

Blazing the Trail

Engineered wetlands and recirculating filters join aerobic treatment units to offer innovative methods for treating wastewater on challenging building sites

By **Scottie Dayton**

Each April, Onsite Installer has listed aerobic treatment units (ATU) and biofilters that are NSF Class I certified. However, an accurate picture of the rapidly developing advanced wastewater treatment market must include engineered wetlands and recirculating filters (which are not NSF Class I certified).

Natural treatment

Constructed wetlands have evolved substantially over the past 40 years. Unlike earlier generations of passive-constructed wetlands, these systems boost treatment performance through aeration or recirculation. They provide effective nitrogen removal, although phosphorus removal is minimal. Engineered systems can reduce the size of the treatment area by 50 percent or more, and treatment is faster, too. However, wastewater from constructed wetlands must be routed to the subsoil for final treatment.

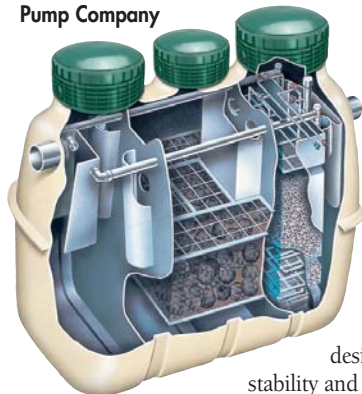
Of the five major types of constructed wetlands, horizontal flow and vertical flow are the favorites for residential designs. Horizontal systems can be surface flow (also called free-water) or subsurface flow. In both, wastewater enters at one end of a lined excavation and exits at the other. Vertical flow applies water down through the root zone, creating a more compact design. Plants can be cattails, bulrushes, reeds, and sedges.

Through the sand

Recirculating filters — sand beds, intermittent sand filters, or recirculating sand filters — are aerobic, fixed-film bioreactors that treat wastewater varying in volume and strength. They consist of a PVC-lined excavation or structure filled with uniform washed sand positioned over a drainage system.

Effluent is sprayed or discharged onto the sand bed, where it is treated as it percolates down. The drainage system collects and recycles effluent to the recirculation tank for further processing or discharges it. Recirculating filters serve single-family homes, small communities, restaurants, large commercial establishments, and schools.

Fusion Series from Zoeller Pump Company



New ATUs

Of course, ATUs remain a staple of advanced treatment, and there are a few new entries this year.

The **Fusion Series** wastewater treatment system from **Zoeller Pump Company** doesn't require a septic tank. The compact drop-in units receive and treat raw wastewater using dual treatment zones. An anaerobic compartment followed by an aerobic contact chamber use specially designed media to provide biological stability and treatment consistency. Maintenance

is simple, and the media is never removed or replaced.

The quiet, programmable compressor consumes no more power than an 80-watt light bulb. Effluent quality is within secondary treatment standards for all available disposal methods. **Call 800/928-7867 or visit www.zoeller.com.**

The **Bio-Robix** unit from **Enviro-Flo Inc.** is an extended aeration system with suspended growth and a clarification chamber. Several options are available



for the secondary treatment chamber. Hydraulic retention is 45 hours at design flow.

The unit has a remote integrated failure-warning system. Additional biochemical nutrient removal options are available. **Call 877/836-8476 or visit www.enviro-flo.net.**

Clearwater systems

from **AquaKlear** install in a single, shallow-design fiberglass or reinforced concrete tank and incorporate


components normally found in larger commercial or municipal extended aeration systems with suspended growth. A modified effluent outlet assembly slows hydraulic flow, enabling a skimmer to remove floatage solids before they are washed out.

No moving parts are below ground, and that enables easier maintenance. The linear compressor and control panel are remotely located. The fiberglass line has more than 200 combinations of pre-assembled, multiple-tank designs. Numerous all-in-one series for concrete tanks are also available. The systems are designed to handle user abuse and shock loads. **Call 877/936-7711 or visit www.aquaklear.net.**




Those new systems aside, the aerobic treatment units and biofilters in the accompanying table have been tested against NSF/ANSI Standard No. 40 and meet or exceed all criteria for Class I certification. They are approved for national and international sales. Some states require additional testing, while others do not permit ATUs or other advanced systems. The following table summarizes what is available. Check with manufacturers for complete details.

