Prüfinstitut für Abwassertechnik GmbH

Prüfeinrichtung des Prüf- und Entwicklungsinstituts für Abwassertechnik an der RWTH Aachen

Prüfinstitut für Abwassertechnik GmbH

DIN EN ISO 9001:2000

Report on the treatment efficiency test according to EN 12566-3 of the

ASP 06

of

Premier Tech Ltd.

Test report - No. PIA2008-086B25.02

Aachen, February 2009 – rebranded in April 2015

Dipl.-Ing. Elmar Lancé

PIA GmbH
Prüfinstitut für Abwassertechnik
Hergenrather Weg
52074 Aachen

geprüft - tested - testé
NB 1739
PIA
EN 12566

TABLE OF CONTENTS

1 Introduction

Due to a company takeover of the original owner Conder Solutions Ltd. of the test report PIA2008-086B25 this report was issued for the use by the company:

Premier Tech Ltd.
2 Whitehouse Way
South West Industrial Estate
Peterlee
Co Durham, SR8 2RA
United Kingdom.

PIA GmbH
Hergenrather Weg 30
52074 Aachen
Germany

received an order for a practical examination of the treatment efficiency of a ASP 06 – small wastewater treatment system according to EN 12566 Part 3 Annex B. The system was charged with a hydraulic daily flow of 1.2 m³/d domestic wastewater.

The examination started subsequent to the biomass establishment, on 22.10.2007 and ended on 13.07.2008.

The PIA GmbH has a certified quality management system according to DIN EN ISO 9001:2000 for the field "testing of wastewater equipment" and is approved by the European Commission as a testing authority "Notified Body" (NB 1739) according to the Construction Products Directive (CPD) for small wastewater treatment systems for up to 50 PE according to EN 12566-1 and EN 12566-3.

2 Description of the small wastewater treatment plant ASP 06

The small sewage treatment plant ASP 06 is part of a range of systems. Due to the requirements of the EN 12566 part 3 the ASP 06 as the smallest model of the range, was tested by the PIA GmbH.

Figure 1: The ASP 06 with a non-original cover installed on the testing field of the PIA GmbH

2.1 Description of the tank

The small sewage treatment plant ASP 06 by Premier Tech Ltd. is a GRP tank consisting of a biological aeration zone in the centre and an outer settlement zone. The access cover is made of zinc coating steel and is fixable by screws. A control box with a blower is situated next to the treatment plant.

The dimensions of the tank were checked by the PIA and were found in accordance with the specifications given by the manufacturer.

