

# HALOX Products Fact Sheet

## Chlorine Dioxide (ClO<sub>2</sub>) For Food And Beverage

### Introduction

Chlorine dioxide provides excellent microbiological control for brewing and bottling, and in the preparation of fruit and vegetables, poultry and other meats, fish, and dairy. ClO<sub>2</sub> provides excellent microbiological control in flume waters, packaging operations and process disinfection. ClO<sub>2</sub> does not react with most "organics" in flume water, which makes it a very effective disinfectant. It also neutralizes foul smelling secondary and tertiary amines formed in the meat packing industry. Dirt and organic compounds from cleaning and packaging provide nutrients for microorganisms. As food processing plants recycle more water, organic loading and microbiological growth increase. In beverage processing, water-lubricated conveyor lines are also prone to bacterial contamination and biofilm formation.



### Chlorine dioxide

Halox chlorine dioxide is a stable, dissolved gas that is a strong bactericide and virucide at concentrations as low as 0.1 ppm in water. With minimal contact time, ClO<sub>2</sub> is highly effective against many pathogenic organisms such as Listeria, E. Coli, Salmonella, amoebal cysts, Giardia cysts, Legionella, and Cryptosporidium. ClO<sub>2</sub> reduces biofilm and significantly impedes regrowth. It is effective over a wide pH range. At recommended levels, ClO<sub>2</sub> has no adverse taste or odor. ClO<sub>2</sub> reduces biofilms so bacterial regrowth is significantly impeded.

ClO<sub>2</sub> does not ionize to form weak acids (as chlorine and bromine do) in aqueous solutions. This allows ClO<sub>2</sub> to be effective over a wide pH range. ClO<sub>2</sub> is approved and recommended by the U. S. Environmental Protection Agency as an environmentally friendly drinking water additive to replace chlorine. Because U.S. Federal law prohibits the transportation of ClO<sub>2</sub>, chlorine dioxide is generated on-site at the point-of-use.

### Chlorine Dioxide Approvals

- United States Environmental Protection Agency (USEPA)
- United States Food and Drug Administration (FDA)
- Building Services Research and Information Association of the UK (BSRIA)

### Halox SRE Electrochemical Chlorine Dioxide Generators

In February 2005, the U. S Food and Drug Administration amended the food additive regulations (21 CFR Part 173.3) to permit the manufacture of ClO<sub>2</sub> by electrolysis of an aqueous solution of sodium chlorite. In ruling the FDA stated, "...the chlorine dioxide generated by the electrolytic process will have the same intended technical effect and use as the chlorine dioxide produced by the currently-approved methods." The ruling further went on to state that the additive produced i.e. chlorine dioxide: "...may be used as an antimicrobial agent in water used in poultry processing in an amount not to exceed 3 parts per million (ppm) residual chlorine dioxide."

"The additive may be used as an antimicrobial agent in water used to wash fruits and vegetables that are not raw agricultural commodities in an amount not to exceed 3 ppm residual ClO<sub>2</sub>. Treatment of the fruits and vegetables with chlorine dioxide shall be followed by a potable water rinse or by blanching, cooking, or canning."

Halox SRE electrochemical systems use electricity in the unit's cassette(s) to generate a small amount of acid to convert a single precursor, sodium chlorite, into ClO<sub>2</sub> and NaCl. There is no acid to handle, no chlorine and no bleach. Halox generators produce up to 100 g/hr (5.5 lb/day) of ClO<sub>2</sub>.

**Halox Accu-Cide Chemical Chlorine Dioxide Generators**

Halox Accu-Cide chemical generators safely mix dilute sodium chlorite and acid to generate chlorine dioxide. No chlorine and no bleach are used. Accu-Cide generators are available in wall-mount or skid-mount configurations and produce up to 10 lb (4.5 kg) of ClO<sub>2</sub> per day.

When operated according to Halox guidelines, Halox equipment generates a safe, dilute solution at a controlled, measurable rate that contains up to 550 ppm of chlorine dioxide. For specific sizing concentrations, please contact Halox Technical Service. Immediately after generation, the ClO<sub>2</sub> solution is fed directly to the water being treated.

**CIP Sanitizing**

ClO<sub>2</sub> can be very effective as the terminal sanitizing rinse in CIP systems, including filler rooms. Typically applied at 2 to 5 ppm (where its kill-rate is on the order of 60 to 90 seconds) it leaves no toxic residues to interfere with other chemical/biochemical processes. ClO<sub>2</sub> works quickly and breaks down into inert compounds. The unique chemistry produces no toxic organo-chlorine by-products (such as THM's). ClO<sub>2</sub> is a proven virucide and fungicide and is effective in destroying detrimental wild yeast strains.

**Pasteurizers, Bottle/Can Warmers, Coolers**

ClO<sub>2</sub> effectively controls both free floating (planktonic) and attached (sessile) microorganisms. Sessile bacteria flourish in biofilm that builds-up due to ideal conditions (temperature, nutrients, etc.). Biofilm buildup occurs on heat exchange surfaces, in pipes, lines, orifices and pumps. The resulting inefficiencies cost money on wasted energy, down time and repairs. ClO<sub>2</sub> is the best available technology for controlling biofilm in these systems. ClO<sub>2</sub> can be periodically batch loaded into the water system or metered on a timed basis. This can extend pasteurizer waters 4 to 6 times their previous discharge cycles.

**Chain and Conveyor Lube Injection**

ClO<sub>2</sub> is injected into lubrication streams for effective slime control on conveyor lines. This permits significantly longer run times between shut downs for cleaning, resulting in dramatic cost reductions. By attacking biofilm attached to conveyors and underlying rails, various soils are loosened and the natural cleaning action of the lube is enhanced. Chains and conveyors run more smoothly, with less wear on chains and motors. Even small levels of ClO<sub>2</sub> will help deodorize the line.

**Filler Head Assemblies**

ClO<sub>2</sub> solutions can be sprayed on filler head assemblies in 10-second bursts during breaks and lunch. The spray coats all surfaces attacking biofilm, inhibiting bacterial growth and deodorizing the surrounding environment.

**Water Filtration and Distribution System Disinfection**

ClO<sub>2</sub> effectively controls both planktonic and sessile microorganisms. Because planktonic cells are much easier to destroy, a disinfection procedure often produces excellent results initially, but within 7 to 10 days the counts return. ClO<sub>2</sub> is able to penetrate, disrupt and greatly reduce the biofilm where chlorine is completely impractical.

**Mold and Odor Control of Environmental Spaces**

Misting of ClO<sub>2</sub> solutions into air streams prevents the spread of mold and wild yeast. This controls "off-tastes" in the product.

**Sanitation of Tanker Trucks and Rail Cars**

ClO<sub>2</sub> solutions are effective for sanitizing and removing biofilm from the insides of tanker trucks and rail cars. A thorough sanitizing rinse of ClO<sub>2</sub> with close attention to overhead surfaces can improve the quality of product, and significantly extend its shelf life.