



Air Diffusion Systems

Fine Bubble Aeration for Water & Wastewater Treatment

ADS Fine Bubble Aeration: How it Works?

For thousands of years communities have relied on the natural rolling action of rivers and streams to naturally treat wastes as they moved down stream. This fast moving flow of water provided both circulation & oxygenation to the entire water column. Elevated levels of dissolved oxygen allowed for microbes to literally eat these wastes converting them into minerals, gasses, & inert ash. In rivers and streams where the pollution was significant, dissolved oxygen levels were unable to match the oxygen demand exerted on them by the influent wastes. Over time these waters became anoxic and were unable to treat the wastes.

For over 50 years Air Diffusion System (ADS) fine bubble aeration has been used in lakes, lagoons, reservoirs, and other bodies of water duplicating nature's own process for wastewater treatment. By mimicking mother nature, ADS fine bubble aeration promotes both circulation and oxygenation in order for proper biological treatment to occur.

Our professional engineering staff can help you in your search for a reliable and cost effective approach to your water treatment needs. Typically there are two basic formats for most ADS systems: Linear grid coverage and the ADS "Billion Bubble per Day" Disk Module. The traditional linear tubing is commonly used for flat bottom water treatment systems, most notably domestic wastewater facilities. The ADS Disk Module is best suited for use in lakes, deep bodies of water, and irregularly shaped lagoons.



Bubble Size, Surface Area, & Energy Efficiency

The Mass-Gas Transfer of oxygen into water is directly proportional to the size of the bubble and its contact time in the water column. "Fine" bubbles need less energy to create, while providing a much greater surface area for oxygen transfer to occur. The same amount of energy is required to produce a single one inch bubble or a million 1/100" bubbles.

In addition, bubbles larger than 1/10” in diameter are limited in their mixing capabilities due to the turbulent manner in which they move through the water. ADS fine bubble aeration ranges from 1/8” to 1/64” in diameter, providing efficient quiescent mixing and unsurpassed oxygenation.

Bubble Diameter (inches)	# of Bubbles	Volume (cu mm)	Surface Area (sq mm)	Surface Factor Increase
1	1	8,584	2,028	1
1/2	8	8,584	4,052	2
1/8	512	8,584	16,206	8
1/64	262,144	8,584	129,651	64
1/100	1,000,000	8,584	202,580	100

ADS Fine Bubble Aeration Tubing

ADS fine bubble aeration tubing is manufactured using virgin plastics containing more than 2% “carbon black” to prevent UV degradation. The aeration tubing contains surgical slits located along the top and sides where the fine bubbles are emitted. If the air supply is shut off, these surgical slits act as a one-way check valve preventing plugging or clogging of the aeration. One of the key design features of ADS aeration is the built in pressure drop. The 2 PSI pressure drop ensures that the diffuser will work even if the bottom is not perfectly level.

Independently Certified Using “ASCE” Oxygen Transfer Standards

ADS aeration offers a superior oxygen transfer, which was independently tested and certified in 2001 by former federal EPA Advisor Dr. Michael Stenstrom. Three sets of test were run according to the new “ASCE” standards for oxygen transfer. The results concluded that ADS fine bubble aeration delivers an oxygen transfer rate of ~ 3% per foot of water Standard Oxygen Transfer Efficiency (SOTE.)

Applications

There are many different applications where ADS aeration has been successfully incorporated to provide oxygenation, circulation, and other benefits.

- Municipal and industrial wastewater treatment facilities
- Clean water quality management
- Industrial tanks & cooling pond circulation
- Ice melting and prevention for marinas, water tanks, and other applications
- Soil remediation & hydrocarbon reduction (BTX)

Wastewater Treatment

ADS fine bubble aeration implemented in wastewater lagoons can reduce BOD, ammonia, and suspended solids to single digit effluent numbers year round. Because the water is saturated with dissolved oxygen, additional benefits include:

- No odors
- Internal digestion of sludge
- Ability to handle spike loads and flows

Clean Water Quality Management

ADS fine bubble aeration can rejuvenate water quality for; lagoons, lakes, ponds, reservoirs, storm water retention basins, rivers, streams, canals, marinas, etc. Some of the benefits include:

- Improved DO levels throughout the entire water column
- Improved water quality, clarity, & taste
- Improved Settling of Iron, Manganese, & other minerals
- Destratification of the water column preventing spring & fall turnover
- Reduction / elimination of eutrophication and algal blooms
- Reduction / elimination of chemical treatments
- Reduction / elimination of odors including Hydrogen Sulfide

Industrial Tanks & Cooling Pond Circulation

ADS fine bubble aeration is an effective method to provide mixing for industrial tanks and cooling ponds. Each system is optimized to provide several complete fluid turn-over's per day to homogenize the waste stream while de-stratifying water temperature.

Ice Melting / Ice Prevention System

ADS aeration can be used for ice melting and ice prevention systems to protect water tanks, docks, piles, and boats from ice related damage. Warmer bottom water is circulated multiple times per day making it extremely difficult for ice to form.

Soil remediation & hydrocarbon reduction (BTEX)

ADS aeration can be used for soil remediation in a similar manner to our water and wastewater applications. Many soil contaminants can be treated biologically with the addition of air and/or beneficial bacteria. Horizontal wells are drilled below the contaminated area then ADS aeration is installed to improve DO levels. This process has proven to be very reliable in the treatment of hydrocarbons, petroleum byproducts, and aromatic compounds such as BTEX.

For more information please contact your local ADS representative!

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