

# A PLUG & PLAY BIOLOGICAL WASTEWATER TREATMENT SYSTEM

The BioGill Ultra is an attached-growth bioreactor for secondary wastewater treatment. The largest bioreactor in the BioGill product range, the Ultra is a compact design ideal for facilities seeking a simple, robust and highly efficient biological treatment system or to boost capacity of an existing treatment process. BioGill bioreactors are simple to install and easy to operate, with minimal maintenance requirements and low lifecycle costs.

At the core of the BioGill Ultra is patented Nano-ceramic media, known as Gills. The unique design of the Gills provides the ideal habitat for microorganisms to rapidly establish into a robust biomass.

Wastewater is dispersed at the top by the patented non-clog HydroSwirl™ system and gravity fed down the Gills. The Gills are permeable, allowing microorganisms to grow throughout the Gill media with simultaneous access to both oxygen entering on the air side and nutrients on the water side.

## Air side & water side

Oxygen diffuses within the biomass from the air side to the liquid side. At the same time, nutrients diffuse through the biomass from the liquid side to the air side. The process is known as counter diffusion and works 4 to 5 times faster than oxygen diffusion. This means BioGill systems can be online, achieving treatment goals within days after start-up or system restart.

The BioGill media fosters a biomass that is remarkably tolerant of fluctuations in wastewater flow and organic (BOD & COD) loadings. This is a key benefit for facilities with variations in wastewater-producing activities over the course of the week or throughout the year, making the bioreactors equally well suited to year-round or seasonal use.

The Gills achieve higher BOD & COD removal capacity through faster microbial community start-up which is up to 7 times faster than conventional bioreactor technology. As

such, substantial biomass re-establishment can occur within 24 hours after a system shock, upset or system shutdown and restart following a dormant period. BioGill technology can also treat a wide range of influent BOD & COD concentrations and tolerate levels of Fat, Oil and Grease (FOG) that challenge or disrupt alternative biological treatment systems.

## Reduced carbon footprint

As the Ultra is passively-aerated with natural convection moving air from vents located at the bottom through to vents at the top, there is no need for energy intensive blowers or aeration as used in conventional technologies. This delivers significant savings in energy and operating costs and a reduced carbon emissions footprint.

A plug & play solution, the Ultra is quick to install, and the modular design makes it easier to scale up and add more units when wastewater volumes increase.



## BIOGILL BENEFITS



Meet compliance & discharge limits



Boost performance of existing systems



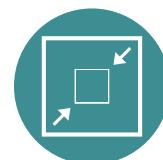
Resilient to shock loads & flow fluctuations



Save on surcharges

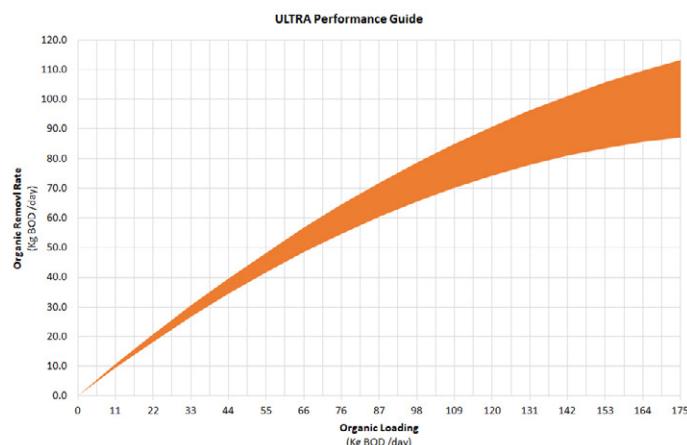
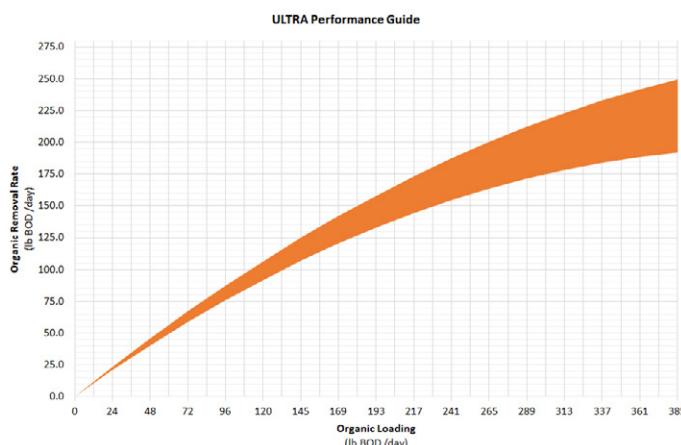


Reduce odor



Compact footprint, modular & scalable

# PERFORMANCE GUIDE - BIOGILL® ULTRA



These performance graphs are to be used as a sizing guide only. Actual performance is determined by site specific factors and may vary. The above information is based on the following; a continuous flow system; brewery wastewater and water temperature at 86°F | 30°C. Removal rates and reductions are based on soluble BOD only. BioGill and its authorized representatives do not guarantee performance unless stated otherwise. For detailed system sizing or for information on projects outside these influent parameters, please contact your authorized BioGill representative.

