Average Testing Performance Data for Components of Performance-Based Treatment Systems (PBTS) by E. Roeder

- **from innovative system testing in Florida or**
- **from test centers for evaluation of use in nutrient and fecal coliform-reducing PBTS or**
- **from test centers for NSF-certification as aerobic treatment units (ATUs)**
- **Innovative drainfield/disposal systems (Table 4)**

For all performance-based treatment systems, the engineer will establish performance levels, and design the system as a whole to meet them. Approval of treatment receptacles is a separate matter and should be checked under the septic tank design approval listings http://www.floridahealth.gov/environmental-health/onsite-sewage/products/_documents/septic-tanks.pdf.

Table 1 summarizes **results of innovative systems testing under non-test-center** conditions in Florida. The components listed in table 1 have undergone innovative system testing and been reviewed by the Bureau as indicated in the column "innovative status" for use in conjunction with engineer-designed performance-based treatment systems.

Table 2 summarizes test center testing results either associated with an NSF or ETV protocol or during the Big Pine Key study in Florida. These data have been used to evaluate treatment components that might be used as part of a **nutrient-reducing or fecal coliform reducing performance-based treatment system** designed by engineers. These are systems that are designed to reduce nitrogen and/or phosphorus to specified levels. The components listed in table 2 below have previously been reviewed by the Bureau as indicated in the column "innovative status". "yes" indicates that the components are currently in innovative status. Innovative status indicates that such approval has occurred in a limited fashion, providing for a limited number of permits and requiring additional testing.; "passed" indicates that components have completed innovative testing in Florida; "n/a" indicates that the use of previously approved ATU's in nutrient-reducing systems was accepted based on third-party testing data.

Table 3 summarizes test center testing results where the objective was usually to achieve certification by NSF under standard NSF-40 (**waste strength reduction**). The components listed in table 3 below are treatment systems approved in Florida as ATUs under 64E6.012, Florida Administrative Code, except for the last few as noted. Currently, the Department is accepting such data as a form of documentation of the "application of sound engineering principles" by engineers designing performance-based treatment systems with the only goal of **reducing waste strength** (CBOD5, TSS) in order to qualify **for drainfield size reductions** under 64E-6.028(5), Florida Administrative Code.

Table 4 lists additional innovative systems that are evaluated as drainfield/disposal systems. Table 5 additional innovative systems.

Table 1. Results of Innovative System Testing in Florida

Component/ Configuration	Type of testing	CBOD5 (mg/L)		TSS (mg/L)		TN (mg/L)		TP (mg/L)		Vendor	Vendor Contact Phone	Vendor web-site	Innovative Status
		In	Out	In	Our	In	Out	In	Out				
EcoPure 300	Innovative in Florida (n=25/9 of 1 system)	327	7.7	421	6.2	58	31	11	5.1	Eco-Pure Waste-water Systems	888-999-0936	www.eco-purewastewatersystems.com	Passed
EnviroFilter C	Innovative in Florida (n=26/24 of 5 systems)		7.6		5.3		21.7		5.8	Earthtek Environmental Systems			Passed
ZeroImpact	Innovative in Florida (n=33/29 of 5 systems)		10.49		16.63		23		1.4	Biotech Systems LLC	352-376-8016	www.biofilter.com	Yes

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Table 2. Test Center Testing Results, which have been used in evaluating components proposed for nutrient- and fecal coliform reducing performance-based treatment systems.