Advanced Wastewater Treatment Systems

MANUFACTURER	BRAND	GPD	TYPE	RELEASED	DESCRIPTION	DISTRIBUTORS IN
Advanced Septic Treatment Systems Inc. 360/856-2142 www.advancedsepticssystems.com	TRD 1000	500 to 1,000	SBR	1996	Unit processes 130 gallons per batch every three hours. Sludge is recirculated, leaving none to pump. UV light in clarification chamber. Treated effluent averages 3 mg/l BOD and TSS and fecal coli 47 Geometric Mean. Telemetry reports problems to manufacturer over home-owner's phone line.	OR, WA
Advantage Wastewater Technologies LLC 318/745-2223	T Series	500 to 1,000	NR	2005	Rectangular concrete basin has a tapered wall. A pre-treatment tank, aeration chamber, and clarification tank are inside the basin. Compressor style blowers are outside the aeration chamber.	IL, LA, TX
Alternative Wastewater Systems Inc. 630/761-8720	SyBR-AER	500 to 1,500	SG	1999	Extended aeration and activated sludge treatment process using fill, react (aeration), settle (sedimentation/clarification), and draw (decant).	IL
American Wastewater Systems Inc. 800/960-3997 www.best1systems.com	B.E.S.T. 1 AWS	500 to 1,500	SG	2002	Aeration blower discharges air into the second compartment, causing the liquid to roll with sufficient force to suspend all solids. Clarifier compartment is sloped to direct settled solids back toward second compartment. Hydraulic roll created by the air system helps draw settled solids from the bottom of the clarifier back into the second compartment.	AL, FL, LA, MS, VA, WV
AquaKlear Inc. 877/936-7711 www.aquaklear.net	AK Series	500 to 1,500	SG	1996	Extended activated sludge process occurs within a single, shallow-design fiberglass or reinforced concrete tank. A patented automatic skimmer in the clarifier removes any floating solids and returns them to the aeration zone every 24 hours to keep the chamber clean. The blower operates continuously, allowing the system to handle shock loads, while fine air diffusion to the aeration chamber maximizes the unit's rebound period. Under normal operation, BOD and TSS are in the single digits.	AL, AR, AZ, CA, FL, GA, IA, IL, LA, MS, TX, USVI, Belize, the Caribbean
	Clearwater	500 to 1,500	SG	2007	Upgraded version of the AK has a modified effluent outlet assembly that slows hydraulic flow, enabling the skimmer to remove flotage solids before they are washed out. The systems are designed to handle user abuse and shock loads.	
Aquapoint 508/998-7577 www.aquapoint.com	Bioclere	200 to 50,000	FF	1991	Modified trickling filter over a clarifier contains pumps that maintain a consistent dosing pattern throughout flow variations. Designed for high-strength waste streams, Bioclere relieves biologically overloaded facilities and uses existing septic tanks and leaching fields.	AL, AR, CT, DE, FL, GA, ID, KY, ME, MD, MA, MN, MS, MO, NC, NH, NJ, NV, NY, PA, RI, TN, TX, VA, VT, WA, WI, WV, ON
Aquarobic International 800/927-8304 www.aquarobicinternational.com	Mini-Plant	500 to 1,500	SG	1971	Sequencing batch reactor is controlled by a factory-set program that times aeration and settling functions. Filter is beet or peat gravel. Tertiary treatment, achieved through add-on components, permits discharge of effluent to raised filter bed, drip irrigation, constructed wetland, or surface discharge after disinfection.	CO, GA, IL, NC, NJ, NV, VA, WI, MB, ON
Bio-Microbics Inc. 800/753-3278 www.biomicrobics.com  See ad page 19 <i>(Bio-Microbics is continued on following page)</i>	MicroFAST	500 to 9,000	SG/FF	1996	Fixed activated sludge treatment (FAST) is a hybrid combination of attached and suspended growth in an aerobic-packed bed bioreactor. Nitrification and denitrification occur simultaneously within the same tank with no modifications. An aerating blower is the only moving part. FAST needs no other filters or pumps, and is garbage disposal and dishwasher compatible. The system is suited for single-family dwellings, clustered subdivisions, and residential communities.	AK, AL, AR, AZ, CA, CO, CT, FL, GA, HI, IA, ID, IL, IN, KS, KY, MA, MD, MI, MN, MO, MS, NC, NE, NH, NJ, NM, NV, NY, OH, OK, OR, PA, PR, RI, TX, VA, VT, WA, WV, WI, WY and Canada

