

ClearBlu Environmental focuses on aerobic digestion of organic waste. This process is desirable over anaerobic digestion because it is fast, odor free, and prevents the need for any solids removal procedures. Aerobic digestion is desirable over DAF systems because it eliminates the need for costly chemical use and disposal. ClearBlu uses a unique aeration technology, Ultra Fine Bubble (UFB) surface aeration, to achieve a more highly oxygenated environment over conventional technology that allows microbes to thrive.

The UFB Difference in Wastewater Treatment

- Higher and faster removal rate of BOD and TSS
- Up to **70%** reduction in electrical consumption
- Elimination of odors
- Improvement of water quality
- Rapid microbial growth and reproduction
- Elimination of pathogens
- Control of algae growth



The Ultra Fine Bubble Advantage

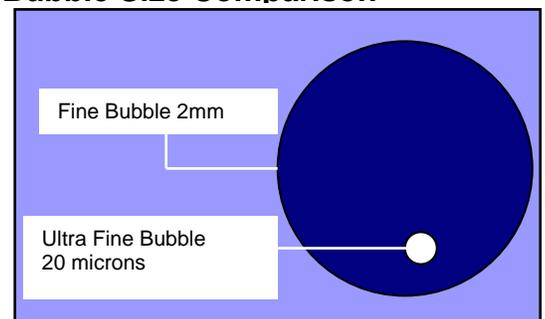
What sets this aerator apart is in the size of the bubbles. Through years of research and field tests, we have taken micro bubble technology to a new level. The Ultra Fine Bubble unit produces a bubble size of 0.02 mm or less in a negative pressure environment. That's over 1 billion micro bubbles per cubic foot which translates to over 1,000 square feet of surface area of oxygen molecules. As compared to conventional aeration technology, UFB produces an exponentially greater oxygen source which is denser and longer lasting in water. This allows the volume of healthy bacteria to increase, resulting in a more effective elimination of waste products and bad odors.

UFB introduces micro bubbles into the water without causing excessive agitation to the water through the use of low pressure air. This is important because high turbulence is counterproductive to aerobic digestion. It has been shown that aerobic bacteria fixed to a submerged surface within a low turbulence, oxygen rich environment are up to 10 times more efficient at digesting organic matter.

Benefits of Ultra Fine Bubbles

Other aeration devices predominantly use compressed air which is forced into the water. This displaces the water particles and produces large bubbles (2 mm at the smallest) that "pop" immediately to the surface where their oxygen is lost to the atmosphere. With UFB units, the bubbles are created in a partial vacuum and therefore contain air below atmospheric pressure. Their tiny size combined with the low pressure air they contain means that their buoyancy is so low that they cannot overcome the surface tension in the water. This results in the bubbles staying suspended in the liquid. Based on the principles of Brownian movement, the reduced pressure environment allows the micro bubbles to be dispersed throughout the body of water. We have shown that the bubbles can reach the bottom of a 20 foot pond. The trapped air moves throughout the water and remains until it is used or absorbed within the water. In other words, the ultra fine

Bubble Size Comparison



bubbles stay resident in the water for up to 10 minutes and the dissolved oxygen can remain for 4-6 hours.

The UFB generator creates a much higher lateral oxygen transfer to replenish the oxygen imperative for microbial life. Not only is horsepower reduced by up to 70%, the digestion capability of the pond or tank is dramatically increased.

These bubbles, being of extremely small size, are characterized by having negative electrical charges. They attract suspended floating particles effectively. This particular property has been used in sludge treatment by using the ultra fine bubbles to capture and float organic material, thus decreasing the time required for the sludge treatment. The ultra fine bubble system will actually digest sludge off of the bottom of the pond.

While traditional aeration systems only create an air cap (aerobic environment only in the top 2 to 3 feet of water), ultra fine bubble treatment creates an aerobic environment throughout the entire body of water. One of its most significant advantages is the processing time required for treatment. Organic material that requires months to be digested in an anaerobic environment while outgassing methane can be digested from 8 hours to 4 days in a proper aerobic environment.

Wastewater Treatment

The UFB units have been used in the winery, livestock, and food processing industries, as well as other applications around the world to eliminate odors and reduce organic waste. Faster treatment and more efficient breakdown of harmful by-products lead to a safer transition for land application or reclamation water.

In addition to effectively reducing influent BOD and TSS, wineries can also avoid costly dredging procedures by digesting the existing sludge at the bottom of ponds, and preventing new sludge from building up. With a shorter treatment time, water becomes readily available for irrigation use or other discharge.

Before and after photos of a winery pond:

