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Average Testing Performance Data for Components of Performance-Based Treatment Systems (PBTS)

- from innovative system testing in Florida (Table 1) or
- from test centers for evaluation of use in nutrient and fecal coliform-reducing PBTS (Table 2) or
- from test centers for NSF-certification as aerobic treatment units (ATUs) (Table 3)
- Innovative drainfield/disposal systems (Table 4)
- Other innovative systems (Table 5)

Construction permits for PBTS must comply with Part IV of Rule 62-6, Florida Administrative Code (F.A.C.) (for details, see [Memo HSES-10-001](#)). For all PBTS, the engineer will establish performance levels, and design the system as a whole to meet them. To find treatment receptacles approved for use for a particular PBTS, refer to the septic tank design approval listings under [Septic Tank Designs](#).

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 as a component of an engineer-designed PBTS.

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 a component of a **nutrient-reducing or fecal coliform reducing PBTS** 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”. Equipment series where “yes” is indicated in the “Innovative Status” column, are currently in innovative status, indicating that such approval has occurred in a limited fashion, providing for a limited number of permits and requiring additional testing. **Note that construction permits for systems currently in innovative status require forms DH 3144 and DH 3145 and must be reviewed by the Onsite Sewage Program office for compliance with the innovative system permit. in addition to the regular county health department review.** “Passed” indicates that components are not in innovative status (completed innovative testing in Florida); “n/a” indicates components are not in innovative status (use of previously approved ATUs in nutrient reducing systems accepted based on third party data); “Rule 62-6.025(7)(a), F.A.C.” indicates components are approved without innovative system testing per rule 62-6.025(7)(a)(1) to (3) F.A.C.

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 rule 62-6.012, 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 PBTS with the only goal of **reducing waste strength** (CBOD₅, TSS) in order to qualify for **drainfield size reductions** under 62-6.028(5), F.A.C.

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

Table 5 lists additional innovative systems.

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TN= Total Nitrogen

¹Construction permits require filing of DH 3144 and DH3145 and must be reviewed by the Onsite Sewage Program office for compliance with the innovative system permit.

²No data available

³Yes = components are currently in innovative status (approval has occurred in a limited fashion, providing for a limited number of permits and additional testing; construction permits must be reviewed by the Onsite Sewage Program office for compliance with the innovative system permit and include forms DH 3143 and DH 3144).

Table 1. Results of Innovative System Testing in Florida

Component/ Configuration	Type of testing	CBOD5 (mg/L) (In/Out)	TSS (mg/L) (In/Out)	TN (mg/L) (In/Out)	TN (%)	TP (mg/L) (In/Out)	Vendor	Vendor Contact Phone	Vendor web-site	Innovative Status
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	EcoPure website	Passed
EnviroFilter C	Innovative in Florida (n=26/24 of 5 systems)	² /7.6	² /5.3	² /21.7		² /5.8	Earthtek Environmental Systems			Passed
Fuji Clean CE	Innovative in Florida (13 systems, 50-52 data points total); average of system averages	² /4.4	² /4.3	45(assumed)/10.9	75.7		Fuji Clean USA, LLC		Fuji Clean USA website	Passed
ZerolImpact	Innovative in Florida (n=33/29 of 5 systems)	8/10.5	² /16.6	² /23		² /1.4	Biotech Systems LLC	352-376-8016	Biofilter website	Yes ³

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 or E. coli (CFU/100mL or MPN /100ml)	Out fecal coliforms or E.coli (CFU/100mL or MPN /100ml)	% Removal E. coli or fecal Coliforms	Vendor	Innovative Status
Advantex	Advantex 20x Mode 1	N-testing concurrently with NSF-40, Squamish, B.C.	33	12	64%	-	-	-	-	-	Orengo Systems	Yes ³
Advantex	Advantex 20x Mode 3	N-testing after NSF-40, Squamish, B.C.	35	12	66%	-	-	-	-	-	Orengo Systems	Yes ³
Aerocell	Aerocell ATS SCAT-8-AC-C500	NSF+Nitrogen, Waco	40	9.3	77%	-	-	-	-	-	Quanics (Anua)	Yes ³
Aqua Klear 245	AK6S245	NSF 245, Ascension Parish, LA November 2019- May 2020	47.5	19.6	59.4%	-	-	-	-	-	Aqua Klear	62-6.025(7)(a) F.A.C.

