



THE ADI-HYBRID ANAEROBIC REACTOR

The hybrid reactor, in custom-designed and packaged configurations, is a combination of the UASB (upflow anaerobic sludge bed) and the UFF (upflow fixed film) reactors. It retains process advantages of each technology.

The lower part of the reactor volume is the UASB portion where flocculant and/or granular sludge develop. Much of the organic stabilization (treatment) may occur in this sludge bed.

The upper part of the reactor is the UFF section. In this section, a cross-flow type media provides an extensive surface area for the fixed-film bios to develop and grow. This media also intercepts sludge bed solids and raw influent solids and promotes its flocculation and return to the sludge bed below. The fixed-film slough is directed to the sludge bed below in similar fashion.

Loading Rates and Performance

The ADI-Hybrid can treat almost any wastewater where the load is primarily in the form of soluble COD. Normally, the influent TSS should not exceed 10 to 20 percent of the COD; and the fat, oil, and grease concentrations should not exceed 100 mg/l. These levels are affected by the nature and biodegradability of these solids/substances. Pilot testing is advisable if there is any question regarding impact of loadings on the system.

Typical design loading and removals at 30°-37°C are listed below:

- Hydraulic retention time (HRT) – 16 to 36 h, depending on loading and removals desired.
- Loading – 5 to 10 kg COD/m³.d, depending on wastewater characteristics and HRT.
- COD removals – 70 to 90 percent (for removals higher than 90 percent, a two-stage system is recommended).

Advantages of the Hybrid High-Rate Treatment System

Granular sludge bed is unnecessary

- A flocculant sludge will perform satisfactorily and attain good stability and high loadings; also, it is not essential to seed with granular sludge at start-up.

Provides consistent performance

- The retention of greater amounts of biomass allows for higher loadings and more consistent performance.

Longer solids retention times (SRTs) promote higher removals

- The higher solids inventory also results in longer SRTs. Longer SRTs result in higher removals and lower waste sludge production.

Stable and resilient to shock loadings

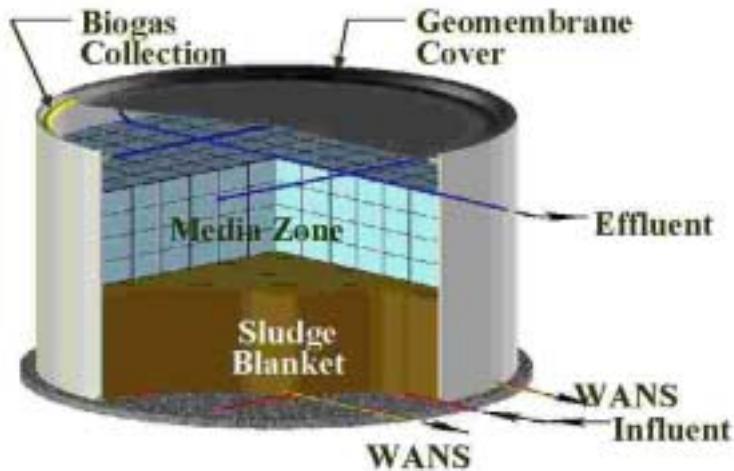
- A further benefit of longer SRTs is the reactor's ability to handle higher levels of toxic substances, shock loadings, and influent suspended solids.

OUR MISSION:

Success through
satisfied customers

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Schematic of ADI-Hybrid



THE ADI-HYBRID PROCESS

Wastewater enters the reactor through an extensive influent distribution system located at floor level. Recycled effluent is mixed with raw wastewater in varying degrees as a means of attenuating the variability of the feed and recycling alkalinity; this reduces chemical costs for pH and alkalinity control.

The wastewater enters the sludge bed where it receives a high degree of stabilization. It is then "polished and clarified" as it passes through the UFF section. The final effluent leaves the reactor through an effluent/level control structure. There are no moving parts inside the reactor.

The excess sludge is wasted from the reactor on a regular basis through a simple header-lateral system located at the bottom of the reactor.

FREE APPLICATIONS SCREENING

If you have a potential application for an ADI-Hybrid or other type of anaerobic technology, call ADI and you will receive:

- Advice from an anaerobic (and aerobic) treatment specialist.
- A budget capital cost estimate.

The Two-Stage Hybrid

For cases requiring very high removals, a two-stage hybrid system is recommended. This system consists of two equally sized reactors that operate in series and alternate lead and lag positions periodically.

The two-stage cyclic process can achieve a higher effluent quality than the single-stage process. The improved performance of the two-stage system is due to the cyclic operation which produces a biological solids mass in the lag reactor that is greater than it would be at the previous (lag) operating conditions. This greater mass of bios permits the lag reactor to achieve soluble organic concentrations that are less than the normal equilibrium levels.

- An O&M cost estimate.
- An estimate of energy savings, reduction in surcharges, reduction in waste sludge generation, and value of biogas as an alternative fuel source.
- A payback calculation.



ADI SYSTEMS INC.

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