## TECHNICAL SPECIFICATIONS

		Value (Imperial)	Value (Metric)	
OPERATING & DESIGN INFORMATION*	Temperature Range (wastewater)	65-100°F	18-37°C	
	pH Range	6.5-8.5		
	Optimum C:N:P Ratio	100:10:1 to 100:5:0.5		
	Required Pre-treatment**	Influent TSS <300mg/L   Maximum FOG <100mg/L		
	Recirculation Flow Rate per Cartridge	18 - 44gpm	4 - 10m³/hr	
NOMINAL DIMENSIONS & WEIGHT	BIOREACTOR ONLY	Gill Surface Area	23,520ft²	
		Minimum Height Clearance (Approx.)	6'-6 ¾"	
		Length	18'-8 ¼"	
		Width	7'-2 ¼"	
		Height	7'-3 ½"	
		Footprint	140ft²	
		Dry Weight	11,795lb	
		Wet Weight (Max. Load Approx.)	34,285lb	
	ULTRA (COMPLETE PACKAGE)	Length	26'-2 ½"	
		Width	8'-7 ½"	
		Height	14'-6"	
		Footprint	226ft²	
		Recirculation Tank Capacity	5,020gals	
		Dry Weight	20,065lb	
		Wet Weight (Max. Load Approx.)	84,660lb	
		Inlet Connection	6" Flange	
ULTRA CONNECTIONS		Outlet Connection	6" Flange	
		Recirculation Pump Connection	6" Flange	
		Inter-Unit Recirculation Connection	6" Flange	
		Drain Connection	2" Flange	
			150mm Flange	
			150mm Flange	
			150mm Flange	
			150mm Flange	
			50mm Flange	

\*Consult your authorized BioGill representative for information about specific applications. \*\*General recommendation - can vary depending on influent composition.

## DESIGN FEATURES & BENEFITS

### KEY FEATURES

- Control system includes PLC, HMI and extra control connections
- Recirculation pumps with VFD
- Sloped floor in the recirculation tank for easier sludge removal
- Feed water flow monitoring & control, ensuring consistent flow
- Separate hydraulic skid
- Two stage unit
- Patented, non-clog HydroSwirl™ water dispersal system
- Safety rail and ladder (optional)

### KEY BENEFITS

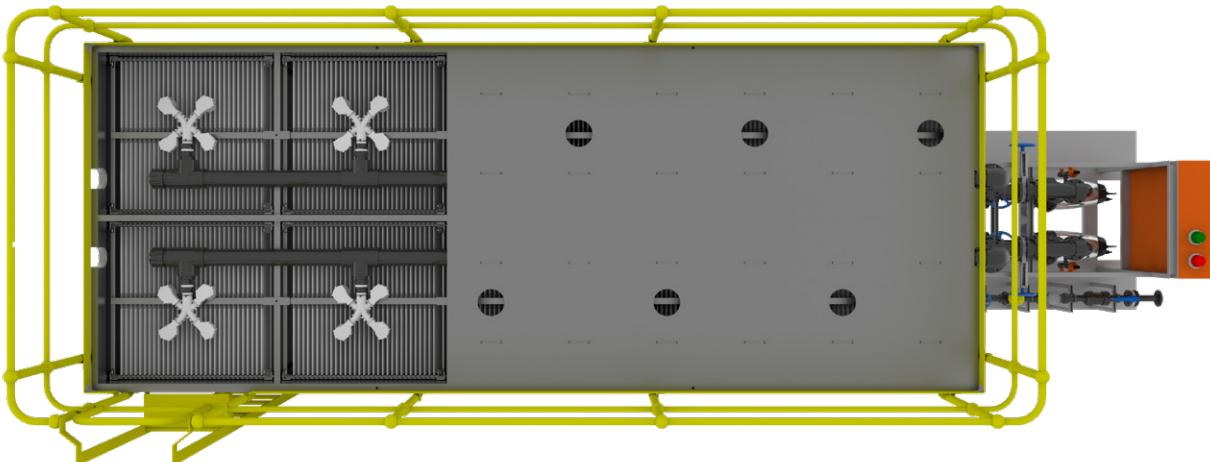
- Simple to operate
- Low sludge yield
- Low energy consumption
- Modular/expandable
- Tolerance to high organic loading and FOG
- Tolerance to fluctuations in flow & load
- Rapid biological start-up & restart time
- Quick installation
- Easy to operate with minimal operator input
- Simultaneous aerobic & anaerobic treatment
- Low lifecycle costs

## CONFIGURATIONS

The BioGill Ultra comes complete with a container housing ten internal treatment cartridges, a recirculation tank, pumps and control panel. The design is both compact and flexible, allowing for a variety of installation configurations, such as side by side, stacked or placing the recirculation tank underground. The control system also allows for easy addition of ancillary equipment and simple integration into an existing wastewater treatment process.