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²No data available

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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 or E. coli (CFU/100mL or MPN /100ml)	Out fecal coliforms or E.coli (CFU/100mL or MPN /100ml)	% Removal E. coli or fecal Coliforms	Vendor	Innovative Status
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 ³
BioBarrier	BioBarrier MBR 0.5	NSF 40/ NSF 350 MASSTC Dec. 2010 – Sept. 2011	-	-	-	-	-	2.09+e06	1.3 (geomean)	99.99%	Bio-Microbics	62-6.025(7)(a) F.A.C.
BioBarrier	BioBarrier MBR 0.5	NSF 245, MASSTC Dec. 2010 – Aug. 2011	43	9	79%	-	-	-	-	-		62-6.025(7)(a) F.A.C.
Clearstream Model D	Clearstream 500 D	NSF 245 Prairieville, LA (June-November 2012)	42	19	54%	-	-				Clearstream Wastewater Systems, Inc.	62.6.025(7)(a) F.A.C.
Clearstream Model DA	Clearstream 500 DA	NSF245 (June-November 2012)	42	19	54%	-	-				Clearstream Wastewater Systems, Inc.	62.6.025(7)(a) F.A.C.
Clearstream Model N	Clearstream 500 N	Prairieville, LA after NSF 245 (December 2013 – May 2014)	42.3	10.7	74.8%	-	-	-	-		Clearstream Wastewater Systems, Inc.	Yes ³
CE	Fuji Clean CE 5	NSF 40+Nitrogen, Waco	47.6	15.7	67%						Fuji Clean USA, LLC	Passed (see Table 1)
CEN	Fuji Clean CEN 5	Testing concurrent with NSF40 (for fecal coliform)				-	-	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 ³
CEN	Fuji Clean CEN 5	NSF 245, Waco TX (June – December 2014)	40	10	74%						Fuji Clean USA, LLC	62-6.025(7)(a) F.A.C.
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 ³
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	Passed
Enviro-Guard	Enviro-Guard 0.75	NSF+Nitrogen with reduced sampling	46	20	57%	-	-	-	-		Consolidated Treatment Systems	n/a
Jet CF	J-500CF	NSF 40/ NSF 245, Ascension Parish, LA (February 2008 – August 2008)	39.1	12.9	67.1%	-	-	-	-		Jet, Inc.	62-6.025(7)(a) F.A.C.
MicroFAST	MicroFAST 0.5	Keys Study, Phase I (12 samples)	38.45	10.97	71%	8.39	5.38	-	-		Bio-Microbics	n/a
MicroFAST	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	99.81%	Bio-Microbics	n/a

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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 or E. coli (CFU/100mL or MPN /100ml)	Out fecal coliforms or E.coli (CFU/100mL or MPN /100ml)	% Removal E. coli or fecal Coliforms	Vendor	Innovative Status
MicroFAST	MicroFAST 0.5	NSF 245 testing, Waco TX (September 2006 – April 2007)	38	17	55%						Bio-Microbics	62-6.025(7)(a) F.A.C.
MicroFAST	FAST	NSF40+Nitrogen	34.5	9.4	73%	-	-	-	-	-	Bio-Microbics	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
HOOT	HOOT ANR-450	NSF 245, Waco TX (May 2006-October 2006)	37	5.6	85%	-	-	-	-	-	Hoot Aerobic Systems	62-6.025(7)(a) F.A.C.
Hydro-Kinetic	Hydro-Kinetic 600 FEU	NSF245, Norwalk OH (June 2011-December 2011)	36	8.7	76%						Norweco, Inc.	Yes ³
Hydro-Kinetic	Hydro-Kinetic 600 FEU	NSF/ANSI Standard 40 12 months test						1.50E+06	2.5E+4		Norweco, Inc.	Yes ³
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 ³
Nitrex	Nitrex (after LAI-specified pretreatment)	NSF-load, MASSTC 10/2001-03/2004	19.3	5.4	Additional 72%						Lombardo Associates, Inc.	Yes ³
Nitrex	Nitrex (after LAI-specified pretreatment)	NSF-load, MASSTC 12/2004-10/2005	22.6	7.1	Additional 69%						Lombardo Associates, Inc.	Yes ³
Singular	Singular 960 w/ Biokinetics phase 1 w/ recirc	16 N-tests at NSF-testing facility (Chelsea, MI)	25	6.8	73%	-	-	-	-		Norweco, Inc.	n/a
Singular	Singular 960 w/ Biokinetics phase 2 no recirc	8 N-tests at NSF-testing facility (Chelsea, MI)	25	11.8	53%	-	-	-	-		Norweco, Inc.	n/a
Singular	Singular R3-500	NSF 245/350, Norwalk OH (February 2017 – August 2017)	42.1	14.4	65.7%			1.66 e+06	1.9	99.99%	Norweco, Inc.	62-6.025(7)(a) F.A.C.
Singular	Singular TNT-500	NSF 245, Waco TX June 2005 – January 2006	38	12	68%			-	-		Norweco, Inc.	62-6.025(7)(a) F.A.C.
Septitech	Septitech Model 400	ETV (MA)	39	14	64%	-	-	-	-		BioMicrobics	Yes ³

