



## Application in Preventing biofouling and microbial contamination in the RO membranes

The membrane separation technology, especially reverse osmosis, is used for high purity water for used for production and also in wastewater treatment in industrial process for its reuse.

However, the use of the membranes is limited by its lifetime which varies according to the species and amount of impurities present in the effluent and the frequency of cleaning. Some impurities also can propitiate the development of microorganisms in the flow channels and on the surface of the membranes that, in some extend, will contribute for the membrane degradation, this phenomenon is known as **biofouling**. To prevent Biofouling is necessary an efficient disinfection process in the feed stream of the reverse osmosis unit, to promote the death of the microorganisms and the oxidation of the organic matter. Chlorination is the practice adopted in many industries, but chlorine can cause environmental damage, health hazards in the industry and damages the polyamide membranes. Therefore, it is necessary to find a less aggressive agent to the environment and to the polyamide membranes.

**CDD-5000** (0.5% Chlorine Dioxide) is less aggressive than any chlorinating agent and than free chorine but is capable to reduce the total population of bacteria.

In high purity water system the primary concern is due to pseudomonas and in waste water system it's the drop in performance

### RO Tolerance Of CDD-5000 :

Many experiments (mentioned below) had already been carried out in various laboratory scale to reverse osmosis units with chlorine dioxide generated by classical way. It was verified that chlorine dioxide is less aggressive than chlorine. And below 0.8 ppm of chlorine dioxide, carbon filters and RO equipment's effectively removes chlorine dioxide and its by products.

When using CDD-5000 it is possible to use CDD-5000 before the RO-membrane without damaging the membrane. The function of adding CDD-5000 after the active coal and before the membrane is simple: by adding CDD-5000 in ppb dosage rates the water contains disinfection power at low dosage contributing positively to face the undesired fouling of RO systems.

The degree and frequency of fouling varies widely from one membrane system to another. Fouling to the point of cleaning begin required can occur as limited as once per year or as frequently every day. The foulants can be classified into four main categories: dissolved solids, suspended solids, biological, and non-biological organics. Biological fouling continues to be a major unresolved problem for membranes and systems as the most common RO-membrane types in use today are attacked and degraded by chlorine and according to public literature by other oxidizing agents. Chlorine is commonly used as a feed water disinfectant. However it must be removed from the feed water prior to entering the RO. system. Without a disinfectant present in the water, microorganisms colonize and form a biofilms in the RO system. Ultimately common practice is that the RO membranes have to be removed from service and cleaned. Thus the biofilms causes a reduction in membrane performance and membrane damage leading to higher maintenance and system operating cost.

The main objectives of CDD-5000 disinfection treatment, is to efficiently treat a membrane separation system to control biofilm formation by extremely low levels of CDD-5000 solution by not adversely affecting the RO membrane.

### CDD-5000 test protocol :

Firstly to sterilize an RO system a dosage rate of 25-100ppm of CDD-5000 is required with a circulate sterilization solution for 10-15 minutes. After that the system needs to be rinsed several times with tap water. The tap water needs to be renewed between rinses.

Afterthat the system needs to be rinsed 3-4 times with deionized water. Once drained, the system is ready for use and the membrane can be installed. By dosing extreme low levels of CDD-5000 solution in the feed water the depositing and growing of biofilm on membranes can be significantly reduced without damaging the membranes leading to increased salt passage. The dosage rate of CDD-5000 to the feed water will vary per RO system depending on the available biofilm in the RO system as well as the composition of the feed water.



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