

Mixing Various Type Units in an Aeration System

Bulletin Brief

A frequently asked question about various types of units is “can I put various type units (coarse bubble and fine bubble) in the same application?” The answer is yes, but there are several areas that must be considered and controlled for effective use and mixing of various types of units.

Technical Presentation

Q. Should I use coarse bubble mixing when oxygen is NOT a factor?

A. It is a common misconception that coarse bubble diffusers should always be used where mixing is the major requirement in a basin requiring aeration. Coarse bubble diffusers have been the traditional diffusers for "mixing only" until recent advancements in fine bubble technology. Coarse bubble diffusers create substantial surface turbulence because of the air volume or energy in the basin, which can be confused for mixing. True mixing is defined as pumpage rate of the liquid and fine bubble systems pump more liquid per cfm of air.

Fine bubble diffusers reduce energy consumption for oxygen transfer because of the small bubble size and high surface area of the air volume introduced to the tank. The fine bubbles create maximum oxygen transfer efficiency plus the fine bubbles also create maximum pumpage per scfm of air applied. Fine bubble diffusers operating at the same air volume in an aeration basin gets better mixing vs. coarse bubble diffusers¹

Summary

Fine bubble diffusers properly applied can offer major benefits in mixing as well as major benefits in oxygen transfer or energy conservation! This eliminates the need to mix various types of units. Environmental Dynamics Inc. can provide an evaluation of your system of existing coarse bubble diffusers or fine bubble diffusers and evaluate the benefit and potential for converting to EDI advanced technology fine bubble diffusers using your existing blowers and existing blowers and existing piping.

Q. Should I consider fine bubble for digesters?

A. EDI membrane fine bubble diffusers offer mixing and oxygen transfer advantages in digesters as well as conventional aeration applications.

¹. Note: for solids concentrations in excess of 3%, special design considerations must be employed. Technical Bulletins are presented as a service by Environmental Dynamics Inc. of Columbia, Missouri. CT050100

High solids applications such as digesters can make full use of fine bubble diffusers. A particular benefit of EDI membrane fine bubble diffusers is the triple check valve feature, which excludes all solids when air is turned off! Coarse bubble diffusers rely on large openings to blow out solids when starting operation following shut down. This large opening concept is flawed. Large openings allow entry of many solids on shut down of aeration. When heavy solids or particularly rags, these solids are not effectively purged or blown out on start-up. Fine bubble is routinely being applied to retrofit coarse bubble to REDUCE maintenance. Advanced technology fine bubble is a superior choice for digesters and sludge tanks that have large solids and rags.

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For existing applications where mixing of units is the only viable option due to pressure constraints, budgetary concerns, or installation related issues, various units can be mixed providing there is adequate airflow distribution valving and control. Different types of units with different headloss and pressure requirements must be operated in a manner to ensure adequate airflow distribution and uniformity without exceeding specific unit air handling capacity.

For specific information on proper design and evaluation of your existing system contact Environmental Dynamics, Inc. at 573-474-9456.