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Advanced Wastewater Treatment Systems (continued)

MANUFACTURER	BRAND	GPD	TYPE	RELEASED	DESCRIPTION	DISTRIBUTORS IN
Bio-Microbics Inc. (continued) 800/753-3278 www.biomicrobics.com	HighStrength FAST	Consult Factory	SG/FF	1998	Ideally suited for restaurants, schools, trailer parks, office buildings, commercial properties, and other unsewered, high-strength waste applications.	AK, AL, AR, AZ, CA, CO, CT, FL, GA, HI, IA, ID, IL, IN, KS, KY, MA, MD, MI, MN, MO, MS, NC, NE, NH, NJ, NM, NV, NY, OH, OK, OR, PA, PR, RI, TX, VA, VT, WA, WV, WI, WY and Canada
	RetroFAST	250 and 375	SG/FF	2000	Designed to enhance conventional septic systems or renovate biologically failed systems. The unit produces highly treated wastewater with oxygenated effluent, enabling aerobic bacteria to develop in the soil and digest the clogging biomat. The unit can be adapted and inserted into existing tanks with minimal site disruption. When used with new construction, the bioreactor assures that the clogging layer never forms.	
Bionest Technologies Inc. 866/538-5662 www.bionest.us	BN Model	750 to 1,500	BF	2004	A biological treatment process using a fixed biofilm reactor and alternating aerobic and anaerobic environments. Microorganisms attach to both sides of the ribbon-shaped plastic media, which never needs replacing.	PQ (U.S. distribution coming soon)
Bord Na Mona Environmental Products U.S. Inc. 800/787-2356 www.bnm-us.com  See ad page 14	Puraflo	300 to 1,500	BF	1993	Peat biofilter provides a minimal-maintenance and efficient treatment option for difficult and sensitive sites. It can be used where conventional systems are restricted, or have failed due to high groundwater levels, shallow bedrock, poor soils, or other limiting site conditions. Treatment performance levels average less than 5 mg/l TSS and BOD with 99 percent reduction for fecal coliforms and no pathogens.	AL, AR, FL, GA, IA, IL, NJ, MA, ME, MI, MN, MO, NC, NM, NY, OH, PA, RI, TX, VA, VT, WV, WI
Clearstream Wastewater Systems Inc. 800/586-3656 www.clearstreamsystems.com	N Series	500 to 1,500	SG	1992	Standard septic tank required in front of ATU, which provides aeration and clarification inside a round fiberglass or concrete tank. System uses flow equalization weir instead of filter for minimum maintenance. No moving parts. Discharge safe for spray and drip irrigation and many other nonpotable water uses.	AL, AK, AZ, CA, CO, FL, GA, IA, IL, KS, KY, LA, MI, MO, NM, NY, NC, OH, OK, SC, TX, VA, WA, WV, WI
Consolidated Treatment Systems Inc. 937/746-2727 www.consolidatedtreatment.com	Multi-Flo FTB	500 to 1,500	SG/FF	1973	Aerator at bottom of unit draws air into reactor chamber where it mixes with wastewater. Thirty white filter bags provide filtration at 100 micron size. Bags prevent release of solids. As bags develop a particle layer, filtering capabilities increase. Bags can be cleaned and reused.	
	Nayadic M	500 to 1,500	SG/FF	Late 1960s	Compressed air pumped into the conical-designed inner reactor vessel mixes wastewater with bacteria. A scum baffle keeps floating material from entering the outer clarification chamber. Reactor chamber also creates a quiescent zone along the clarification chamber where bacteria can settle.	AL, AR, AZ, FL, HI, IA, IL, ME, MS, MO, NJ, NM, NY, OH, OR, PA, TX, VA, WA, WV
	Enviro-Guard	750	SG/FF	2003	The system incorporates three treatment chambers. The first receives wastewater and separates non-biodegradable solids. The second, a dosing chamber, continuously mixes and holds liquids until they are pumped to the fixed film treatment plant. A patented three-stage process in the third chamber completes the final treatment.	
Delta Environmental Products Inc. 800/219-9183 www.deltaenvironmental.com (Delta Environmental is continued on following page)	DF Series	400 to 1,500	SG	1993	Whitewater Home Series utilizes the activated sludge and extended aeration methods of biological waste reduction. Conical clarifier supported inside main tank. Space between the two chambers is the aeration zone.	AL, AK, AZ, CA, CO, FL, GA, HI, ID, IL, IN, IA, KY, LA, ME, MD, MI, MN, MS, MO, MT, NV, NM, NY, NC, OH, OK, OR, TN, TX, UT, VA, WA, WV, WI, AB, BC, BWI, MB, ON, SK, USVI, Trinidad, and Tobago
	UC Series	500 to 1,500	SG	2001	Three specially placed air drops equipped with Delta's patented air port enables the Whitewater UltraClear Series to be self-balancing and nonclogging for a maintenance-free air delivery system. Otherwise, the same features as the Whitewater Home Series.	


