

# Siemens Superior Aeration Technologies - Orbal®, VLR® and VertiCel® Processes

Orbal®, Vertical Loop Reactor (VLR®) and VertiCel® processes are far superior to all other aeration technologies. They save energy and footprint, while producing and unparalleled effluent quality.

Aeration processes from Siemens can be ideally suited for most wastewater treatment plants. Select the VLR® process for flows of 1 mgd to over 20 mgd, VertiCel® process for flows of 2 mgd+, or the Orbal® process for flows up to 15 mgd.

Choose the Orbal®, VLR®, or VertiCel® processes for Conventional Activated Sludge design as well as Extended Aeration. These designs can save you energy and footprint while providing a plant that produces superior effluent quality.

# SIEMENS

Features	Orbal®/VLR®/VertiCel®	Other Manufacturer's Products and Processes	Orbal®/VLR®/VertiCel® Benefit
Tank Arrangements	Tanks-in-series arrangement.	Single tanks - upgrades necessary for BNR requiring up front anaerobic/anoxic tank(s) with mixers and recycle.	Tanks in series achieve higher kinetic reaction rate, so basin volume can be reduced.
Process	Aerated-anoxic tank(s) followed by Aerobic tank(s).	Aerobic, additional up front anaerobic/anoxic tank(s) for BNR.	Different environments can be maintained in each reactor for nitrogen or phosphorus removal.
Energy	Transferring oxygen into an Aerated-Anoxic environment saves 20-30% of the power of conventional design.	Oxygen transfer in a high DO environment only.	Lower power cost.
Effluent Quality	BOD/TSS/NH <sub>4</sub> -N <10/<10/<1 mg/l Tanks-in-series design prevents short-circuiting of ammonia through the system reducing effluent levels to non-detectable.	Single reactor systems are more vulnerable to spikes of ammonia short-circuiting.	Less risk of fines for effluent violations.
Total Nitrogen Removal	All designs utilize simultaneous nitrification-denitrification for power savings and superior treatment capacities (80% TN removal for three tank design). Adding internal recycle (Sim-Pre® Process) increases TN removal up to 95%.	Anoxic tanks with recycle lines and mixers required for TN removal to 80%. Additional mixers and recycle lines increase energy requirements of the system.	Lower maintenance and operating costs.
Biological Phosphorus	Most designs do not require additional tankage or recycle lines.	Anaerobic and Anoxic tanks required with additional mixers and recycle lines.	Lower maintenance and operating costs.
Flexibility	Aerator rotational speed, Immersion range, Disc placement, Channels out of service for seasonal or start-up loads.	Aerator (or blower) speed and immersion are the only adjustments normally available. Brush aerators and vertical shaft aerators do not mix as well as disc aerators, thus range of adjustment or turndown capacity is limited.	Lower power usage and better effluent quality.



Orbal® Process



VLR® Process

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Mixing Energy	Mixing energies of up to 1 bhp/200,000 gallons in Orbal® Aerated Anoxic tanks.	Carrousel systems advertise 0.4 hp/1,000 cu. ft. This translates to 1 hp/18,700 gallons to maintain mixing in aerobic tank. Fine bubble needs to maintain 0.12 SCFM/sq. ft. of surface area to maintain mixing (1 BHP/26,000 gallons - 20' SWD 0.7 mechanical efficiency).	Lower power usage due to better turndown and better effluent quality.
Footprint	VLR® and VertiCel® have deep tank design thus further reducing footprint.	Other surface aerators require mixers for deep tank designs. Fine Bubble may require stainless steel piping or heat exchangers for deep tank applications.	Reduced construction cost and less maintenance.
Process Guarantees	Total system responsibility available with the addition of the Tow-Bro® clarifier for rapid sludge removal. Guarantees include BNR and energy usage.		Less risk of fines for effluent violations.
Electrical Controls	Not required with this system. Available for energy savings and for plants requiring BNR with wide fluctuations in loads to the plant.	Phased reactor processes are impractical to operate without sophisticated controls. Electrical controls are limited in energy savings capacity due to limited aerator turn down.	Lower operating cost.
O&M	Weekly bearing greasing is required at 5 minutes per bearing. No tank downtime required for equipment replacement or repair.	Tanks must be taken out of service for fine bubble repair. If only single surface aerator is available, tank must receive no treatment (including aeration or mixing) until repair or replacement is made.	Lower operating cost and better effluent quality.
Hydraulic Surges or Process Upset	Modified contact stabilization mode reduces clarifier loadings thus reducing loading rates on secondary clarifiers preventing biomass washout.	Strategies include influent bypass or turning aerator units off. These methods do not maintain treatment. The choice given to the operator is to stop treatment when it is needed most.	Lower construction cost and better effluent quality.

The information provided in this brochure contains merely general descriptions or characteristics of performance which in actual case of use do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of the contract.

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