evoqua
WATER TECHNOLOGIES

# DISINFECTION SOLUTIONS FOR FOOD & BEVERAGE

## DISINFECTION, SAFETY & SANITATION

## ABOUT US

Evoqua Water Technologies is a leading manufacturer of disinfection solutions. Wallace & Tiernan® systems have been established within the market for over 100 years, and ATG™ UV sytems provide ultraviolet solutions for a range of municipal and industrial applications. Pacific Ozone™ air-cooled ozone generators and systems have been proven in industrial applications around the world.

# Disinfection Systems for Food & Beverage Applications

Food and Beverage production consumes significant volumes of water globally, and so reducing the associated water footprint of production without compromising its quality is an essential target of the industry, especially in water challenged regions.

Microorganism contamination can affect taste, colour, odour, and shelf life of bottled water, soft drinks, and a wide variety of beverage and food products. It is critical that product or process water is free from these contaminants to ensure water quality is of the highest standards and meets production requirements.

In this safety-conscious market with stringent regulations, manufacturers trusted with food safety are challenged to keep their production process sanitised without introducing impurities into their products. Evoqua understands the specific process requirements in this industry and the importance of keeping employees and products safe. With innovative products and service capabilities, Evoqua is focused on sustainable solutions that are efficient, reliable and compliant with the applicable regulations, standards and codes, while providing security of supply for on-site disinfection.

We at Evoqua have the broadest range of disinfection solutions, including UV, Ozone and Chlorine based disinfection systems that allow manufacturers to gain complete control over potential contamination and reduce the risk of costly production downtime, product recall, spoilage, or damage to brand equity. Evoqua Analyzers and Controllers provide monitoring solutions for disinfection process parameters assuring compliance with health, safety and regulatory standards.

| Application | UV | Ozone | Chlorine Dioxide | OSEC |
|---|---|---|---|---|
| Pre-treatment | • | • | • | • |
| RO/ CDI Protection | • | | | |
| CIP | | • | • | • |
| De-chlorination | • | | | |
| De-ozonation | • | | | |
| Bottle Rinse | • | • | • | • |
| Product Water | • | | | |
| Final Product | • | | | |
| Liquid Sugar | • | | | |
| Rinse Water | • | • | | • |
| Barrel Sanitization | | • | | |
| Surface Sanitization | | • | | • |
| Utility Water | • | • | • | |
| Water Re-Use | • | | | • |

# Ultraviolet Solutions

## UV IN THE FOOD AND BEVERAGE MARKET

UV disinfection can inactivate waterborne microorganisms including bacteria, moulds, yeasts and algae. With a number of “emerging” pathogens now displaying increased tolerance to only chlorine disinfection, Cryptosporidium for example, UV is now used for disinfection in conjunction with conventional chemical methods, for a total solution. Within the food and beverage market, UV provides a chemical free, odour and taste free option for disinfection. Our leading UV technology is used by many global food and beverage brands to reduce the risk of product rejection and increase shelf life.

## WHAT IS UV DISINFECTION?

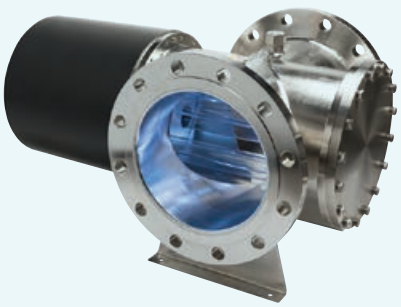
UV disinfection is a highly effective, chemical free, physical disinfection process. Ultraviolet light at 254 nm (UV-C band) permanently damages the DNA and RNA of all living microorganisms, rendering them harmless and unable to replicate. Microorganisms that are exposed to the correct dose of UV-C effectively ‘die’ at their next natural reproductive cycle, reducing process risk and extending product shelf-life.

As microorganisms cannot reproduce, genetic mutation is significantly less likely to occur, meaning no known microorganism has developed any immunity to UV disinfection, including chlorine resistant microorganisms such as Cryptosporidium and pasteurization tolerant, thermophilic bacteria. Industry standard doses of 40 mJ/cm$^2$ will typically provide >4 log (99.99%) reduction of all known microorganisms, in a single pass (0.5 seconds exposure) through the UV System.

## EVOQUA UV RANGE

Evoqua offer a range of medium and low pressure UV models to suit your application. The industry leading technology features closed vessel UV chambers with no harmful byproducts produced, enhancing user safety. The systems are supported by the Spectra controller to offer basic controls to full plant room system integration.