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Delta Environmental Products Inc. (continued) 800/219-9183 www.deltaenvironmental.com	E Series	500 to 1,500	FF	2005	The Ecopod intra-tank bioreactor inserts into an average-sized wastewater treatment tank or vault. Nitrification and denitrification occur in a single tank. Round or rectangular concrete or fiberglass tanks available. Suited for individual residences, cluster designs, and small-to-medium commercial applications.	Nationwide
Desoto Concrete Products Inc. 888/445-9347	H-TWO-O Series	500 to 1,000	SG	2003	Rectangular basin has a pretreatment tank, aeration chamber, and clarification tank.	IL, LA, MO, MS, OH, OK, TX
Ecological Tanks Inc. 800/277-8179 www.etiaquasafe.com	Aqua Aire	500 to 1,500	SG	2002	Rectangular-configured Aqua Aire system comes in many configurations and can be cast with the pretreatment tank, aeration chamber, clarifier, and pump tank in a monolithic unit for easy installation. The system has a diffuser deflector assembly for air entrainment. Fiberglass disks break air stream into smaller bubbles for optimal oxygenation.	AL, AK, CA, FL, GA, HI, IL, IA, KS, LA, MS, MO, NM, NY, OH, OK, PA, SC, SD, TX, VA, WV, WI, BWI
	Aqua Safe	500 to 1,500	SG	1995	Aqua Safe treatment plants use an extended aeration activated sludge process. They have an outer mixing tank and center settling chamber (clarifier). Units provide fine air diffusion through four diffusers located quarterly inside the tank. Included is Aqua Safe's patented design of fine air diffusion above the clarifier's plane.	
Enviro-Flo Inc. 877/836-8476 www.enviro-flo.net	E Series	500 to 1,500	SG	2002	Two-phase extended aeration system with clarifier chamber and chlorine contact chamber. Tanks are concrete, asphalt-coated steel, or fiberglass. Hydraulic retention at design flow is 44 hours. Integrated failure warning system.	AL, AR, FL, GA, IL, LA, MS, NC, OH, SC, TX, VA, WA
	Bio-Robix	500 to 5,000	SG	2007	Extended aeration system with clarification chamber has several secondary treatment chamber options. Hydraulic retention is 45 hours at design flow. Remote integrated failure-warning system. Available with additional biochemical nutrient removal options.	LA, MS
Hoot Aerobic Systems 337/474-2804 www.hootsystems.com	Hoot-LA	500 to 1,000	SG	1984	An improved version of the Hoot treatment system. Although it is the most basic of the line, results are better than 10/10 mg/l on CBOD and TSS with more than a 95 percent reduction of the wastewater influent.	AL, AZ, CA, CO, FL, KS, LA, MO, MS, NC, NM, OK, TX, VA
	Hoot	500 to 1,000	SG	1995	Five-stage, one-piece systems have a pretreatment tank, aeration chamber, final clarifier, optional disinfection device, and a pump tank. Results are better than 3/2/14 mg/l on CBOD/TSS and total nitrogen. A 99 percent reduction on CBOD and TSS, and better than 50 percent reduction of total nitrogen. Install in areas where 20 mg/l is the discharge limit for total nitrogen. Carries a three-year warranty.	
	Hoot-BNR	500 to 1,000	SG/FF	2001	Adds biological nitrogen reduction to the system. Results are better than 5/5/10 mg/l on CBOD/TSS and total nitrogen. Install in areas where 10 mg/l is the discharge limit for total nitrogen, the federal level for drinking water.	
Hydro-Action Industries 800/370-3749 www.hydro-action.com	AP Series Turtle Drip	500 to 1,500	SBR	1998	Sequencing batch reactor (fill and draw) allows for natural aerobic processing and clarification of household wastewater. Round fiberglass tanks have internal aeration (mixing) chamber. Ceramic Airstone diffusers create oxygen bubbles in the sludge and a high rate of oxygen transfer. Microorganisms transform wastewater to a clear, odorless liquid in 24 hours.	CA, CO, FL, HI, IL, IN, ND, NV, OH, OK, OR, SC, SD, TX, WA, WY, BC