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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 or E. coli (CFU/100mL or MPN /100ml)	Out fecal coliforms or E.coli (CFU/100mL or MPN /100ml)	% Removal E. coli or fecal Coliforms	Vendor	Innovative Status
-	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

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

3a) Treatment systems certified to NSF/ANSI standard 40 and ATUs approved in Florida according to 62-6.012, Florida Administrative Code

Equipment Series	Model Tested	In BOD5 (mg/L)	Out CBOD5 (mg/L)	In TSS (mg/L)	Out TSS (mg/L)	Manufacturer
Advantex	AX20N Mode 1	162	5	291	4	Orenco Systems
Aerocell	ATS SCAT-8-AC-C500	240	2	290	2	Quanics (Anua)
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.
AquaKlear	AK6S245	209	7	193	6	Aquaklear, Inc.
B.E.S.T. 1 AWS 1	500	130	21	139	21	American Wastewater Systems, Inc.
BioBarrier	MBR-0.5	220	<2	220	<2	Bio-Microbics
Bio-Coir	ATS-SCAT-8-BC-C500	160	9	190	12	Quanics (Anua)
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 Model D	500 D	278	4	258	7	Clearstream Wastewater Systems, Inc.
Clearstream Model DA	500 DA	278	4	258	7	Clearstream Wastewater Systems, Inc.
Clearstream Model N	500 N	171	6	222	9	Clearstream Wastewater Systems, Inc.
Delta DF	DF40-M	173	6	189	7	Delta Treatment Systems, LLC
Delta EA	EA50	190	12	190	16	Delta Treatment Systems, LLC
Delta UC	UC50	181	6	159	8	Delta Treatment Systems, LLC
Delta ECOPOD-N	E50-N	210	9	170	8	Delta Treatment Systems, LLC
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	2.35	Hoot Systems LLC
HOOT	H-600 A	110	<5	107	3	Hoot Systems LLC
HOOT ANR	Hoot ANR-450	240	6	310	4	Hoot Systems LLC
Hydro-Action	AP500	177	9	201	15	Hydro-Action Industries
Jet	J-500 (Model J-353)	172	15	194	12	Jet Inc.
Jet CF	J-500CF	205	11	192	10	Jet Inc.
MicroFAST	0.5	250	3	310	1.4	Bio-Microbics, Inc.

Equipment Series	Model Tested	In BOD5 (mg/L)	Out CBOD5 (mg/L)	In TSS (mg/L)	Out TSS (mg/L)	Manufacturer
Multi-Flo	FTB-0.5	170	5	195	5	Consolidated Treatment Systems
Nayadic	M-6A	150	6	184	7	Consolidated Treatment Systems
Puraflo P150N	Puraflo P150N*3B	240	2	260	2	Anua
PuraSys	PekaSys CRB1 (PuraSys PS1-4)	180	11	120	20	Anua
Singulair 960	500 w/ Biokinetics	184	6	238	10	Norweco, Inc.
Singulair TNT	500	240	4	260	9	Norweco, Inc.
Singulair R3	500	233	5	176	4.6	Norweco, Inc.

3b) Treatment systems that are not ATUs per 62-6.012, Florida Administrative Code (generally, innovative systems)

Equipment Series	Model Tested	In BOD5 (mg/L)	Out CBOD5 (mg/L)	In TSS (mg/L)	Out TSS (mg/L)	Manufacturer
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 (BioMicrobics)

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

Table 4. Innovative Systems that are evaluated as drainfield/disposal systems (construction permits require filing of DH 3144 and DH3145 and must be reviewed by the Onsite Sewage Program office for compliance with the innovative system permit).

Manufacturer	Equipment Series
Eljen Corporation	Geotextile Sand Filter (GSF)
Geomatrix	GeoMat Leaching Systems
NoMound Onsite Systems	NoMound

Table 5. Other Innovative Systems (construction permits require filing of DH 3144 and DH3145 and must be reviewed by the Onsite Sewage Program office for compliance with the innovative system permit).

Manufacturer	Equipment Series
Environmental Conservation Solutions	Passive Onsite Treatment System (POTS)