



VĮ STATYBOS PRODUKCIJOS SERTIFIKAVIMO CENTRAS
Linkmenų str. 28, LT-08217 Vilnius, Lithuania
Notified body No. 1397



LIETUVOS
NACIONALINIS
AKREDITACIJOS
BIURAS

BANDYMAI
ISO/IEC 17025

Nr. LA. 01.103

Waste water treatment plant laboratory

TEST REPORT No. 1397-CPR-104/B

According to EN 12566-3:2005+A2:2013 annex B (Treatment efficiency test)
2015-02-18

1. **CLIENT:** AQUATECH Limited Liability Company 18-400 Lomza, Poznanska street 148A, Poland.
Contract No. NVI-6_2010.
2. **MANUFACTURER:** AQUATECH Limited Liability Company 18-400 Lomza, Poznanska street 148A, Poland.
3. **SAMPLE:** Small wastewater treatment plant (WWTP) BIOTIC 4, nominal hydraulic load 0,6 m³/d. Biological waste water treatment process with activated sludge. Detailed WWTP description and technical information provided at annex 1, Operation instructions.
4. **SAMPLE DELIVERY DATE:** 2010-08-12.
5. **TESTING LOCATION, ADDRESS AND DATE:**
 - Wastewater treatment plant laboratory Maišiagalą, Vilnius district.
 - The date presented at table 2.
6. **SAMPLING:** The client responsible for WWTP sampling. Sampling report No 006-ARD.
7. **THE TEST MADE ACCORDING TO:**
EN 12566-3:2005+A2:2013 Small wastewater treatment systems for up to 50 PT — Part 3: Packaged and/or site assembled domestic wastewater treatment plants, item 6.3 and annex B.
8. **TEST SPECIFICATIONS:**

During the test inlet and outlet samples were taken flow-bases composites over 24 hours. During the test at the aeration chamber were measured temperature, pH and dissolved oxygen concentration. The following parameters were measured at Table 1.

Table 1 Parameters measured*

	Parameter	Abbreviation	Measurement method	Units
1	Biochemical oxygen demand	BOD ₇	EN 1899-1:2000	mg/l
2	Chemical oxygen demand	COD	ISO 6060	mg/l
3	Suspended solids	SS	EN 872	mg/l
4	Kjeldahl Nitrogen	N	EN 25663:2000	mg/l
5	Phosphorus	P	EN ISO 6878	mg/l
6	Ammonium nitrogen	NH ₄ -N	ISO 7150-1	mg/l

*Work made by subcontractor. Reports are kept at Waste treatment plant laboratory. WWTP BIOTIC 4 test was started after biomass establishment sequence. The test was performed with 0,6 m³/d hydraulic load.



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The test schedules listed in Table 2:

Table 2. The test schedules of BIOTIC 4

Sequence	Sequence name. Characteristic	Time elapsed weeks
	Start after biomass establishment	2010.09.09
2	NOMINAL. Nominal daily flow	6
3	UNDERLOADING. 50% nominal daily flow	2
4	NOMINAL – POWERBREAK DOWN. Nominal daily flow	6
5	LOW OCCUPATION STRESS. No flow	2
6	NOMINAL. Nominal daily flow	6
7	OVERLOADING 150 % nominal daily flow	2
8	NOMINAL – POWERBREAK DOWN. Nominal daily flow	6
9	UNDERLOADING. 50% nominal daily flow	2
10	NOMINAL. Nominal daily flow	6
	End of test	2011.07.14

The daily flow pattern used for BIOTIC 4 testing in Table 3:

Table 3 Daily flow pattern

Period h	Percentage of daily volume %
3	30
3	15
6	0
2	40
3	15
7	0

There were no deviations from standard EN 12566-3:2005+A2:2013 annex B procedures.



9. TEST RESULTS.

The tested organic daily load 0.163 kg/d (mean value of the 20 organic daily loads measured during the nominal sequences.

Efficiency ratios and mean values for each parameter obtained during nominal sequences (with and without power breakdown) is listed at Table 4.

The individual values for UNDERLOADING and OVERLOADING sequences listed at Table 5.

The efficiency ratios for UNDERLOADING and OVERLOADING sequences listed at Table 6.

All measured values during the test listed at Table 7.