Side view (with 6 external walls removed)



Top view (with 8 access hatches removed)

## HOW BIOGILL WORKS

Biological wastewater treatment relies on microorganisms to consume organics in the wastewater. Like all living things, microorganisms need the right habitat to flourish. BioGill above ground bioreactors use patented Nano-ceramic media, known as Gills, to provide the ultimate air and liquid interface for the microorganisms to grow, multiply and thrive. Arranged in suspended vertical loops, each Gill is folded over a support, creating two distinct sides: one in contact with the water and the other in contact with the air.

By providing the perfect habitat, the microbes perform at their best, protected in the biofilm and effectively removing pollutants from the wastewater. BioGill solves many of the shortfalls of other technologies by delivering effective treatment of high organic waste streams, Fat, Oil and Grease (FOG), as well as reducing odor.

<b>STEP 1</b>	Wastewater is pumped to the top of the BioGill bioreactor.
<b>STEP 2</b>	The wastewater is then dispersed over the looped Gills and gravity fed down through the unit.
<b>STEP 3</b>	Biomass self-optimizes, growing the most suitable microbes to feed on a given wastewater. The result is a robust biomass that is more resilient to shock loads, FOG and high organic wastewaters.
<b>STEP 4</b>	Natural air convection, resulting from the heat generated by the biomass, creates a continuous supply of oxygen.
<b>STEP 5</b>	Treated wastewater exits the BioGill system with reduced levels of BOD, COD and FOG.

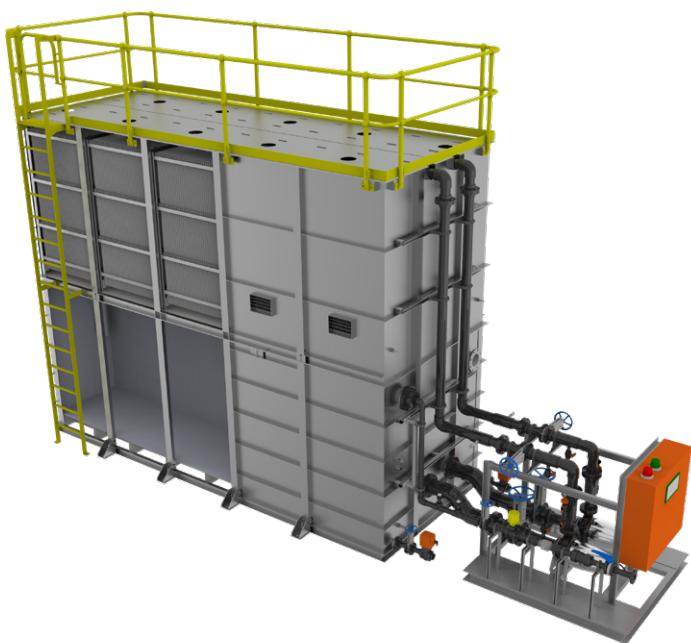


Fig. 1. Gill Structure

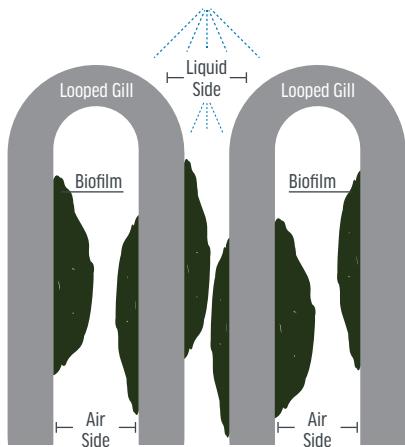
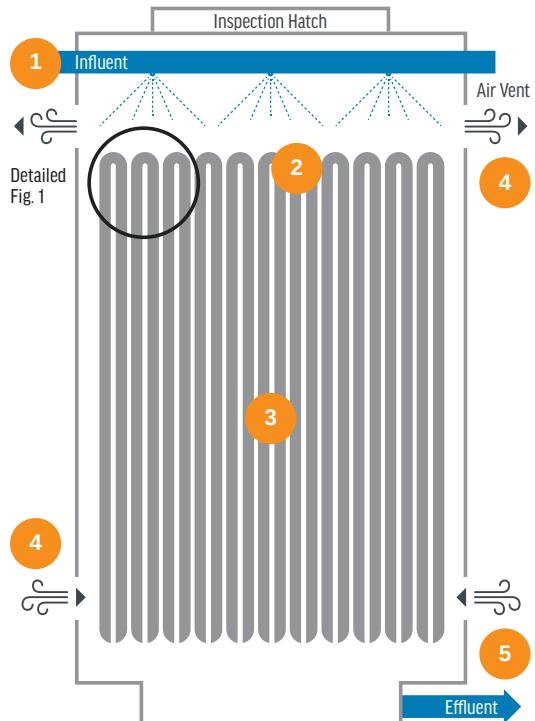


Fig. 2. BioGill Cartridge Process Flow



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Case studies and technical reports are available at [biogill.com](http://biogill.com)