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Jet Inc. 800/321-6960 www.jetincorp.com  See ad page 33	1500 Series	500 to 1,500	FF	1993	In Jet's biologically accelerated treatment (BAT) process, millions of microorganisms attach themselves to the media. A Jet Aerator supplies the oxygen the microorganisms use to convert the waste to colorless, odorless liquids and gases. Process eliminates sludge. Three-stage filterless system has pretreatment, treatment, and settling compartments.	AK, AZ, AR, CA, CO, FL, ID, IL, IA, IN, MS, MO, MT, NJ, NY, OH, PA, TX, VA, WA, WV, WI, WY
Lombardo Associates Inc. 617/964-2924 www.lombardoassociates.com	Nitrex	330 to 10,000+	Nitrogen removal	2001	Patented media provides a carbon source for heterotrophic denitrification that converts nitrate to inert nitrogen gas within the filter. The media is contained in a prefabricated tank or, for larger installations, in an engineered excavation. For septic tank application, a nitrifying (TKN <5 mg/l) pretreatment system such as recirculating media filters is required. Single pass filters can be used if sufficient wastewater alkalinity exists. Nitrate-free effluent is discharged to a drainfield or other approved technique. The filter is passive, essentially maintenance free, and will not need media replacement for 20 years or more.	USA
	PhosRID	330 to 10,000+	Phosphorus removal	2003	System uses a reductive iron dissolution (RID) media upflow filter to remove wastewater phosphorus by iron mineralization. The system has two treatment units: the first contains the RID media; the second operates as an oxygenation filter using sand, gravel, or other approved media.	
MicroSepTec 877/473-7842 www.microseptec.com	EnviroServer	600 to 2,500	SG/FF	1999	Extended storage system has attached film growing on a biomedium in one chamber, two aerated suspended growth compartments, and a denitrification chamber all inside a fiberglass tank. The combination exceeds the individual performance of a fixed film or suspended growth system.	AZ, CA, MA, MD, NV, NM, PA
Mo-Dad-1 Inc. 800/999-0615 www.mo-dad.com	Alliance	500 to 1,000	SG	2000	Two-phase treatment occurs inside a square concrete tank. Concrete is poured onsite, then Alliance components installed.	AL, AR, AZ, FL, GA, IL, KY, LA, MS, OH, OK, TX, VA, WV
	Cajun Aire	500 to 1,000	SG	1990	Rectangular concrete basin has pretreatment tank, aeration chamber, and clarification tank. Compressor style blowers are outside the aeration chamber.	
	Mo-Dad-II	500 to 1,000	SG	2001	Main round tank is UV-protected PVC. Wastewater enters a Schedule 20, 24-inch vertical PVC pipe inside the main tank. Effluent flows into 10-inch PVC pipe containing gravel filter, then into final 10-inch settling pipe. Clarification occurs in the main tank. Liquid is safe for watering lawns, trees, etc.	LA
National Wastewater Systems Inc. 337/439-0680 www.solarair.net	SA II	500 and 1,000	SG	2003	Four-compartment concrete tank contains the pretreatment and aeration chambers, clarifier, and holding tank. The unit is an efficient one-piece design.	GA, IL, LA, MS, MO, OK, TX
	Solar Air	500 to 1,200	SG	2000	Three-compartment concrete tank contains the pretreatment chamber, aeration chamber, and clarifier. Sprinkling or pressure dosing disperses the final liquid. The plant is distributed nationally and internationally.	
Norweco Inc. 419/668-4471 www.norweco.com (Norweco is continued on following page)	Standard Singulair	500 to 1,500	SG	1978	Extended aeration process provides nonmechanical demand use flow equalization, pretreatment, aeration, clarification, tertiary filtration, and optional disinfection and dechlorination inside a single precast rectangular concrete tank. Effluent averages 6 mg/l cBOD5 and 10 mg/l TSS.	AR, AZ, CA, CO, FL, GA, ID, IL, IN, IA, KS, KY, LA, MD, MI, MN, MS, MO, MT, NJ, NY, NC, OH, OK, PA, RI, TX, VT, VA, WA, WV, WI, AB, BC, NB, ON
	Singulair TNT	500 to 1,500	SG	2006	Operates like the Standard Singulair system, but biologically oxidizes nitrogen compounds without complicated and expensive equipment. Designed for easy operation and maintenance, it does not require chemicals or recirculating the effluent. Effluent averages 4 mg/l cBOD5, 9 mg/l TSS, 7 mg/l nitrate, and 12 mg/l total nitrogen. Average total nitrogen reduction is 68 percent.	