Equipment Series	Equipment	type of test	in TN (mg/L)	out TN (mg/L)	TN removal (%)	in TP (mg/L)	out TP (mg/L)	in fecal coliforms (CFU/100mL)	out fecal coliforms (CFU/100mL)	Vendor	Innovative Status
Advantex	Advantex 20x Mode 1	N-testing concurrently with NSF-40, Squamish, B.C.	33	12	64%	-	-	-	-	Orenco Systems	Yes
Advantex	Advantex 20x Mode 3	N-testing after NSF-40, Squamish, B.C.	35	12	66%	-	-	-	-	Orenco Systems	Yes
Aerocell	Aerocell ATS SCAT-8-AC-C500	NSF+Nitrogen, Waco	40	9.3	77%	-	-	-	-	Quanics	Yes
Aqua Safe	Aqua Safe 500	~31 N-tests during NSF-40 test	30.78	14.9	52%	8.21	5.87	-	2200 median	Ecological Tanks, Inc.	yes
Clearstream	Clearstream 500 D	NSF 245 Prairieville, LA	42	19	53%	-	-	-	-	Clearstream Waste-water Systems, Inc.	yes
CEN	Fuji Clean CEN 5	NSF 245 (for TN), testing concurrent with NSF40 (for fecal coliform)	40	10.4	74%	-	-	2.0E+6 to 1.2E+9 (30-day geomean)	2.7E+4 to 6.3E+5 (30-day geomean)	Fuji Clean USA, LLC	yes
CEN +Salcor 3G	Fuji Clean CEN 5 + +Salcor 3G	testing concurrent with NSF40 (for fecal coliform)	-	-	-	-	-	2.7E+4 to 6.3E+5 (30-day geomean)	70 geomean (6 to 183 30-day geomean)	Fuji Clean USA, LLC	yes
EcoPure	EcoPure 300	25 (9 for N) samples, one installation Lee County	56.13	31.16	44%	11.12	5.11	101586	80.6	Eco-Pure Wastewater Systems	n/a
Enviro-Guard	Enviro-Guard 0.75	NSF+Nitrogen with reduced sampling	46	20	57%	-	-	-	-	Consolidated Treatment Systems	n/a
MicroFAST	MicroFAST 0.5	Keys Study, Phase I (12 samples)	38.45	10.97	71%	8.39	5.38	-	-	Bio-Microbics	n/a
	MicroFAST 0.5	Keys Study, Phase II (13- 14 samples)	47.98	11.51	76%	8.72	6.62	144,500 (mean log)	269 (mean log); 1,510 max		n/a
	FAST	NSF40+Nitrogen	34.5	9.4	73%	-	-	-	-		n/a
HOOT	HOOT H-500 AND	N-testing (25 samples) concurrent with NSF-40	26.3	9.63	63%	8.8	3.12	-	-	Hoot Aerobic Systems	n/a
Hydro-Kinetic	Hydro-Kinetic 600 FEU	NSF245	36	8.7	76%			1.5E+6	2.5E=4	Norweco, Inc.	Yes
Hydro-Kinetic+UV	Hydro-Kinetic 600 FEU w/ AT-1500 UV	Within 12 months of NSF-40	-	-	-			2.5E+4	0.096	Norweco, Inc.	Yes
Nitrex	Nitrex (after LAI-specified pretreatment)	NSF-load, MASSTC 10/2001-03/2004	19.3	5.4	Additional 72%					Lombardo Associates, Inc.	Yes
		NSF-load, MASSTC 12/2004-10/2005	22.6	7.1	Additional 69%						

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2. cont'd Test Center Testing Results, which have been used in evaluating components proposed for nutrient- and fecal coliform reducing performance-based treatment systems.

Equipment Series	Equipment	type of test	in TN (mg/L)	out TN (mg/L)	TN removal (%)	in TP (mg/L)	out TP (mg/L)	in fecal coliforms (CFU/100mL)	out fecal coliforms (CFU/100mL)	Vendor	Innovative Status
Singulair	Singulair 960 w/ Biokinetics phase 1 w/ recirc	16 N-tests at NSF-testing facility (Chelsea, MI)	25	6.8	73%	-	-	-	-	Norweco, Inc.	n/a
Singulair	Singulair 960 w/ Biokinetics phase 2 no recirc	8 N-tests at NSF-testing facility (Chelsea, MI)	25	11.8	53%	-	-	-	-	Norweco, Inc.	n/a
Puraflo P150N w/ added carbon addition and UV-disinfection	Puraflo P150N*3B	concurrent w/NSF40		-	-	6.8	5.3	6.99E+06 geomean	3.01E+3 geomean	Bord-na-Mona	Yes
	Puraflo P150N*3B (single pass-through)	NSF 40 +Nitrogen Waco	38.3	5.2	86%		-	-	-		
	added anoxic carbon addition Micro C-G	weekly and biweekly sampling under normal NSF-load, MASSTC	18.9	6.3	additional 67%	-	-	-			
	added UV disinfection	NSF-load, MASSTC	-	-		-	-	13,529 geomean	25.1 geomean		
Septitech	Septitech Model 400	ETV (MA)	39	14	64%	-	-	-	-	Septitech	Yes
-	24" unsaturated crushed brick ~1 gpd/sqft	Keys Study, Phase I (11 samples)	-	-	-	6.04	0.60	-	-	-	n/a
-	24" unsaturated crushed brick ~1.7 gpd/sqft	Keys Study, Phase II (n=13/ 4)	-	-	-	8.72	2.65	-	-	-	n/a
-	24" unsaturated LECA ~1 gpd/sqft	Keys Study, Phase I (11 samples)	-	-	-	6.04	1.31	-	-	-	n/a
-	24" unsaturated filterlite ~1.7 gpd/sqft	Keys Study, Phase II (n=13/10)	-	-	-	8.72	0.53	-	-	-	n/a