Figure 2: The ASP 06

Figure 3: View into the empty ASP 06

Figure 4: View into the operating ASP 06

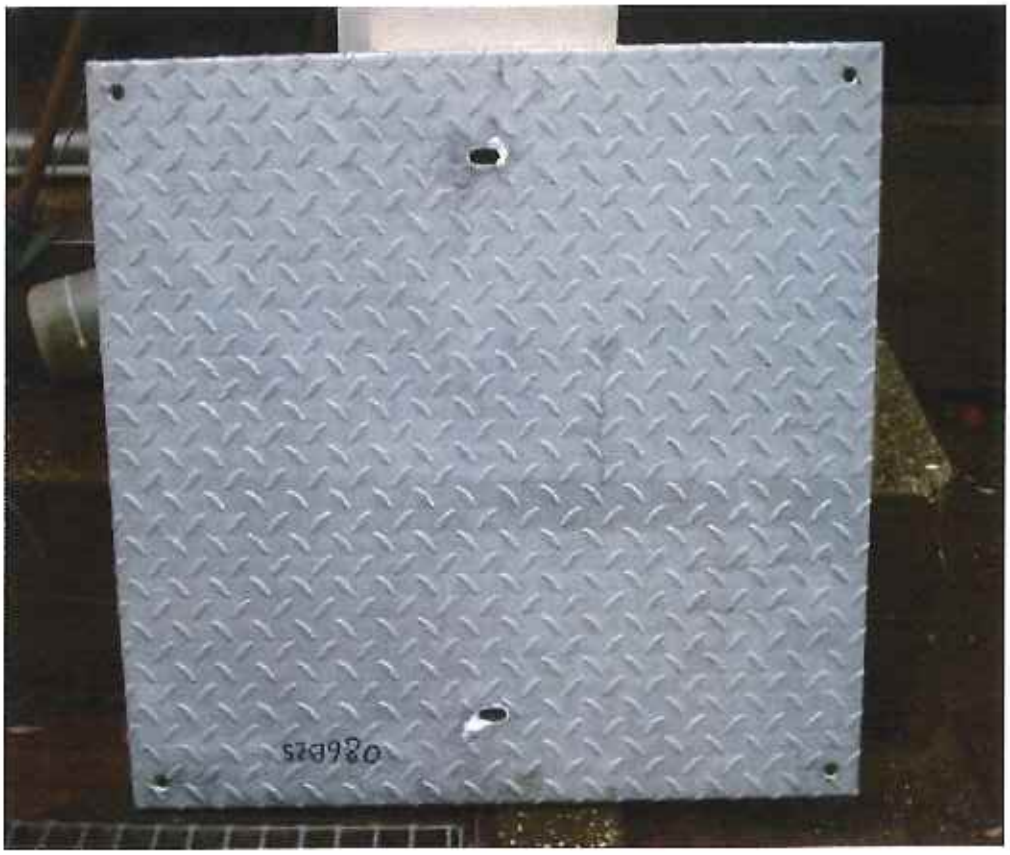


Figure 5: Original cover of the ASP 06

Figure 6: Blower of the ASP 06 with a capacity of 100 l/min.

2.2 Description of the treatment process

In the bioreactor of the small wastewater treatment plant ASP 06 by Premier Tech Ltd. the wastewater is treated with an aerated biological process.

The wastewater enters the biological zone directly. There it is treated by aerobe bacteria. An upright tube with a bubble diffuser in it creates a vertical circular drift within the cone-shaped zone (compare drawing on page 37). At the bottom of the cone tip the wastewater can emerge into the outer settlement chamber. After clarification in the outer zone, the treated water leaves the treatment plant by gravity flow.

A detailed description of the system (manufacturer's information) can be found in the annex of this report.

2.3 Watertightness test

The test for watertightness of the tank was carried out on 10th of September 2007. The test procedure complied with the EN 12566-3 Annex A.2 "Water test". Due to inaccurate lamination of the tank there was a detectable leakage.

A second test for watertightness with a new tank was executed on the 19th of September 2007. The tank was watertight and the plant ASP 06 therefore passed the watertightness test.

3 Sampling and analytics

For the test of the treatment efficiency of the ASP 06 small sewage treatment system according to the EN 12566-3 Annex B, all influent and effluent samples were taken as flow-based 24-h composite samples. The bioreactor was sampled by grab samples.

The following parameters were analysed:

Inflow : Temp., pH, COD, BOD_5, NH_4-N, N_{tot}, P_{tot}, conductivity, suspended solids (SS), settleable solids, turbidity

Bioreactor : Temp., SSV_{30}, MLSS, O_2

Outlet : COD, COD_{fil}*, BOD_5, NH_4-N, NO_3-N, NO_2-N, N_{tot}, P_{tot}, pH, conductivity, suspended solids (SS), settleable solids, turbidity

The parameters COD, BOD_5, NH_4-N, NO_3-N, NO_2-N, N_{tot}, P_{tot}, SS and MLSS were analysed by IWA "Institut für Wasser- und Abwasseranalytik", Jülicher Str. 336 in 52076 Aachen. IWA uses the standard analytical methods that are required by the EN 12566-3 annex B. IWA is accredited according to DIN EN ISO/IEC 17025:2000-04 and is part of the PIA accreditation as a notified body.

* COD filtrated

4 Course and particularities of the examination

Due to the requirements of the EN 12566 part 3, the dosing of the tested treatment plant is divided into periods of nominal loading (100%), underloading (approximately 50% of the nominal loading in sequence 2 and 8) and overloading (150% of the nominal loading for 48 hours at the beginning of sequence 6). The progression of those scenarios throughout the whole testing period is shown in Table 1.