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Norweco Inc. (continued) 419/668-4471 www.norweco.com	Singulair UV	500 to 1,500	SG	2006	Operates like the Standard Singulair system but with UV disinfection. The system provides reliable biological treatment without chemical additives. The UV chamber's design and flow path ensure long lamp life and expose the effluent to multiple doses of UV radiation.	See previous page
OMNI Environmental Systems Inc. 508/548-0343 www.omnirsf.com	OMNI RSF	110 to 1 million	RSF	1999	Variable multi-pass system allows operators to adjust various effluent mix ratios and dosing schedules for optimal performance. The unit has several design enhancements that reduce maintenance requirements, and a subsurface filter that can be hidden below grade.	CA, MA, MD, VA
Orengo Systems Inc. 800/348-9843 www.orengo.com  See ad page 17	AdvanTex AX20, AX20N	500 to 1,500	PBF	2000	Compact textile filter in a 20-square foot watertight fiberglass basin operates in recirculating mode, providing secondary treatment for residential or small commercial wastewater. Produces BOD and TSS less than 10 mg/l and nitrogen reduction better than 70 percent. Treated effluent can be reused. Unit has a small installation footprint. It's reliable, serviceable, and sustainable even under peak flows, and economical to operate. Telemetry control panel with Web-based monitoring system.	AL, AK, AZ, AR, CA, CO, CT, FL, GA, ID, IL, IN, IA, MA, ME, MI, MN, MO, MT, NC, NH, NJ, NM, NV, NY, OH, OR, PA, RI, SC, TN, TX, VT, VA, WA, WI, WY, AB, BC, NB, NF, NS, ON, PE
	AdvanTex AX100	Up to 5,000	PBF	2002	Compact textile filter in a 100-square foot watertight fiberglass basin operates in recirculating mode, providing secondary treatment for commercial and multi-family wastewater. Produces 5 to 25 mg/l BOD and TSS and nitrogen reduction better than 60 percent depending on loading rates. Treated effluent can be reused. Unit is reliable, serviceable, and sustainable even under peak flows. It's energy efficient and low maintenance. Real-time telemetry panel and software provides Web-based tracking of site, maintenance, and performance data.	AL, AK, AZ, AR, CA, CO, CT, FL, GA, ID, IL, IN, IA, MA, ME, MI, MN, MO, MT, NC, NH, NJ, NM, NV, NY, OH, OR, PA, RI, SC, TN, TX, VT, VA, WA, WI, WY, AB, BC, NB, NF, NS, ON, PE
	Intermittent Sand Filter	Loading rate: 1.25 gpd/sq. ft.	PBF	1981	Pre-engineered sand filter provides secondary treatment of residential and small commercial wastewater. The kit includes pumps, liquid level sensors, and programmable controls to dose small, even amounts of filtered effluent over a bed of sand meeting specific media gradation. Treated effluent can be reused. Unit produces less than 5 mg/l BOD and TSS, less than 400 ppm fecal coli, and reduces nitrogen 40 to 50 percent. Highly reliable, serviceable, and sustainable even under peak flows. Economical, needs minimal maintenance, but requires large installation footprint.	AL, AK, AZ, AR, CA, CO, CT, FL, HI, ID, IL, IN, IA, KS, KY, ME, MD, MA, MI, MN, MS, MO, MT, NE, NV, NH, NM, NY, NC, OH, OR, PA, RI, SC, TN, TX, UT, VT, VA, WA, WI, WY, AB, BC, NS, ON
	Recirculating Sand Filter	5 gpd/sq. ft.	PBF	1981	Pre-engineered sand filter operates in recirculating mode for advanced treatment of commercial and multi-family wastewater. The kit includes pumps, liquid level sensors, and programmable controls to dose small, even amounts of filtered effluent over a bed of sand and gravel meeting specific media gradation. Treated effluent can be reused. Unit produces less than 10 mg/l BOD and TSS, and reduces nitrogen 40 to 50 percent. It is reliable, serviceable, and sustainable even under peak flows. Economical, does not need a full-time operator, but does require a large installation footprint.	U.S. and Canada