Table 4. Efficiency ratios and mean values for each parameter obtained during nominal sequences (with and without power breakdown)

Parameter	Unit	Value
BDS ₇	%	96,5
ChDS	%	90,4
SS	%	94,4
N	%	93,9
P	%	53,2
NH ₄ -N	%	98,9
BDS ₇	mg/l	8,5
ChDS	mg/l	47,1
SS	mg/l	15,2
N	mg/l	3,7
P	mg/l	3,1
NH ₄ -N	mg/l	0,4



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Table 5. The individual values for UNDERLOADING and OVERLOADING sequences

Sequence No		3	3	7	7	9	9
Flow rate		50%	50%	150%	150%	50%	50%
Date		2010.11.24	2010.12.01	2011.03.23	2011.03.30	2011.05.25	2011.06.01
Parameter							
Outlet							
t	°C	8,3	3,6	4,5	4,4	13,2	15,7
BDS ₇	mg/l	7,3	8	7,5	11	4,7	3,2
ChDS	mg/l	65,5	75,2	42	44	53	36
SS	mg/l	12	9,8	10	37	6,8	14
N	mg/l	4,48	6,44	2,52	1,68	2,52	1,68
P	mg/l	2,65	3,72	2,39	3,45	2,65	3,46
NH ₄ -N	mg/l	0,235	0,117	0,184	0,105	0,243	0,083
pH	-	7,98	8,1	7,55	7,32	7,84	7,99

Table 6. The efficiency ratios for UNDERLOADING and OVERLOADING sequences

Parameter	Unit	Flow rate	
		50%	150%
BDS ₇	%	97,7	97,5
ChDS	%	88,5	93,4
SS	%	96,1	95,4
N	%	94,2	96,4
P	%	52,1	43,1
NH ₄ -N	%	99,6	99,6

Table 7. Measured values

Sequence No.	2	2	2	2	2	3	3	3	4	4	4
Flow rate	100%	100%	100%	100%	100%	50%	50%	50%	100%	100%	100%
Date	2010.09.15	2010.10.20	2010.11.10	2010.11.17	2010.11.24	2010.12.01	2010.12.08	2010.12.15	2010.12.30		
Inlet											
Outdoor temperatur.	15	6	10	4	3	-15	-2	-12	-7		
Temperature °C	16,4	12	11,2	11,3	9,5	9,2	9,3	9	8		
BOD ₇ mg/l	356	246	352	299	320	295	275	289	354		
COD mg/l	436	341	380	600	548	636	463	485	607		
SS mg/l	288	326	464	640	336	396	344	296	264		
N mg/l	66,6	73,9	67,2	71,1	68,3	71,1	69,4	76,8	86,2		
P mg/l	6,63	4,85	5,72	9,41	6,6	7,65	9,7	6,55	6,68		
NH ₄ -N mg/l	53,4	52,7	46,1	43,8	43,3	50,5	59	54,3	60,2		
pH -	7,47	7,94	7,97	7,96	7,82	7,89	7,8	7,86	7,8		
Outlet											
Temperature °C	15,1	8,7	8,6	8,5	8,3	3,6	4,6	3,4	3,4		
BOD ₇ mg/l	3,1	5,1	5,8	4,6	7,3	8	10	14	13		
COD mg/l	15,4	a<8	a<8	33,1	65,5	75,2	14,2	61	66		
SS mg/l	5,4	5,1	17	17	12	9,8	9,5	49	21		
N mg/l	4,2	5,04	5,04	4,76	4,48	6,44	3,92	5,88	5,32		
P mg/l	0,44	2,83	2,72	0,77	2,65	3,72	3,24	4,21	3,54		
NH ₄ -N mg/l	0,271	0,166	0,108	0,031	0,235	0,117	0,635	0,661	0,191		
pH -	7,94	7,93	8	8,04	7,98	8,1	8,1	7,91	7,84		
Aeration chamber											
pH -	7,79	7,78	7,91	7,88	7,94	7,94	7,92	8,00	7,68		
Dissolved oxygen mg/l	6,77	8,60	8,53	7,7	7,38	11,60	8,12	8,40	6,87		
Temperature °C	15,25	9,15	9,00	13,6	9	4,40	5,35	4,55	4,80		

Table 7 continuation. Measured values

Sequence No.	4	4	6	6	6	6	6	7	7	7	8
Flow rate	100%	100%	100%	100%	100%	100%	100%	150%	150%	150%	100%
Date	2011.01.07	2011.01.12	2011.02.23	2011.03.02	2011.03.09	2011.03.16	2011.03.23	2011.03.30	2011.04.06		
Inlet											
Outdoor temperatur.	°C	-4	-11	-6	-1	-1		2	2	2	5
Temperature	°C	7,8	6,2	6,2	6,2	6,2		6,1	6,1	6,1	6,5
BOD ₇	mg/l	269	178	229	186	292		276	276	477	192
COD	mg/l	512	419	537	336	362		504	504	892	426
SS	mg/l	252	192	292	232	276		336	336	600	284
N	mg/l	75	52,1	61,6	51,5	41,4		52,1	52,1	70,6	50,4
P	mg/l	6,84	6,05	6,21	4,87	4,62		3,15	3,15	9,12	5,39
NH ₄ -N	mg/l	14,3	36,4	44,3	47	30,7		35,9	35,9	51,2	36,9
pH	-	7,8	7,54	7,67	7,86	7,76		7,95	7,95	7,98	7,84
Outlet											
Temperature	°C	-4	2,8	2,5	3	3,8		4,5	4,5	4,4	5,8
BOD ₇	mg/l	25	11	9	8,1	6		7,5	7,5	11	8
COD	mg/l	149	50	51	20	28		42	42	44	30
SS	mg/l	26	6,8	9	9,6	3,6		10	10	37	5,6
N	mg/l	10,1	1,96	1,68	a<1,2	a<1,2		2,52	2,52	1,68	3,64
P	mg/l	6,15	2,64	3	2,68	2,96		2,39	2,39	3,45	0,28
NH ₄ -N	mg/l	0,346	0,137	0,215	0,164	0,182		0,184	0,184	0,105	2,7
pH	-	7,69	7,35	7,58	7,85	7,67		7,55	7,55	7,32	7,75
Aeration chamber											
pH	-	7,10	7,44	7,32	7,55	7,51		7,49	7,49	7,50	7,59
Dissolved oxygen	mg/l	7,62	10,3	9,83	7,9	10,20		8,50	8,50	7,00	7,86
Temperature	°C	5,15	2,05	2,65	3,5	4,25		4,65	4,65	4,65	6,15