LOW PRESSURE VX



MEDIUM PRESSURE SX

### Advantages of Utilising UV

- Chemical free and environmentally friendly disinfection
- Does not change the organoleptic properties (taste, odour, texture or pH) of the liquid
- Effective against all known bacteria, moulds, spores and viruses
- Effective against chlorine resistant and thermophilic strains
- Improves shelf-life and reduces process risk
- Fully automatic process and cannot be overdosed
- Small installation footprint, easy to install and simple operate
- Qualifies as a CCP (Critical Control Point) disinfection barrier
- Independent 3$^{rd}$ party, validated disinfection performance

## 37,000 L

Dayla, now part of Vimto, has a daily output of 15,000 litres of juice products and 37,000 litres of syrup products.

## 120 mJ/cm

The UV system delivers a UV dose of 120 mJ/cm, ensuring a 4-log reduction of Cryptosporidium and adenoviruses and a 5-log redution of viable bacteria.

A fish processing facility in Norway detected Listeria monocytogenes whithin their plant and needed a quick and effective solution. Within three weeks the company had received a Evoqua PC series trolley mounted system. The system provides instant ozonated water anywhere. Since the introduction of ozone to the processing plant no listeria has been detected anywhere within the plant, process machinery or final product.

# Ozone Systems

## OZONE IN THE FOOD AND BEVERAGE MARKET

Ozone's efficacy as a universal and broad-spectrum disinfectant against yeasts, moulds, bacteria, viruses and biofilms is well documented, and has been globally adopted in water treatment processes for decades. Ozone is particularly suited for the food and beverage industry due to its ability to disinfect microorganisms without adding any chemicals to process. This avoids the issue of creating disinfection by-products. After short period of time ozone reverts back to oxygen, leaving no harmful chemical residuals or altering the taste which is essential for this industry.

Ozonated water can also be used to disinfect equipment and surfaces. It can also be used to sanitize hygienic production areas, packaging/ filling lines and help to preserve food in the storage. Ozone is a perfect replacement of hot water disinfection which avoids frequent heat expansion of pipes, joints and tank material.

## WHAT IS OZONE?

Ozone, the tri-atomic form of oxygen (O3), is a very powerful oxidizer with twice the oxidizing potential of traditional disinfection agents. There are many applications that utilize the affects of ozone. One of the most popular applications is the use of ozone as microbiological disinfectant. As a microbiological disinfectant ozone works by oxidizing the cells membrane and interfering with the metabolism of the cell killing it.

Ozone is most commonly produced for industrial use by high voltage electrical discharge (corona discharge). Corona Discharge is the most efficient commercialized method for ozone production. It uses a reaction chamber with a dielectric barrier in which high voltage is applied to an oxygen feed gas to generate ozone. Modern corona discharge units are adjustable to throttle ozone production up or down under dynamic conditions when load and demands change. Most advanced corona discharge ozone generators use enriched oxygen from oxygen concentrators (usually +90% by weight) as the feed gas for more efficient ozone production and lower overall operating costs.

## EVOQUA OZONE RANGE

Evoqua's Pacific Ozone System uses a patented floating plate technology to produce ozone which allow us to be very compact without compromising the efficiency of our ozone generators. In addition, our generators are air-cooled which results in less maintenance, lower power consumption, and ease of installation.


PC3 PORTABLE CART

### Advantages of Ozone

- Chemical Free: no disinfection byproducts in the process or waste
- No required flushing of the system
- No chemical transportation/storage
- Quicker: typical sanitization cycles are reduced by 30% to 75%
- Ozone can be removed instantaneously in the water by UV at 254 nm
- Saving energy as no hot water is required

# Chemical Disinfection

## CHEMICAL DISINFECTION IN THE FOOD AND BEVERAGE MARKET

Utilising in-situ generation of sodium hypochlorite and chlorine dioxide provides the food and beverage plants the flexibility to produce their own safe disinfectant and utilise it around their applications. The use of chlorine based chemicals has been proven over a hundred years for drinking water before contributing to the safety in the industrial production and sanitation processes. Chlorine effectively kills microorganisms in the water, in addition, water with a chlorine residual is ideal for sanitising applications.

Evoqua offers two on-site generating technologies: the OSEC® on-site sodium hypochlorite generation system by means of electrolysis and the most reliable Chlorine Dioxide DIOX generator. The use of chlorine dioxide is increasingly common in food and beverage production due to its high efficacy (strong reactivity) and limited disinfection byproduct formation potential.

## WHAT IS CHLORINE DIOXIDE GENERATION?

Chlorine dioxide provides excellent microbiological control for a range of food and beverage processes. When added to water it helps destroy bacteria, viruses and some parasites such as Crypotsporidium and Giardia. Chlorine dioxide generation can be based on two methods: Acid-Chlorite and Chlorine-Chlorite. In both instances chlorine dioxide is produced as an aqueous solution with a constant strength. For the Acid-chlorite method Hydrochloric acid (HCl) and Sodium Chlorite (NaClO2) are used, and for the Chlorine-Chlorite method Sodium Chlorite (24.5% NaClO2) and Chlorine (Cl2) gas are used. Optimal ration of the two chemicals ensures maximum yield of chlorine dioxide.

