

# HALOX Products Fact Sheet

## Chlorine Dioxide (ClO<sub>2</sub>) In Healthcare Facilities

### Introduction

Hospital-acquired Legionnaires' Disease usually originates in hospital water systems. Legionella not only persists in hot water tanks, it is found in the biofilm through the entire water distribution system. Conditions within water systems that promote Legionella colonization include water temperature, configuration and age of the hot water tank, and plumbing and piping materials and configuration.

According to the Center for Disease Control (CDC), up to 15 thousand persons contract Legionnaires' Disease in the United States each year. Five to 15% of these cases prove to be fatal. An additional unknown number are infected with Legionella bacterium and have mild symptoms or no illness at all. Additionally, Legionellosis is frequently misdiagnosed as common pneumonia.

The occurrence of Legionnaires Disease, and subsequent fatality rates, are much higher in healthcare premises than are observed elsewhere. In many parts of the world there is strong legislation to ensure that this entirely avoidable disease is prevented from coming into contact with high-risk members of the population.



In the U. S. the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) cites a Risk Minimization plan for all healthcare facilities "to reduce the potential for organizational-acquired illness including managing pathogenic biological agents in cooling towers, domestic hot water, and other aerosolizing water systems."

Many unsuccessful control measures are directed at water distribution systems to try and reduce the risk of hospital-acquired Legionnaires ' disease. These include superheat-and-flush, copper/silver ionization, ultraviolet light, instantaneous heating systems, and hyper-chlorination. Each of these disinfection methods are lacking in long-term efficacy due to limitations associated with each method. When applied and operated as part of a complete pathogen control program, only chlorine dioxide provides immediate and long-term disinfection.

### Chlorine Dioxide (ClO<sub>2</sub>)

Chlorine dioxide (ClO<sub>2</sub>) is a highly effective, environmentally friendly biocide used in a variety of disinfection applications. Because of transportation restrictions (U.S. Federal law prohibits the transportation of ClO<sub>2</sub>), chlorine dioxide is always generated on-site at the point-of-use.

ClO<sub>2</sub> is a stable, dissolved gas that is a strong biocide at concentrations as low as 0.1 ppm. With minimal contact time, it is highly effective against many pathogenic organisms including Legionella, Giardia cysts, E. coli, and Cryptosporidium. ClO<sub>2</sub> can greatly reduce and eliminate biofilm populations and discourages bacterial regrowth. ClO<sub>2</sub> is a neutral species; it does not form weak acids as chlorine and bromine do and, therefore, is effective over a wide pH range. ClO<sub>2</sub> is more stable than other oxidizing biocides and therefore, is compatible with most water treatment chemistry.

ClO<sub>2</sub> has consistently been shown to be the best molecule for controlling the causative organism of Legionnaires ' disease. In the UK, the Building Services Research and Information Association (BSRIA) has recommended ClO<sub>2</sub> as the best available technology for control of Legionella in hot and cold water systems.

ClO<sub>2</sub> generated with Halox technology is effective in both short-term and long-term applications. It attacks pathogens on initial application and then leaves a residual of ClO<sub>2</sub> to discourage re-infection. ClO<sub>2</sub> is safe for plastic piping and exhibits no objectionable corrosive attack on copper piping.

**Healthcare Applications**

Potable Water: ClO<sub>2</sub> is EPA-approved for both pretreatment and final disinfection of drinking water. In pre-treatment, it effectively removes iron and manganese and promotes flocculation. It also removes noxious taste and odors as well as disinfectant byproduct precursors that can form trihalomethanes (THM's) and haloacetic acids (HAA's). In post-treatment, it provides a lasting residual throughout the distribution system. ClO<sub>2</sub> is ideal for hospital water systems, small water supplies, and cisterns.

Cooling Towers: ClO<sub>2</sub> controls algae, planktonic bacteria, and biofilm promoting maximum efficiency for heat exchangers and ancillary equipment. It provides lasting residual throughout the distribution system. ClO<sub>2</sub> is more stable than other oxidizing biocides and compatible with most water treatment chemistry.

Waste Treatment and Odor Control: ClO<sub>2</sub> safely oxidizes phenols, cyanides, aldehydes, and mercaptans, reduced sulfur compounds and some pesticides. It is useful in waste treatment and scrubber systems.

**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 Chlorine Dioxide Generators**

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 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. These self-contained systems are safe to use and simple to operate.

**Summary**

Chlorine dioxide is a very safe and potent biocide. It is effective over a wide pH range in both hard and soft water and does not react with most other water treatment chemicals. Many of its uses are highly recommended by top researchers. Halox Systems are the safest and most simple method to produce this versatile disinfectant. Halox-generated ClO<sub>2</sub> is presently in use for potable water disinfection in hospital environments.

**HALOX**

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