will be 17280 gr/d. This amount of chlorine will be produced with BACO 20 in a day. According to the average 7000 ppm FAC concentration of the disinfection solution, the total volume of solution to inject in pipe-line will be 2468 liters. This amount of solution should be injected in pipe-line by rate of 103 l/hr. So one dosing pump by minimum injection rate of 103 l/s is required. If you want to have less than 1 ppm FAC in water, you should simply adjust the dosing pump and decrease the injection.

Other flows like wastewater effluents, cooling water, etc. have similar calculations.

➤ Circulated Streams

Swimming pool water disinfection is a good example. Swimming pool water will be circulated during the day and disinfection solution should be injected in circulation line. According to local standards, the residual free available chlorine of water should be in a certain range. But the chlorine demand of water in a swimming pool will be changed by occupation and the number of users. So the operator should measure the residual chlorine and adjust the dosing pump to achieve that amount. If you want to keep the residual chlorine in a certain amount without a operator, a chlorine analyzer is required to send a feed back to dosing pump and adjust the dosing rate automatically.