Premier Tech Environmental 800/632-6356 www.premiertechenv.com (Premier Tech Environmental is continued on following page)	Ecoflo ST	420 to 1,500	BF	1995	Wastewater from the septic tank with effluent filter is directed into a fiberglass shell where it is evenly distributed over the entire surface of the peat filter using passive distribution consisting of a tipping bucket and distribution plates. The unit, which has no electromechanical parts, can be installed inground or aboveground with a pumping station. The product's life expectancy is more than 30 years.	USA, Canada, Europe, and Asia
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Premier Tech Environmental (continued) 800/632-6356 www.premiertechenv.com  See ad page 32	Ecoflo STB	420 to 1,500	BF	1999	Identical to the ST series, except these have a fiberglass submersible collecting bottom. Designed for sites with a high water table, or where wastewater is collected and discharged to a tertiary treatment unit, a shallow buried trench, or a drip irrigation system. Because they are installed inground, the fiberglass units blend into any landscape design.	USA, Canada, Europe, and Asia
	Ecoflo STB-650B/BR	420 to 1,500	BF	2005	Wastewater from the septic tank with effluent filter is directed into the biofilter's concrete shell where it is evenly distributed using a tipping bucket and distribution plates. Select the 650B with bottom outlet for sloping lots where effluent gravity discharges to surface or subsurface disposal areas. Achieve a no-mound option by using the 650BR with pump vault to discharge the treated effluent to disposal areas. The product's life expectancy is more than 30 years.	
	Rotofix	4,000 to 40,000	RBC	2000	Unit has a patented, tubular PVC medium with multiple internal blades for maximum surface contact with wastewater. Slow, controlled, continuous rotation mimics a waterfall. Wastewater carried by the submerged rotors cascades over the length of the media channels, then spills out the ends and returns to the tank. Captured air is released from the channels, providing additional tank aeration. The design eliminates the risk of media biological clogging and the moving shaft breaking.	
	Peatland	5,000 to 25,000	BF + WL	2002	Designed to treat community, commercial and institutional wastewater, the system has a vertical flow, aerobic peat filter treatment zone followed by a horizontal flow, anaerobic subsurface-constructed wetland. The filter of compacted sphagnum peat moss has a granular media covering. The constructed wetland, composed of granular porous media deep enough to create anaerobic conditions, is populated with fast-growing native plants. Treatment performances make this system suited for sensitive areas.	
Pro Flo Aerobic Systems LP 877/467-7635 www.profloaerobic.com	Pro Flo	500 to 1,500	SG	2004	Rectangular, one-piece reinforced concrete tanks. The 500 gpd system has pretreatment, aeration, clarifier, and pump chambers built into one tank. The 750 gpd system has pretreatment, aeration, and clarifier chambers in one tank. The 1,000 gpd and 1,500 gpd systems have aeration and clarifier chambers in one tank. All systems operate with simple controls.	TX and Canada
Quanics Inc. 877-782-6427 www.quanics.net  See ad page 2	Aero-Cell	500 to 1,500	FF	1999	Patented open cell foam media delivers consistently clean effluent, does not degrade, and provides years of trouble-free performance. Its 80 percent recirculation rate through a filter produces liquid that averages 2 mg/l BOD and TSS and 9 mg/l nitrogen.	KY
	Bio-COIR	200 to 1,500	FF	2005	System uses natural coir media, a byproduct of processing coconuts, to generate high quality effluent, protect drain-fields, and extend the life of the system. The durable fibers are slow to degrade, ensuring that the proper water-to-air ratio is maintained over long periods.	
Rogers Treatment Systems 985/345-4096	Mudbug	500 to 1,500	NR	NR	NR	LA
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Advanced Wastewater Treatment Systems (continued)