The power breakdown in test sequence 3 and 7 stands for a 24-h power cut-off two weeks after the start of the respective sequence. Low occupation stress / vacations means, that during the whole scenario no influent is dosed into the plant.

This testing report No PIA2008-086B25.02 is a revised version of the testing report No PIA2008-086B25. The company name was changed to Premier Tech Ltd.

Table 1: Test schedule

Sequence	Characteristics	Duration / Date
	Start of test	22.10.2007
1	Nominal	6 weeks
2	Underloading	2 weeks
3	Nominal / Power Breakdown	6 weeks
4	Low occupation stress / vacations	2 weeks
5	Nominal	6 weeks
6	Overloading	2 weeks
7	Nominal / Power Breakdown	6 weeks
8	Underloading	2 weeks
9	Nominal	6 weeks
	End of test	13.07.2008

During the nominal loading phases the system was charged with 1.2 m^3/d wastewater and a nominal organic load of 0.37 kg/d.

This testing report No PIA2008-086B25.02 is a rebranded version of the testing report No PIA2008-086B25. Due to a company takeover of the original owner Conder Solutions Ltd. this report was issued with the new company name Premier Tech Ltd..

The charging of the small sewage treatment plant was carried out according to the daily flow patterns taken from the EN 12566-3 shown in Table 2.

Table 2: Daily flow patterns

Time	Percentage of daily volume [%]
3	30
3	15
6	0
2	40
3	15
7	0

During the entire test period an average power consumption of 2.6 kWh/d was determined.

5 Treatment efficiency

Section 5.1 deals with the individual results of all 26 influent and effluent samples.

The evaluation of the results in terms of mean, minimum and maximum values as well as the appropriate standard deviations of the tested system can be found within section 5.2 in Tables 9 to 12.

To display the treatment efficiency and the concentrations of the influent and effluent of the tested system more clearly, the results of all test sequences are graphically shown in section 5.3.

5.1 Individual results

The individual results of all parameters are listed in Tables 3 to 8.

Table 3: Results from 31.10.2007 to 06.12.2007

Test schedule		1	1	1	1	2
		100 %	100 %	100 %	100 %	50 %
Date		31.10.2007	08.11.2007	15.11.2007	22.11.2007	06.12.2007
Air Temperature min/max	[°C]	2/10	4/9	0/5	3/11	5/12
Influent:						
Temperature	[°C]	10.2	11.7	7.9	9.8	11.2
COD	[mg/l]	449	830	697	928	635
BOD_5	[mg/l]	201	271	242	393	371
NH_4-N	[mg/l]	22.0	28.6	28.0	32.6	21.2
N_{tot}	[mg/l]	41	54	39	63	48
P_{tot}	[mg/l]	6.4	7.9	7.8	11.4	7.9
pH	[-]	7.2	7.3	7.1	7.0	7.0
Conductivity	[µS/cm]	646	805	679	832	746
SS	[mg/l]	308	328	450	620	436
Settleable solids $_{120}$	[ml/l]	15	16	30	40	30
Turbidity	[FNU]	150	152	174	210	189
Faecal coliforms	[1/100ml]	-	-	-	-	-
Effluent:						
COD_{hom}	[mg/l]	38	53	42	44	40
COD_{fil}	[mg/l]	24	21	35	38	15
BOD_5	[mg/l]	6	13	7	8	9
NH_4-N	[mg/l]	1.7	4.7	4.6	10.4	1.6
NO_3-N	[mg/l]	20.4	18.2	11.9	17.5	22.6
NO_2-N	[mg/l]	1.6	2.5	1.2	1.2	0.4
N_{inorg}	[mg/l]	23.7	25.4	17.7	29.1	24.6
N_{tot}	[mg/l]	25.0	30.0	17.7	31.4	25.7
P_{tot}	[mg/l]	3.6	3.8	2.5	3.8	3.1
pH	[-]	6.9	7.0	7.4	7.0	6.8
Conductivity	[µS/cm]	579	629	535	689	550
SS	[mg/l]	13	22	11	4	14
Settleable solids $_{120}$	[ml/l]	< 0.1	0.1	< 0.1	0.7	0.7
Turbitidy	[FNU]	3.8	11.2	4.0	4.7	7.5
Faecal coliforms	[1/100ml]	-	-	-	-	-
Biology:						
Temperature	[°C]	11.9	11.9	8.9	10.5	10.1
SSV_{30}	[ml/l]	400	100	100	170	240
MLSS	[g/l]	1.5	1.1	0.8	1.6	2.3
O_2	[mg/l]	3.0	4.7	7.2	3.0	5.2