Table 3. Test Center Testing Results, which have been used in evaluating components proposed for performance-based treatment systems designed for drainfield size reductions.

a) Treatment systems certified to NSF/ANSI standard 40 and ATUs approved in Florida according to 64E-6.012, Florida Administrative Code						
Equipment Series	Model_tested	in BOD5 (mg/L)	out CBOD5 (mg/L)	in TSS (mg/L)	out TSS (mg/L)	Manufacturer
Advanced Enviro-Septic (innovative as disposal system)	Simple Septic (used to certify Advanced Enviro-Septic)	180	11	210	7	Presby Environmental, Inc.
Advantex	AX20N Mode 1	162	5	291	4	Orenco Systems
Aerocell	ATS SCAT-8-AC-C500	240	2	290	2	Quanics
Aero-Tech	AT-500	230	5	210	6	Aero-Tech
Alliance	500	137	6	140	15	Acquired Wastewater Technologies, LLC
Aqua Aire	500	170	2.7	184	3.9	Ecological Tanks, Inc.
Aqua Safe	500	170	2.4	183	2.1	Ecological Tanks, Inc.
AquaKlear	AK6PT	200	8	180	9	Aquaklear, Inc.
AquaKlear	AK500C	150	10	130	11	Aquaklear, Inc.
Bio-Coir	ATS-SCAT-8-BC-C500	160	9	190	12	Quanics
Bionest	BN-400	210	2	240	2	Bionest Technologies
Cajun Aire Advanced	500	170	13	60	19	Acquired Wastewater Technologies, LLC
Cajun Aire Basic	500	189	9.5	214	10.2	Acquired Wastewater Technologies, LLC
Clearstream	500 N	171	6	222	9	Clearstream Wastewater Systems, Inc.
Delta DF	DF40-M	173	6	189	7	Delta Environmental Products, Inc.
Delta UC	UC50	181	6	159	8	Delta Environmental Products, Inc.
ECOPOD-N	E50-N	210	9	170	8	Delta Environmental Products, Inc.
Ecoflo Biofilter	STB-500	140	2	170	2	Premier Tech Environment
Enviro-Guard	0.75	220	5	220	5	Consolidated Treatment Systems
Fuji Clean CEN	CEN 5	190	5	300	6	Fuji Clean USA
Fuji Clean CE	CE 5	150	11	260	13	Fuji Clean USA
HOOT	H-500 A	196.1	2.3	194.3	1.8	Hoot Aerobic Systems
HOOT	H-600 A	110	<5	107	3	Hoot Aerobic Systems
Hydro-Action	AP500	177	9	201	15	Hydro-Action Industries
Hydro-Kinetic	600 FEU	190	2	150	2	Norweco, Inc.
Jet	J-500 (Model J-353)	172	15	194	12	Jet Inc.
MicroFAST	0.5	250	3	310	1.4	Bio-Microbics, Inc.
Multi-Flo	FTB-0.5	170	5	195	5	Consolidated Treatment Systems
Nayadic	M-6A	150	6	184	7	Consolidated Treatment Systems

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Table 3. cont'd. Test Center Testing Results, which have been used in evaluating components proposed for performance-based treatment systems designed for drainfield size reductions.

Equipment Series	Model_tested	in CBOD5 (mg/L)	out CBOD5 (mg/L)	in TSS (mg/L)	out TSS (mg/L)	Manufacturer
Puraflo P150N	Puraflo P150N*3B	240	2	260	2	Bord-na-Mona
Singulair 960	500 w/ Biokinetics	184	6	238	10	Norweco, Inc.
Singulair TNT	500	240	4	260	9	Norweco, Inc.
b) Treatment systems that are not ATUs per 64E-6.012, Florida Administrative Code (generally, **innovative** systems)						
Advantex	AX20N Mode 3	139	10	173	18	Orenco Systems
Nitrex	Nitrex (after pretreatment) (note: for systems designed to meet 10/10 standard, innovative permit requires polishing filter)	6	26	5	5	Lombardo Associates, Inc.
Septitech	Model 400	250 (BOD5)	5.4	150	3	Septitech

Notes: Influent and effluent concentrations are averages unless otherwise noted.

Table 4. Innovative Systems that are evaluated as drainfield/disposal systems (Requires forms DH 3144 and 3145 to be filed and coordination with State Health Office)

Manufacturer	Equipment Series
NoMound Onsite Systems	NoMound
Presby Environmental Inc.	Advanced Enviro-Septic (AES)

Table 5. Other Innovative Systems (Requires forms DH 3144 and 3145 to be filed and coordination with State Health Office)

Manufacturer	Equipment Series
Plastic Tubings Industries, inc.	Passive Onsite Treatment System (POTS)

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