## WHAT IS AN OSEC SYSTEM?

Sodium hypochlorite added to water can destroy germs associated with raw foods. It is also a proven solution for disinfection of production equipment, food preparation surfaces and transportation containers. OSEC systems provide for on-site, on-demand production of sodium hypochlorite solution from salt, water, and electricity. Generation takes place on demand only, by electrolyzing the brine solution.

Sodium hypochlorite solution is produced in batch operation and retains its strength even if it is stored over an extended period of time. The sodium hypochlorite is then added to water to disinfect surfaces, produce or containers.

DIOX A CHLORINE DIOXIDE GENERATOR

### Advantages of Chlorine Dioxide Generation

- On demand production means you only produce what you need, lowering costs and reducing waste
- Proven against bacteria, viruses and some parasites to ensure safe food and beverage production
- Pathogens cannot become resistant to Chlorine dioxide
- Fast acting, solution, surfaces can be disinfected within one minute
- Safe operation

A bavarian brewery was able to enhance their disinfection capabilities and provide more flexibility in the applications by installing a DIOX-A-1000 chlorine dioxide generation system. The systems allowed them to produce 1000g/h ClO2 and the ditstribution system made it available at crucial points of consumption including CIP, bottle washing and utility water.


OSEC SODIUM HYPOCHLORITE GENERATOR

### Advantages of an OSEC System

- Significantly lower cost than purchased bulk hypochlorite
- Production on demand means that there is no chemical degradation—you only produce what you need
- Proven chemical in destroying contaminants, and residual allows for ongoing protection
- Consumes only water, salt and electricity
- No concerns for transporting or storing chemicals on-site

# Monitoring and Control

An important part of all water treatment processes is the careful monitoring of the water being used. One further step is then the control of equipment to ensure that processes operate at maximum efficiency and safety. Monitoring industrial systems can be via continuous automated options, or manual methods. The method chosen will depend on the application, volume of water used, and available resources. As well as measuring chlorine, Evoqua analyzers can monitor a range of water quality indicators to ensure that only the highest quality water is used for its application.


DEPOLOX® 400 M ANALYSER

## Advantages of Monitoring

- Reducing risks and costs associated with under and over feeding of chemicals
- Ensures compliance to regulations and standards
- Enables quick identification of any quality issues
- Minimize chemical, energy and water costs
- Improve plant operation through ensuring efficient processes
- Provides traceability

| Product | Description |
|---|---|
| SFC | Flexible disinfection measurement and control systems |
| MFC | Online process analyzer for the measurement and control of multiple disinfection process parameters |
| DEPOLOX® 700 M Analyser | Online process analyzer for the measurement and limited control of disinfectant concentration in clean water applications |
| DEPOLOX® 400 M Analyser | Online process analyzer for the measurement of disinfectant concentration in clean water applications |
| Variansens | Flow cell for use with membrane sensors. Compatible with MFC and SFC electronics modules |
| Sensors | • electrode sensors: free chlorine, ClO2, DO3, KMnO4, pH, ORP, conductivity, temperature<br>• membrane sensors free chlorine (FC1), ClO2 (CD7),DO3 (OZ7), total chlorine (TC1) |

# Service

Evoqua Water Technologies is one of the world's leading providers for water treatment equipment and service. We offer industrial customers and communities sustainable solutions for highly efficient water usage and supply.

Service is a key issue for the satisfaction of our customers. Aftermarket services offers unique, product-related service and support across a product's entire lifecycle.

To protect your investment in our premium quality equipment, we deliver unrivalled after-sales service packages—including technical support, training, on-site service, troubleshooting and spare parts—provided by a worldwide network of factory trained and dedicated professionals.

## EVOQUA SERVICE

**Service Contracts**—Recurring scheduled services with a defined scope of work for operations, or maintenance of a customer's water treatment systems.

**Field Services**—One time event services covering a broad range of activities; equipment repairs, warranty services, new equipment startups, unscheduled maintenance and safety audits.

**Spare Parts/Repairs**—Evoqua provides both proprietary spare parts, consumable items and comprehensive repair services for clients.

**Technical Support**—Evoqua can quickly support you in all technical queries during the complete product life cycle.

**Training**—Evoqua offers training directly from the manufacturer and therefore first hand know-how. The courses comprise the entire disinfection range.

TRANSFORMING
WATER
ENRICHING
LIFE

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WATER TECHNOLOGIES

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