Table 4: Results from 13.12.2007 to 17.01.2008

Test schedule		2	3	3	3	3
		50 %	100 %	100 %	100 % *PB	100 %
Date		13.12.2007	20.12.2007	28.12.2007	10.01.2008	17.01.2008
Air Temperature min/max	[°C]	1/5	-5/4	-6/4	0/8	2/3
Influent:						
Temperature	[°C]	10.0	9.2	9.2	9.1	9.1
COD	[mg/l]	547	736	995	952	488
BOD_5	[mg/l]	201	377	476	419	201
NH_4-N	[mg/l]	23.8	50.6	32.0	33.2	32.6
N_{tot}	[mg/l]	40	83	59	50	46
P_{tot}	[mg/l]	6.4	10.1	8.6	7.8	6.2
pH	[-]	7.4	7.6	7.3	7.5	7.4
Conductivity	[µS/cm]	740	889	853	814	811
SS	[mg/l]	234	434	534	532	234
Settleable solids $_{120}$	[ml/l]	12	30	34	28	30
Turbidity	[FNU]	152	239	215	259	246
Faecal coliforms	[1/100ml]	-	-	-	-	-
Effluent:						
COD_{hom}	[mg/l]	34	34	66	54	43
COD_{fil}	[mg/l]	17	24	37	49	28
BOD_5	[mg/l]	3	4	5	5	3
NH_4-N	[mg/l]	1.4	2.3	5.0	4.6	3.1
NO_3-N	[mg/l]	18.5	24.2	25.8	18.2	21.5
NO_2-N	[mg/l]	0.3	< 0.1	0.5	0.5	0.6
N_{inorg}	[mg/l]	20.3	26.6	31.3	23.3	25.2
N_{tot}	[mg/l]	21.5	31.0	33.3	27.3	28.0
P_{tot}	[mg/l]	2.4	2.2	2.5	2.5	3.1
pH	[-]	7.0	6.9	7.1	7.1	7.1
Conductivity	[µS/cm]	548	650	686	651	651
SS	[mg/l]	6	6	9	9	10
Settleable solids $_{120}$	[ml/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Turbidity	[FNU]	3.9	2.6	2.8	2.6	2.8
Faecal coliforms	[1/100ml]	-	-	-	-	-
Biology:						
Temperature	[°C]	8.4	6.9	8.5	8.5	7.9
SSV_{30}	[ml/l]	215	300	420	420	750

