

Average Testing Performance Data for Components of Performance-Based Treatment Systems (PBTS) 11/03/2008 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)

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.doh.state.fl.us/environment/ostds/pdfiles/forms/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/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 pressure dosed 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(3), Florida Administrative Code.

If you find errors, want to submit additional data or have questions, please contact Eberhard Roeder at Eberhard_roeder@doh.state.fl.us

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	Out	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 Wastewater Systems	1-888-999-0936	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	904-381-0405		Passed
ZeroImpact	Innovative in Florida (n=33/29 of 5 systems)		10.4 9		16.6 3		23		1.4	Biotech Systems LLC	352-376-8016	www.biofilter.com	Yes

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%	-	-	-	-	Oreco Systems	Yes
Advantex	Advantex 20x Mode 3	N-testing after NSF-40, Squamish, B.C.	35	12	66%	-	-	-	-	Oreco 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
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
FAST	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
Nitrex	Nitrex (after LAI-specified pretreatment)	NSF-load, MASSTC 10/2001-03/2004	19.3	5.4	Additional 72%					Lombardo Associates, Inc.	y
		NSF-load, MASSTC 12/2004-10/2005	22.6	7.1	Additional 69%						
Norweco 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 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		

Table 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
RetroFAST	RETROFAST 0.375	ETV, B.C.	39	19	51%	-	-	-	-	Bio-Microbics	Yes
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, used for NSF-40 certification and evaluation of waste strength reduction

Equipment Series	Equipment	Vendor	type of test	in CBOD5 (mg/L)	out CBOD5 (mg/L)	in TSS (mg/L)	out TSS (mg/L)	out 30-day CBOD5 (mg/L)	out 30-day TSS (mg/L)
Advantex	AdvanTex AX20N	Orenco Systems	NSF 40 (Squamish, B.C.)	162	5	291	4	8	6
Aerocell	Aerocell ATS SCAT-8-AC-C500	Quanics	NSF+Nitrogen, Waco	240	2	290	2	4	4
Alliance	Alliance 500	H.E. McGrew Inc.	ANSI/NSF Standard 40	137	6	140	15	14	22
Aqua Aire	Aqua Aire 500	Ecological Tanks, Inc.	NSF 40 (Baylor)	169.73	2.684	183.97	3.925	3.66	6.93
Aqua Safe	Aqua Safe 500 with Model Series 600,750,1000, and 1500	Ecological Tanks, Inc.	NSF/ANSI Standard 40	170.43	2.4	183.01	2.1	3.26	2.76
AquaKlear	AK500C	Aquaklear, Inc.	NSF/ANSI Standard 40	150	10	130	11	17	23
B.E.S.T.	B.E.S.T. 1	American Wastewater Systems, Inc.	ANSI/NSF Standard 40	130	21	139	21	29	40
Bio-Coir	Bio-COIR Model ATS-SCAT-8-BC-C500	Quanics	NSF/ANSI Standard 40	160	9	190	12	14	20
Bionest	BN-400	BIONEST Technologies, Inc.	NSF/ANSI Standard 40	210	2	240	2	3	3
Cajun Aire	Cajun Aire Advanced 500	H.E. McGrew Inc.	ANSI/NSF Standard 40	170	13	60	19	17	22
Clearstream	500N	Clearstream Wastewater Systems, Inc.	NSF Standard 40	148	14	193	48	8	13
Delta	DF40-M	Delta Fiberglass & Environmental Products, Inc.	NSF Standard 40	173	6	189	7	8	8
Delta	UC50	Delta Environmental Products, Inc.	ANSI/NSF Standard 40	181	6	159	8	8	15
Enviro-Guard	Enviro-Guard 0.75	Consolidated Treatment Systems	NSF+Nitrogen with reduced sampling	220	5	220	5		
FAST	MicroFAST 0.5	Bio-Microbics, Inc.	NSF/ANSI Standard 40	250	3	310	1.4	4	11
		Bio-Microbics, Inc.	ANSI/NSF Standard 40	155	11	177	16	11	22
HOOT	HOOT H-500 A	Hoot Aerobic Systems	NSF-40	196.1	2.3	194.3	1.8		
	HOOT H-600 A		subsequent to NSF-40	110	<5	107	3		

Table 3 cont'd. Test Center Testing Results, used for NSF-40 certification and evaluation of waste strength reduction

Equipment Series	Equipment	Vendor	type of test	in CBOD5 (mg/L)	out CBOD5 (mg/L)	in TSS (mg/L)	out TSS (mg/L)	out 30-day CBOD5 (mg/L)	out 30-day TSS (mg/L)
Hydro-Action	AP500	Hydro-Action Industries	ANSI/NSF Standard 40	177	9	201	15	22	16
Jet	J-500 - originally evaluated as the Jet Model J-353	Jet, Inc.	NSF Standard 40	172	15	194	12	19	17
Mighty Mack	Mighty Mack 500	H.E. McGrew, Inc.	ANSI/NSF Standard 40	160	7	218	13	11	20
Multi-Flo	FTB-0.5	Consolidated Treatment Systems	NSF Standard 40	170	5	195	5	5	5
Nayadic	M-6A	Nayadic, Inc.	NSF Standard 40	150	6	184	7	8	8
Norweco Singulair	Singulair 960 w/ Biokinetics	Norweco, Inc.	NSF-40 (Chelsea, MI)	184	6	238	10	8	13
Norweco Singulair	Singulair Model TNT-500 Wastewater Treatment System	Norweco, Inc.	NSF Standard 40	240	4	260	9	7	17
Premier Tech	Premier Tech STB-500	Premier Tech Environment	NSF/ANSI Standard 40	140	2	170	2	2	2
Puraflo P150N	Puraflo P150N*3B	Bord na Mona	NSF/ANSI Standard 40	240	2	260	2	3	2
Data on treatment units not certified by NSF									
Nitrex	Nitrex (after pretreatment) (note: for systems designed to meet 10/10 standard, innovative permit requires polishing filter)	Lombardo Associates	NSF-load, MASSTC	6	26	5	5	Not determined	Not determined
			NSF-load, MASSTC	7	6	6	3	Not determined	Not determined
RetroFAST	RETROFAST 0.375	Bio-Microbics	ETV, B.C.	150	12	180	28	Not determined	Not determined

Notes: Influent and effluent concentrations are averages unless otherwise noted. 30-day averages are the highest reported over the testing period or the highest over the last five months of a testing period if reported separately.

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