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Table 7 continuation. Measured values

Sequence No.		8	8	8	8	8	8	9	9	10	10
Hidraulické aprkrova		100%	100%	100%	100%	100%	100%	50%	50%	100%	100%
Date		2011.04.13	2011.04.22	2011.05.04	2011.05.11	2011.05.25	2011.06.01	2011.06.08	2011.06.22		
Inlet											
Outdoor temperature.	°C	10	15	4	16	12	25	26	20		
Temperature	°C	6,6	7,6	8,5	9,1	11,5	12,3	12,5	13,5		
BOD ₇	mg/l	148	286	327	216	188	171	322	366		
COD	mg/l	345	419	563	512	383	433	557	811		
SS	mg/l	372	264	304	305	196	234	291	208		
N	mg/l	47	53,8	75	59,9	52,6	59,9	65	87,9		
P	mg/l	5,03	5,38	11,2	7,09	4,97	7	6,94	8,87		
NH ₄ -N	mg/l	34,1	37,4	54,4	43,9	42,2	42,6	45,1	63,9		
pH	-	7,86	7,75	7,68	7,85	7,67	7,84	7,56	7,5		
Outlet											
Temperature	°C	6,1	7,7	10,4	11,2	13,2	15,7	15,9	15,9		
BOD ₇	mg/l	5,1	7,8	7	3,4	4,7	3,2	6,2	4,2		
COD	mg/l	24	49	51	44	53	36	32	37		
SS	mg/l	1,7	10	9	6,7	6,8	14	4,9	56		
N	mg/l	a<1,2	2,8	2,24	3,36	2,52	1,68	1,4	3,36		
P	mg/l	2,62	2,7	3,91	3	2,65	3,46	3,48	5,2		
NH ₄ -N	mg/l	0,127	0,633	0,721	0,696	0,243	0,083	0,48	0,598		
pH	-	7,51	7,78	6,68	7,73	7,84	7,99	7,48	7,53		
Aeration chamber											
pH	-	7,68	7,63	7,56	7,43	7,40	7,52	7,32	7,34		
Dissolved oxygen	mg/l	7,60	8,73	5,28	2,76	5,54	6,70	1,28	3,64		
Temperature	°C	6,05	7,30	9,20	10,65	13,35	14,95	15,75	15,90		



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10. MAINTENANCE AND REPAIRS MADE DURING THE TEST PERIOD.

Maintenance cared out by client under supervision made by laboratory. There was not needed repair work and no electrical or mechanical faults happened during tested period.

Sludge removal:

There was not needed sludge removal from aeration chamber during tested period. Operations made during test period listed at Table 8.

Table 8. Operations made during test period.

	Date	Operation description
	2010.09.09	Start after biomass establishment
1	2011.12.13	Floating sludge displacement from settling chamber into aeration chamber by WWTP aeration/airlifting system according to manual.
2	2011.03.09	Floating sludge displacement from settling chamber into aeration chamber by WWTP aeration/airlifting system according to manual.
3	2011.05.04	55 litres of floating sludge removed by bucked from settling chamber.
	2011.07.14	End of testing

Electrical energy consumption: 1,57kWh/d is average rate during nominal sequences of the test.
Electrical energy consumption: 1,57 kWh/d is average rate during the all test period.
There were installed air blower type EL-S-80-15 with timer for periodical (non-continued) operation.

11. ASSESSMENT. No requirements for the efficiency performance in the standard.

12. INFORMATION ON THE CONFORMITY OF THE PLANT TESTED WITH INFORMATION PROVIDED PRIOR TO TESTING.

There are not any contradictions or deviations from information provided before tests.

13. ANNEXES. Annex 1: Operating instructions 18 pages.

This test report only certifies the characteristics of the sample submitted for testing.

Head of laboratory

Arnas Danila

Director

Robertas Encius