MLSS	[g/l]	1.9	2.5	3.8	4.0	4.2
O_2	[mg/l]	6.7	5.8	0.8	0.8	7.1

*Power breakdown 31.12.07 from to 01.01.08

Table 5: Results from 24.01.2008 to 27.03.2008

Test schedule		3	5*	5	5	6
		100 %	100 %	100 %	100 %	150 %
Date		24.01.2008	21.02.2008	14.03.2008	20.03.2008	27.03.2008
Air Temperature min/max	[°C]	3/5	-3/6	5/12	1/7	-3/9
Influent:						
Temperature	[°C]	9.8	8.9	11.6	8.8	8.2
COD	[mg/l]	568	439	595	724	610
BOD_5	[mg/l]	178	191	202	374	239
NH_4-N	[mg/l]	31.6	33.8	34.6	33.0	36.6
N_{tot}	[mg/l]	43	47	48	51	49
P_{tot}	[mg/l]	6.3	5.7	8.4	7.8	7.1
pH	[-]	7.4	7.3	7.5	7.3	7.4
Conductivity	[µS/cm]	796	847	890	872	1042
SS	[mg/l]	304	216	228	442	490
Settleable solids $_{120}$	[ml/l]	20	14	21	27	23
Turbidity	[FNU]	124	121	119	268	172
Faecal coliforms	[1/100ml]	-	-	-	-	-
Effluent:						
COD_{hom}	[mg/l]	56	77	49	50	99
COD_{fil}	[mg/l]	48	48	42	36	33
BOD_5	[mg/l]	9	15	7	12	45
NH_4-N	[mg/l]	5.5	14.9	4.4	5.3	3.9
NO_3-N	[mg/l]	14.9	5.6	17.1	17.3	18.8
NO_2-N	[mg/l]	1.4	1.8	0.8	1.3	0.2
N_{inorg}	[mg/l]	21.8	22.3	22.3	23.9	22.9
N_{tot}	[mg/l]	23.3	23.4	24.6	25.1	27.7
P_{tot}	[mg/l]	2.9	3.3	3.3	3.4	3.3
pH	[-]	7.2	7.2	7.1	7.1	7.1
Conductivity	[µS/cm]	629	710	636	682	821
SS	[mg/l]	12	22	8	12	57
Settleable solids $_{120}$	[ml/l]	< 0.1	1.5	0.1	0.5	0.3
Turbidity	[FNU]	5.3	6.5	6.6	9.3	30.8
Faecal coliforms	[1/100ml]	-	-	-	-	-
Biology:						

Temperature	[°C]	9.5	7.4	9.4	8.1	8.1
SSV_{30}	[ml/l]	480	690	900	810	180
MLSS	[g/l]	4.2	6.5	7.0	5.2	1.5
O_2	[mg/l]	6.5	6.3	1.9	3.4	3.6

*First sample after sequence 4 "Low occupation stress / vacations"

Table 6: Results from 03.04.2008 to 08.05.2008

Test schedule		6	7	7	7	7
		150 %	100 %	100 %	100 % *PB	100 %
Date		03.04.2008	10.04.2008	17.04.2008	30.04.2008	08.05.2008
Air Temperature min/max	[°C]	5/12	1/12	-3/11	10/18	8/24
Influent:						
Temperature	[°C]	11.0	9.4	9.3	12.9	15.1
COD	[mg/l]	663	947	768	631	739
BOD_5	[mg/l]	259	330	379	253	379
NH_4-N	[mg/l]	34.8	30.4	31.6	35.8	32.7
N_{tot}	[mg/l]	49	62	45	47	49
P_{tot}	[mg/l]	7.5	9.9	6.7	6.9	9.0
pH	[-]	7.1	7.0	7.1	7.2	7.1
Conductivity	[µS/cm]	865	1082	907	870	958
SS	[mg/l]	450	512	548	318	356
Settleable solids $_{120}$	[ml/l]	25	55	24	25	25
Turbidity	[FNU]	262	251	208	258	168
Faecal coliforms	[1/100ml]	-	-	-		-
Effluent:						
COD_{hom}	[mg/l]	87	76	54	33	40
COD_{fil}	[mg/l]	32	28	41	26	30
BOD_5	[mg/l]	21	16	4	4	6
NH_4-N	[mg/l]	1.9	1.4	1.3	1.3	5.3
NO_3-N	[mg/l]	22.2	27.2	19.5	21.8	14.4
NO_2-N	[mg/l]	0.5	0.4	0.4	0.8	1.2
N_{incrg}	[mg/l]	24.6	29.0	21.2	23.9	20.9
N_{tot}	[mg/l]	26.5	34.0	23.9	28.2	22.2
P_{tot}	[mg/l]	3.1	3.7	3.2	3.2	3.8
pH	[-]	7.2	7.0	7.3	7.2	7.4
Conductivity	[µS/cm]	709	748	647	656	726
SS	[mg/l]	43	30	3	4	4
Settleable solids $_{120}$	[ml/l]	2.5	2.5	0.1	< 0.1	< 0.1
Turbidity	[FNU]	18.1	18.8	5.7	2.7	2.9

Faecal coliforms	[1/100ml]	-	-	-	-	-
Biology:						
Temperature	[°C]	8.7	8.9	9.0	12.0	15.8
SSV_{30}	[ml/l]	200	360	540	300	720
MLSS	[g/l]	2.0	2.7	3.9	3.6	4.0
O_2	[mg/l]	5.3	1.1	7.4	1.2	6.2

