



# ENVIROMIX

BIOCYCLE-D™ AEROBIC DIGESTION PROCESS



## Our Proposition

BioCycle-D™ is an optimized Aerobic Sludge Digestion process. Aerobic sludge digestion requires process control to maintain the optimum environment for the destruction of biomass. In the process, oxygen is transferred to the biomass resulting in volatile solids destruction, but also the production of ammonia. Ammonia will be further degraded to nitrate through nitrification and if uncontrolled will result in the depletion of alkalinity, increased energy consumption and a reduction in sludge pH.

In a conventional diffused aeration mixed aerobic sludge digestion process, continuous aeration can lead to wasted energy, and pH reduction through alkalinity consumption. The limited process control or inability to separate aeration from mixing can also lead to poor sludge dewaterability and polymer overfeeding.

Mixing of the basin contents and distribution of oxygen to the biomass for the destruction of degradable organics is important. BioCycle-D controls and optimizes operation by right-sizing the diffused aeration system to satisfy process oxygen demand and applying energy efficient mixing through the use of the BioMix™ Compressed Gas Mixing System. BioCycle-D maximizes sludge destruction, minimizes energy consumption, and provides automatic process control by decoupling aeration from mixing through instrumentation feedback.

## The Process

BioCycle-D is well suited for facilities without primary clarification, such as biological nutrient removal processes, oxidation ditches, and sequencing batch reactors. These processes are typically operated with longer solids retention times, which results in minimal oxygen demand of the waste sludge. BioCycle-D is an integrated process consisting of diffused aeration, aeration blowers, BioMix nozzle headers, compressor(s), system controls and instrumentation. Through a proprietary control system, parameters of DO, pH and ORP are monitored and used to automatically control the aeration and mixing systems as process needs dictate in order to optimize the system.

## The Process

Controlling the aerobic phase of the process, results in optimized air delivery and effective digestion. Whereas controlling the anoxic phase of the process and efficiently mixing without air via the BioMix Compressed Gas Mixing System results in denitrification, and alkalinity recovery, while limiting phosphorus release to digester supernatant.

The process benefits of optimized digestion through BioCycle-D, also result in improved sludge characteristics. Incorporating phases of settling and supernatant decanting provides reduction in volume by gravity thickening of the sludge. BioMix has been applied to effectively mix sludge concentration up to 6%.

## Key Benefits

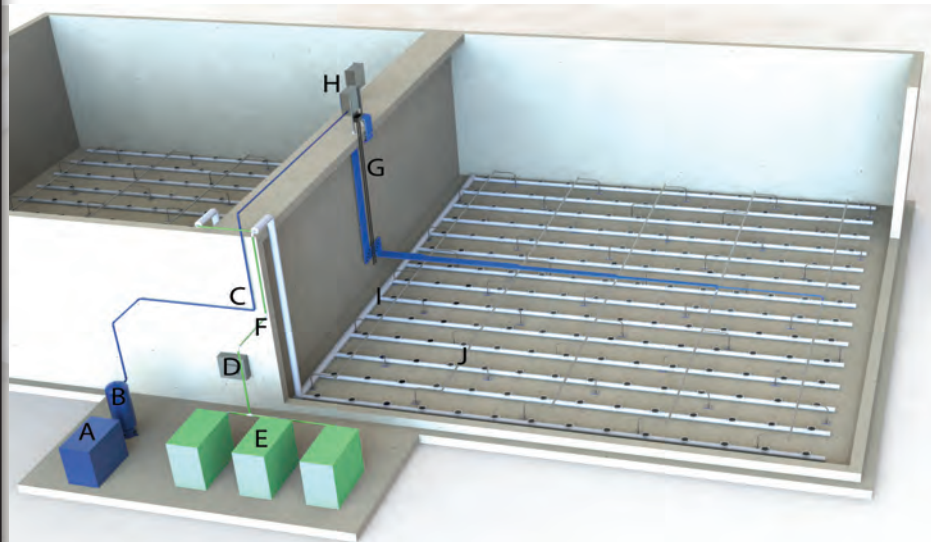
- Right-sized, high efficiency diffused aeration system combined with BioMix Compressed Gas Mixing System provides 50%+ power savings versus traditional diffused air or jet aeration mixing systems
- Ideally suited for aerobic digesters, and aerated sludge holding tanks
- Bottom-up, uniform mixing in basins of any geometry or floor slope with no dead zone
- Minimal maintenance of system components
- Automatically controlled with field adjustable operating parameters to meet varying process requirements
- Decouples aeration from mixing for optimized oxygen delivery and efficient mixing
- Facilitates denitrification and alkalinity recovery
- Provides effective VS destruction
- Precise process control of sludge pH and ORP provides improved sludge dewaterability
- Improved process control



*BioCycle-D installation with integrated diffused aeration system and BioMix mixing system.*

### Target Applications:

- Greenfield or retrofits
- Aerobic Digesters
- Aerated Sludge Holding Tanks
- Longer SRT nitrifying processes
- Extended aeration processes
- Underloaded – long buildout systems



KEY:  
A: AIR COMPRESSOR  
B: RECEIVER  
C: LOW PRESSURE AIR  
D: MASTER CONTROL PANEL  
E: BLOWER  
F: HIGH PRESSURE AIR  
G: INSTRUMENTATION  
H: VALVE PANEL  
I: AERATION GRID  
J: BIOMIX™ HEADER GRID

*BioCycle-D Rendering*

## De-Coupling Aeration from Mixing

A key component of BioCycle-D is the BioMix Compressed Gas Mixing System. In addition to BioCycle-D, BioMix can be applied in other aerobic applications such as aeration basins and aerated sludge holding tanks to effectively decouple aeration from mixing. In basins or treatment zones with relatively low oxygen demand, mixing limited conditions often occur. Under mixing limited conditions, more air is required to mix the basin contents than to satisfy the oxygen demand. Combining BioMix with diffused aeration in these applications provides the operational flexibility to reduce the process air rate below the minimum mixing rate or turn the air off entirely. This not only results in significant energy savings, but provides the process benefit of reducing excessive DO concentration. Excessive DO can lead to biomass upset as well as “poison” anoxic zones or mixed liquor return streams with high DO concentrations that would negatively impact the anoxic or anaerobic environments crucial for biological nutrient removal.

## Mixing Guarantee

BioMix provides homogenous mixing at an energy efficiency that is unparalleled in the industry. Our extensive experience in the design and application of compressed gas mixing technology allows us to select the proper nozzle density paired with the appropriate firing parameters and compressor sizing to ensure optimum mixing performance in conjunction with diffused aeration or without. We advocate for project-specific substantiation of mixing performance and power requirements through Field Performance Testing. EnviroMix is one of the only mixing system suppliers who promotes a guarantee of performance through field verification.

## Corporate

EnviroMix offers energy efficient, high quality and low maintenance compressed gas mixing systems and process control technology for a broad spectrum of water and wastewater treatment applications. Compared to other traditional mixing devices (submersible, vertical shaft, diffused aeration), the benefits of EnviroMix products include enhanced mixing performance, reduced energy requirements, minimal maintenance, and substantially lower operating costs. Whether it's designing efficient compressed gas mixing systems, integrated mixing and aeration processes or implementing energy management solutions, EnviroMix is able to assist you to custom design a system to meet your needs.