



IN-PLACE CLEANING SYSTEM FOR CERAMIC FINE BUBBLE AERATION

BASIC DESCRIPTION

The SANITAIRE Gas Cleaning process is a patented system available to owners of wastewater plants to clean porous ceramic fine bubble diffusers in-place, efficiently, without interrupting the process or dewatering aeration tanks.

When the need for diffuser cleaning is determined, for example by measuring high dynamic wet pressure (DWP) values or decreased efficiency (increased air consumption), small amounts of a cleaning agent such as anhydrous HCl gas are introduced with the process air into the droplet upstream of the diffusers. During the gas injection phase, the air rate to the grid being cleaned is temporarily increased to ensure uniform distribution of the cleaning gas to all diffusers.

HCl gas is soluble in water. The acid permeates the pores of the ceramic diffuser with the process air. At the air/water interface within the diffuser, it combines with water to form concentrated hydrochloric acid. The unique Sanitaire cleaning process ensures that the most concentrated acid forms within the pores of the diffuser where the fouling is most severe. This combination usually restores the porous ceramic diffusers to near new conditions. The degree of restoration depends on the foulant characteristics and the frequency of acid gas addition. This procedure works best when used regularly by plant operators to remove or minimize foulant accumulation on the diffusers.

Sanitaire's Gas Cleaning process has been developed and tested over the past twenty years. An essential element of the cleaning process is adding enough HCl gas to achieve a specific mole ratio for cleaning gas to process air. This rate dependant process requires adding enough gas to achieve a minimum threshold concentration for cleaning to be effective, yet keeping the number of compressed HCl gas cylinders to a minimum.

BACKGROUND

Sanitaire introduced its Gas Cleaning process in 1980, two years after the introduction of its SANITAIRE porous ceramic disc diffusers.

The benefits of higher oxygen transfer efficiency with fine bubble porous ceramic plate type diffusers have been well documented over the past 70 years. Porous ceramics may require regular maintenance and cleaning to achieve the higher oxygen transfer efficiencies. During the late 1970's and 1980's there was a need and a desire to lower treatment plant energy costs, or achieve general power savings. The result was a renewed interest in fine bubble aeration with porous ceramic devices. Along with the need to save energy was also the concern on how to maintain and clean the ceramic diffusers. Historically, various cleaning methods have been used. They include refiring, sand blasting, ultrasonic vibration, caustic and/or acid washing and high-pressure water spray. All of these methods interrupt the biological process. The aeration tank must be taken out of service, drained and manually cleaned. While these cleaning techniques or combination of them may achieve good cleaning results, they also result in additional costs, inconvenience and inefficiencies that are eliminated with the SANITAIRE Gas Cleaning process.

COMPATIBLE DIFFUSERS

While the SANITAIRE Gas Cleaning process is offered for sale separately, it performs most effectively with SANITAIRE porous ceramic disc diffusers. The SANITAIRE diffuser disc assembly incorporates a uniform distributing porous ceramic diffusion element and a top mounted positive sealing "O" ring gasket. The diffuser and "O" ring is held in place with a unique screw-on retainer ring. The combination of these features ensures that the cleaning gas will permeate the fouled ceramic pores with the process air. Other diffuser assembly designs such as the dome shape diffuser have surface irregularities, exposed vertical surfaces, poor air distribution or bottom gasket seals that are prone to leakage. These deficiencies allow the cleaning gas to escape with the air leaks and thus not penetrate the fouled pores of the diffusers. For these reasons, the Gas Cleaning process is not recommended for use with dome type diffusers or diffusers using hold down bolts and/or bottom mounted sealing gaskets.

GAS FEED SYSTEM DESIGN CONSIDERATIONS

Sanitaire is pleased to provide design data and drawings to engineers and owners for a custom designed system for specific applications. The information that would be provided would encompass all aspects of the system such as:

- Pressure Monitoring
- Required HCl Gas Flow Rate
- Cylinder Size and Selection
- Diffuser Grid Sizing
- Storage and Handling of HCl Cylinders
- Purge Gas System
- Automatic Gas Shut Off Feature
- Electrical Requirements
- HCl Gas Distribution Piping

Please contact Sanitaire to obtain the above mentioned information.