MANUFACTURER	BRAND	GPD	TYPE	RELEASED	DESCRIPTION	DISTRIBUTORS IN
Southern Mfg. Co. 800/992-4501	SM Series	500 to 1,500	SG	1993	Round fiberglass and concrete tanks retard sludge buildup. Three-phase mechanical aerobic treatment extended aeration activated sludge process. Compressor style blowers are outside the aeration chamber.	AR, CA, ID, IL, LA, MS, NM, OK, TX
	CM Series	500	SG	2006	Clean H2O Machine is a self-contained, gravity-flow treatment unit in a compact, cylindrical polyethylene housing with 36-inch access port. It operates similar to the SM Series, but has a liquid capacity of 730 gallons instead of 1,020 gallons like the SM500. The CM tank fits in the bed of a half-ton pickup truck, and is small enough for installation in sites where many other units will not fit.	CA, LA, TX
Tex-Aire Inc. 877/752-3700 www.tex-aire.com	Mighty Mac	500 to 750	SG	2004	Two-phase system has no moving parts or filters to replace. Aeration zone inside round fiberglass tank agitates liquid and promotes bacterial growth that digests organic matter. A quiet zone inside a cone in the tank settles suspended solids back into the aeration zone while the liquid rises upward. Medical-grade air pump uses less electricity than a 60-watt bulb.	AR, AZ, FL, GA, IL, LA, OH, OK, TX, WV
	Tex-Aire	500 to 1,000	SG	2004	Three-phase mechanical aerobic treatment extended aeration activated sludge process. Systems, constructed from reinforced concrete, come with a prewired alarm control center for automatic operation. Final product is safe for discharge following state regulations. ■	GA, LA, OK, TX

BF = Biofilter FF = Fixed Film ISF = Intermittent Sand Filter
 NR = No Response PBF = Packed Bed Filter RSF = Recirculating Sand Filter
 SBR = Sequencing Batch Reactor SG = Suspended Growth WL = Wetland



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