



**eVOQUA**  
WATER TECHNOLOGIES

## **EVOQUA NSF CERTIFIED GENERATORS - 2 CHEMICAL C-WM SERIES MILLENNIUM III™ CHLORINE DIOXIDE GENERATOR**

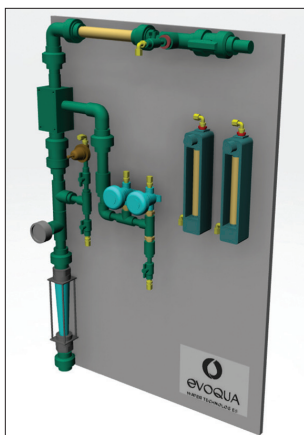
The Millennium III™ Series generators are the next generation in chlorine dioxide technology combining high safety performance with durability, simplicity of use and ease to maintain. The generators are designed, built and certified in compliance to NSF 61, Section 8 standards.

The Millennium III Series C-WM generators combine a 25% or 31% sodium chlorite solution with chlorine gas under vacuum conditions to generate chlorine dioxide safely and efficiently. They are available as a wall-mounted, manual configuration.

The Millennium III Series C-WM generators are available in a range of capacities from a few pounds per day to 12,000 pounds per day all utilizing a standard modular design.

### **Key Benefits:**

- Direct flow path of motive water and chemical precursors provide for minimal pressure losses and improved flexibility.
- Injector design improves overall performance.
- Rotameters and check valves are designed specifically for their intended uses.
- Materials of construction are compatible with chlorine dioxide and chemical precursors.
- Similar compact footprint for larger capacity units.
- The safe generation of chlorine dioxide continues to be a primary design consideration. Generation under vacuum is used to minimize and control the reactions and concentrations. The design ensures safe shut down of the generator during component failure or loss of motive water that drives the injector.
- Efficiency and yield is maximized by reaction of chemical reactants in their concentrated form. These reaction conditions favor the immediate formation of chlorine dioxide, thereby minimizing byproduct formation found in other types of generators.



## Description

### Generator:

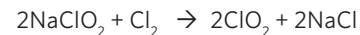
- The same basic process is used for all models, from simple manual units to the most complex automatic model.
- Simple design reduces operational difficulties. This two chemical process does not require pH control or excess chlorine addition. This results in lower operating costs, less maintenance, simplified operator control and precise calibration of the feed system. The pH of the chlorine dioxide exiting the generator is typically 7.
- **Reaction Column:** The reaction column disperses the chemical reactants allowing for intimate contact and immediate reaction. The reaction column is designed to maximize generator yield of chlorine dioxide.
- **Reagent Flowmeters:** A metering tube design calibrated for each chemical reactant is available in units reading in 0-100 %. The chlorine gas meter is also in lbs/day, kg/day or kg/hr. All generators are supplied with custom feed rate charts correlating lbs/day (or kg/hr) of chlorine dioxide with the appropriate flow meter settings.
- **Injector Requirements:** Water passing through the injector generates the vacuum required to pull the two feed chemicals into the reaction column of the chlorine dioxide generator assembly while also serving as the dilution water that the vacuum ejected chlorine dioxide gas is dissolved into. Water temperature requirements are < 100°F/ 37°C. If higher temperature water is used (>100°F/ 37°C), injector performance may be impaired due to decreased solubility of the dissolving chlorine dioxide gas. Motive water temperature should never exceed 115 degrees F.
- **Power Requirements:** This system does not require electrical control

### Assembly:

- Generator comprises of a backboard of PVC construction for easy attachment to a wall. A small footprint allows placement in space constricted areas.
- Each valve and flow meter is secured to the frame to minimize vibration and flow related stresses. Piping runs are designed to insure a simple and safe flow path.
- Components requiring maintenance are easily accessible.

### Typical Specifications

Chlorine dioxide feed equipment shall be manufactured by Evoqua and shall be comprised of a chlorine dioxide generation process utilizing 25% sodium chlorite solution and chlorine gas based on the following stoichiometric reaction:



The reaction of sodium chlorite solution and chlorine gas shall take place under vacuum without the use of a separate mineral acid feed or the excess chlorine method (adding chlorine in excess of the stoichiometric chlorine requirements in order to lower the process pH). Excess chlorine shall be considered as any amount greater than 10% of the chlorine stoichiometric requirements that remains in the generator product as unreacted chlorine.

The feed system shall be arranged with equipment to suit plant requirements. The generator shall maintain a minimum yield efficiency of 95% chlorine dioxide under normal operating conditions. Yield shall be defined as the maximum production of chlorine dioxide, compared to the theoretical maximum available, where;

$$\% \text{ Yield} = (\text{ClO}_2 / (\text{ClO}_2 + \text{ClO}_2^- + (\text{ClO}_3^- * 67.45/83.45))) * 100$$

The theoretical maximum shall be determined from the feed rates of the chemical reactants. They shall be confirmed by an Amperometric analysis capable of differentiating between chlorine, chlorine dioxide, chlorite and chlorate ions. Analysis shall be confirmed by the procedure as described in Standard Methods for the Examination of Water and Wastewater, APHA-AWWAWEF, 20th edition 1998, Amperometric Method II, 4500-CIO2E.



181 Thorn Hill Road, Warrendale, PA 15086

+1 (866) 926-8420 (toll-free) +1 (978) 614-7233 (toll)

[www.evoqua.com](http://www.evoqua.com)

Millennium III is a trademark of Evoqua, its subsidiaries or affiliates in some countries.

All information presented herein is believed reliable and in accordance with accepted engineering practices. Evoqua makes no warranties as to the completeness of this information. Users are responsible for evaluating individual product suitability for specific applications. Evoqua assumes no liability whatsoever for any special, indirect or consequential damages arising from the sale, resale or misuse of its products.

© 2014 Evoqua Water Technologies LLC Subject to change without notice MS-MILLIICWMM-DS-0914