Aeration Efficiency EXAMINED

Thermal Gas Flowmeters Improve Aeration System Efficiency

In the treatment of wastewater, aerobic biological processes are used to degrade the soluble biological content (such as human waste, food waste and detergents). A critical process in this stage of treatment is aeration of the water. With the proper oxygen levels, an optimum environment is created for bacteria and protozoa to consume the organic material, thus removing more than 80 percent of the soluble waste without the addition of chemicals.

A subsurface wastewater aeration system in tanks, lagoons or basins is an effective and cost-saving method of wastewater treatment. This type of system gets the oxygen to the bottom of the water and causes a more natural circulation effect than mechanical mixers. In comparison with surface aeration methods, submerged diffusers have been shown to have a much higher oxygen transfer rate, even in the lower depths of the water. Fine bubble submerged diffusers have been shown to require 30 to 40 percent less air than coarse bubble systems. With fine bubble diffusers, fewer blowers are needed, the energy savings are greater, and the optimal oxygen transfer rate is easier to achieve.

Determining how much air volume in standard cubic feet per minute (SCFM) that will be needed to deliver the mass of air required for optimal bacterial biodegradation of organic matter is a necessary step for proper aeration treatment. The flow of air to the diffusers must be accurately monitored to help determine this rate.

Another important consideration is the oxygen transfer efficiency of aeration systems. This is the ratio of dissolved oxygen to the total amount of air fed into the system. Oxygen that is not dissolved in the wastewater is lost and the biodegradation process is compromised. In order to avoid this, the flow of oxygen fed into the system must be monitored and then compared to water sample data to find oxygen transfer inefficiencies. Typical problems may be air pump malfunctions, air leaks in the delivery system between the air pumps and the submerged diffusers, or clogged air diffuser heads. These inefficiencies can be more easily identified if the air flow is continuously monitored for disruptions or other irregularities.

Thermal gas flowmeters are widely used to measure air and oxygen flow rates in aeration systems to help operators find these process problems. Thermal gas flowmeters are energy-efficient, easy to install, and their no-moving parts design effectively reduces maintenance costs. With the introduction of more stringent sludge disposal regulations, strictly mandated EPA values for oxygen transfer, and the growing scarcity of disposal sites, improving aeration systems by locating and resolving inefficiencies with accurate air flow measurement has become more important.

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