

+ **Addresses Problems**

- Legionella Control
- Giardia Cysts
- Coliforms
- Biofilms
- Cryptosporidium
- Salmonella
- Shigella
- Algae
- Amoebae
- Iron and Manganese
- Taste And Odor
- THM/HAA Formation
- Planktonic and Sessile Organisms

+ **Applications**

- Potable Water
- Water Hygiene
- Cooling Towers
- Waste Water
- Food and Beverage
- Healthcare Facilities
- Process Piping Disinfection
- Oxidation of Reuse and Recycle Streams

+ **Features/Benefits**

- Safe Production of ClO_2
- Chlorine-Free ClO_2
- On-Demand ClO_2
- Alternative To Bleach, Ozone, Bromine
- Point-Of-Use Generation
- No ClO_2 Storage
- No Bleach Or Acid;
No Chlorine Gas
- Single Precursor
- Not pH Dependent
- No Pipe Corrosion
- Environmentally Friendly
- Ease Of Operation

DIOX® Water Hygiene is a
Registered Trademark of
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DIOX® Fact Sheet

Chlorine Dioxide For Legionella Control In Healthcare Facilities



Legionnaires' Disease is caused by the bacterium *Legionella pneumophila*. An estimated 10 to 15 thousand persons contract Legionnaires' Disease in the United States each year; 5 to 15% of these cases prove to be fatal. Additionally, Legionellosis is frequently misdiagnosed as common pneumonia. In 2001 JCAHO recognized the need for plans to control Nosocomial infection from this deadly bacterium by implementing a waterborne pathogen management requirement into the Environment of Care standards (EC1.7).

Legionella bacteria originate and colonize in the healthcare facilities potable and HVAC water systems. *Legionella* not only persists in hot water tanks, it is found in the biofilms throughout the entire water distribution system. Conditions within water systems that promote *Legionella* colonization include water temperature and flow, configuration and age of the hot water tank, and plumbing materials.

The risk of Nosocomial Legionnaires' Disease can be minimized by control measures directed at the water distribution system. In the past these have included superheat-and-flush, copper/silver ionization, and hyperchlorination. Each of these disinfection methods is somewhat effective in the short-term, but long-term efficacy is difficult due to limitations associated with each method. Now a new technology that provides for the safe and simple generation of chlorine dioxide (ClO_2) has proven to be effective, both short-term and long-term, in potable water disinfection.

Efficacy of Chlorine Dioxide

ClO₂ is a stable, dissolved gas that is a strong bactericide and virucide at concentrations as low as 0.2 ppm. With minimal contact time, it is highly effective against many pathogenic organisms including Legionella, Giardia cysts, E. coli, and Cryptosporidium. ClO₂ destroys biofilms and, hence, bacterial regrowth is significantly impeded. ClO₂ is a neutral species; it does not form weak acids as chlorine and bromine do and, therefore, is effective over a wide pH range. ClO₂ is more stable than other oxidizing biocides and therefore, is compatible with most water treatment chemistry. "Selective oxidation" makes ClO₂ ideal for systems with corrosion problems. ClO₂ will not attack water distribution systems including copper pipes.

ClO₂ is already in widespread use in The United Kingdom and continental Europe. In the UK, the Building Services Research and Information Association (BSRIA) has recommended ClO₂ as the best available technology for control of Legionella in hot and cold water systems.

Healthcare Applications

Potable Water: ClO₂ 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. ClO₂ is ideal for hospital water systems, small water supplies, and cisterns. There is no objectionable corrosive attack on copper piping.

Cooling Towers: ClO₂ controls algae, planktonic bacteria, and biofilm promoting maximum efficiency for heat exchangers and ancillary equipment. Again, it provides a lasting residual throughout the distribution system. ClO₂ is more stable than other oxidizing biocides and compatible with all water treatment chemistry.

Chlorine Dioxide from the DIOX System

ClO₂ is generated on-site with a patented electrolytic process. It efficiently generates a very pure ClO₂ solution from a single precursor, sodium chlorite. Immediately after generation, the ClO₂ solution is fed directly to the water being treated. This self-contained system is safe to use and simple to operate. The DIOX system requires NO acid, chlorine gas, or bleach. Because of its unique controlled oxidation, it generates a very pure product at a surprising low cost. The DIOX System, which is completely enclosed, is safe and simple to operate.

The DIOX System delivers an on-demand chlorine dioxide solution at an easily handled concentration of 600 mg/L. The System eliminates the need for complicated reactions of multiple hazardous chemicals. Only a single precursor, sodium chlorite is required. The average conversion of the sodium chlorite precursor is 75% and the power consumption is only 100 watts per 5 gram/hr capacity. The generator process is available in two configurations. The complete system includes generator, controller with modem, residual monitoring probe, storage tank with level control and electronic dosing pump.

The DIOX System 1000		The DIOX System 2000	
<u>No. of 5 grams/hr Cassettes Available</u>	<u>ClO₂ Output</u>	<u>No. of 25 grams/hr Cassettes Available</u>	<u>ClO₂ Output</u>
1 to 4	up to 480 g/day* (1.1lb/day)	1 to 4	up to 2.4 K/day* (5.5 lb/day)

The DIOX System 1000 runs on 110 volts and 15 amps. The DIOX System 2000 runs on 240V and 20 amps. The total power consumption is between 200 and 2000 watts, depending on the size of the system.