

# ADI SYSTEMS INC. – ANAEROBIC BIO-METHANATOR (ADI-ABM)



Industrial wastewater discharges are coming under increasing scrutiny as municipalities struggle to deal with growing demand and capacity constraints, as direct discharge limits tighten, and as the public becomes increasingly aware of potential impacts to the environment. ADI is tackling these issues as a leader in providing cost-effective treatment technologies to the industrial marketplace, including the ADI-ABM.

## The ADI-ABM

The ADI Anaerobic Bio-Methanator, or ADI-ABM system, developed by Phoenix Bio-Systems and offered under license by ADI Systems Inc., is a high-rate, high-density anaerobic biological treatment system that incorporates a proprietary design for maximum removal of COD and BOD with very low energy and maintenance requirements. It offers a number of significant advantages over other high-rate anaerobic processes, including small footprint, low maintenance and quick installation.

A form of expanded granular sludge bed (EGSB) technology, the ADI-ABM has a bed of biological granules or pellets to perform the treatment function. High influent loading rates and an effluent recycle loop fluidizes and expands the sludge bed, increasing the contact between the wastes and microbes, maximizing reaction rates and treatment performance. A proprietary separation device in the top section of the bioreactor retains the sludge bed within the

system. At lower loadings and reduced recycle flow rates, the bed is not expanded and the system can operate as a typical upflow anaerobic sludge bed (UASB) process.

The bioreactor is linked to a proprietary decarbonator, which serves to reduce carbon dioxide in recycle flow to the bioreactor and achieve high COD reduction rates with low hydraulic retention times. A recycle tank is the third part of the recirculation loop where treated recycle, supplemental nutrients and raw wastewater are mixed. Temperature and pH are also monitored and controlled in the recycle tank.

## Renewable Energy

The ADI-ABM generates a renewable energy source as a by-product of treatment. Biogas, or bio-methane, produced in the ABM can be collected and used as an alternative to natural gas. In larger systems, cogeneration of electricity is also possible. A shrouded open biogas flare is provided as standard equipment on the ADI-ABM and often serves as an emergency back-up to the utilization system.

Standard equipment includes a biogas iron sponge scrubber for the removal of hydrogen sulfide (H<sub>2</sub>S). Alternate biogas scrubbing technologies are also available for use when system size or target contaminants dictate their use.



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### Standardized, Modular Bioreactors

The ADI-ABM is a modular treatment system consisting of one or more standard-sized bioreactors operated in parallel from a common recycle and control system. The ABM modules are available in two sizes: capacity rated at 8,000 lb COD/d and capacity rated at 4,000 lb COD/d. Larger and smaller custom modules are also available. Up to six upflow, expanded-bed bioreactor modules can be linked to a common decarbonator and recycle tank.

A prefabricated steel skid unit completes the system and contains the entire control system, internal piping, pumps, auxiliary tanks, flare and scrubber systems, control panels and all field instruments. One skid can service up to six bioreactors. Everything is shop-assembled and prewired on the control skid prior to shipment.

### Simple, Fast Construction

The ADI-ABM is a preengineered, preconstructed modular system. The bioreactors are made from premolded FRP and shipped to site complete with all internals installed. Controls and ancillary equipment are shipped to site prewired, prepiped and skid-mounted, greatly reducing site installation time and disruption. Installation is typically complete in less than a week.

### Proven High Performance

There are over a hundred anaerobic bio-methanator systems operating. It has become the *de facto* standard technology

for treating evaporator condensate wastewater from dry mill fuel ethanol plants. Due to years of successful operation in such applications, it is now utilized to treat a variety of strong wastewaters.

### Advantages

The unique design characteristics of this technology offers many advantages, including:

- Efficient, robust performance under variable conditions
- Low manpower requirements
- Greatly reduced sludge production compared to aerobic systems
- Significant production of methane-rich (~80% CH<sub>4</sub>) biogas
- Simple, reliable, low-maintenance, high-performance biogas scrubbing system
- Very small plant footprint compared to low and medium rate anaerobic systems
- Very quick system delivery and overall project execution
- Extremely quick installation and setup with minimal site disruption

ADI-ABM technology can be applied to any strong, biodegradable wastewater that is low in TSS and FOG. It is most often utilized in the following applications:

- Fuel ethanol plant evaporator condensate
- Food production plant waste
- Beverage plants
- Breweries



### ADI SYSTEMS INC.

ADI Systems is a technology and design-build company that offers a wide range of wastewater treatment systems to customers around the world. We offer both bench and pilot testing, plus custom-designed solutions to provide the best treatment package. In addition to generic technologies, ADI Systems offers proprietary and patented technologies for both anaerobic and aerobic biological waste treatment applications. ADI Systems Inc. provides large treatment systems as well as modular systems for small plant applications.

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