*Power breakdown from 21.04.08 to 22.04.08

Table 7: Results from 15.05.2008 to 19.06.2008

Test schedule		7	8	8	9	9
		100 %	50 %	50 %	100 %	100 %
Date		15.05.2008	21.05.2008	29.05.2008	12.06.2008	19.06.2008
Air Temperature min/max	[°C]	13/25	5/21	15/25	8/21	7/18
Influent:						
Temperature	[°C]	17.8	14.2	16.0	16.7	16.0
COD	[mg/l]	936	774	979	648	816
BOD_5	[mg/l]	390	349	442	234	356
NH_4-N	[mg/l]	39.3	34.6	39.1	28.3	27.0
N_{tot}	[mg/l]	55	54	60	55	41
P_{tot}	[mg/l]	7.3	8.5	9.0	7.0	7.4
pH	[-]	7.0	6.9	7.1	7.1	6.7
Conductivity	[µS/cm]	961	973	922	912	909
SS	[mg/l]	500	418	404	322	446
Settleable solids $_{120}$	[ml/l]	24	22	31	18	22
Turbidity	[FNU]	176	175	236	183	252
Faecal coliforms	[1/100ml]	-	-	-	-	-
Effluent:						
COD_{hom}	[mg/l]	38	52	37	51	46
COD_{fil}	[mg/l]	30	32	23	37	37
BOD_5	[mg/l]	6	12	7	11	6
NH_4-N	[mg/l]	6.2	5.2	2.0	21.7	21.9
NO_3-N	[mg/l]	2.5	12.2	18.0	< 1.0	< 1.0
NO_2-N	[mg/l]	1.2	0.7	0.5	< 0.1	< 0.1
N_{inorg}	[mg/l]	9.9	18.1	20.5	22.3	22.0
N_{tot}	[mg/l]	9.8	19.6	23.0	23.9	22.2
P_{tot}	[mg/l]	4.1	3.7	4.1	3.8	3.0
pH	[-]	7.5	7.1	7.3	7.5	7.3
Conductivity	[µS/cm]	701	767	695	778	769
SS	[mg/l]	3	20	13	21	5

Settleable solids $_{120}$	[ml/l]	0.1	1.3	0.1	< 0.1	< 0.1
Turbidity	[FNU]	4.1	11.7	9.9	9.0	4.1
Faecal coliforms	[1/100ml]	-	-	-	-	-
Biology:						
Temperature	[°C]	16.9	14.3	16.6	14.8	16.3
SSV_{30}	[ml/l]	920	840	780	810	920
MLSS	[g/l]	5.9	5.2	5.4	8.2	9.4
O_2	[mg/l]	0.2	4.8	4.9	5.9	0.5

Table 8: Results from 26.06.2008

Test schedule		9
		100 %
Date		26.06.2008
Air Temperature min/max	[°C]	10/27
Influent:		
Temperature	[°C]	17.8
COD	[mg/l]	852
BOD_5	[mg/l]	391
NH_4-N	[mg/l]	25.2
N_{tot}	[mg/l]	48
P_{tot}	[mg/l]	8.4
pH	[-]	7.1
Conductivity	[µS/cm]	872
SS	[mg/l]	508
Settleable solids $_{120}$	[ml/l]	19
Turbidity	[FNU]	211
Faecal coliforms	[1/100ml]	-
Effluent:		
COD_{hom}	[mg/l]	62
COD_{fil}	[mg/l]	31
BOD_5	[mg/l]	13
NH_4-N	[mg/l]	27.4
NO_3-N	[mg/l]	< 1.0
NO_2-N	[mg/l]	< 0.1
N_{inorg}	[mg/l]	28.0
N_{tot}	[mg/l]	27.8
P_{tot}	[mg/l]	3.7
pH	[-]	7.6
Conductivity	[µS/cm]	750

SS	[mg/l]	27
Settleable solids $_{120}$	[ml/l]	0.1
Turbidity	[FNU]	13.8
Faecal coliforms	[1/100ml]	-
Biology:		
Temperature	[°C]	16.9
SSV_{30}	[ml/l]	930
MLSS	[g/l]	7.4
O_2	[mg/l]	0.0

5.2 Evaluation of the test sequences

The EN 12566-3 requires the evaluation of the 20 samples obtained in the sequences with 100 % daily hydraulic loading (test sequences 1, 3, 5, 7 and 9).

Mean, minimum and maximum values of the 20 effluent samples in the nominal phases as well as the appropriate standard deviations are shown in Table 9 and 10.

Table 9: treatment efficiencies for the nominal test sequences (100%)

Efficiency [%]	Mean*	Minimum	Maximum	Standard deviation
COD	92.8	82.5	95.9	2.9
BOD5	97.1	92.1	98.9	1.8
Ntot	49.2	39.0	82.2	9.9
NH4-N	74.6	0.0	96.4	28.0
Ptot	57.1	42.1	78.2	7.3
SS	96.7	89.8	99.5	2.6

Table 10: effluent characteristics for the nominal test sequences (100%)

Effluent		Mean	Minimum	Maximum	Standard deviation
COD	[mg/l]	50	33	77	12.5
BOD_5	[mg/l]	8	3	16	4.0
N_{tot}	[mg/l]	26	10	34	5.5
NH_4-N	[mg/l]	7.7	1.3	27.4	7.7

*Efficiency ratio for the treatment efficiency declaration according to EN 12566-3 chapter 6.3

NO_3-N	[mg/l]	15.0	< 1.0	27.2	8.6
N_{inorg}	[mg/l]	23.5	9.8	31.3	4.6
P_{tot}	[mg/l]	3.3	2.2	4.1	0.5
SS	[mg/l]	12	3	30	8.3
Settleable solids	[ml/l]	0.3	< 0.1	2.5	0.6

According to the guideline on the treatment of municipal wastewater 91/271/EWG, Annex 1, Table 2, Annotation (3) the nitrogen requirements refer only to water temperatures of 12°C or more in the biological reactor. To correspond this fact with reference to the treatment of household wastewater in decentralised systems Table 11 shows the treatment efficiencies regarding the nitrogen parameters also only for water temperatures in the bioreactor of 12°C or more.

Table 11: nitrogen characteristics for water temperatures of 12°C or more in the bioreactor

		Mean*	Minimum	Maximum	Standard deviation
Efficiency N_{tot}	[%]	**53.4**	40.0	82.2	15.6
Efficiency NH_4-N	[%]	**51.1**	0.0	96.4	41.6
N_{tot}	[mg/l]	**22.4**	9.8	28.2	6.7
NH_4-N	[mg/l]	**14.0**	1.3	27.4	10.9
NO_3-N	[mg/l]	**6.7**	< 1.0	21.8	9.2
N_{inorg}	[mg/l]	**21.1**	9.9	28.0	6.1

Table 12 shows the efficiency for selected parameters in the test schedules with 50 % and 150 % hydraulic load (sequences 2, 6 and 8).

Table 12: efficiencies for 50% and 150% hydraulic daily load

	Test sequence					
	50 %	50 %	150 %	150 %	50 %	50 %
Date / Efficiency[%]	06.12.2007	13.12.2007	27.03.2008	03.04.2008	21.05.2008	29.05.2008
COD	93.7	93.8	83.8	86.9	93.3	96.2
BOD_5	97.6	98.5	81.2	91.9	96.6	98.4
N_{tot}	46.5	46.0	43.4	45.6	63.7	61.7
NH_4-N	92.5	94.0	89.3	94.4	85.0	94.9
P_{tot}	60.8	62.5	53.5	58.7	56.5	54.4
SS	96.8	97.4	88.4	90.4	95.2	96.8

*Efficiency ratio for the treatment efficiency declaration according to EN 12566-3 chapter 6.3

5.3 Graphical presentation

To display the treatment efficiency of the tested system more clearly, the results of all test sequences, including nominal load, hydraulic over- and underload, are graphically shown in this chapter. For clarification, the concentrations of the influent and effluent as well as the resulting efficiency are shown.

The concentrations of COD are shown in Figure 7.

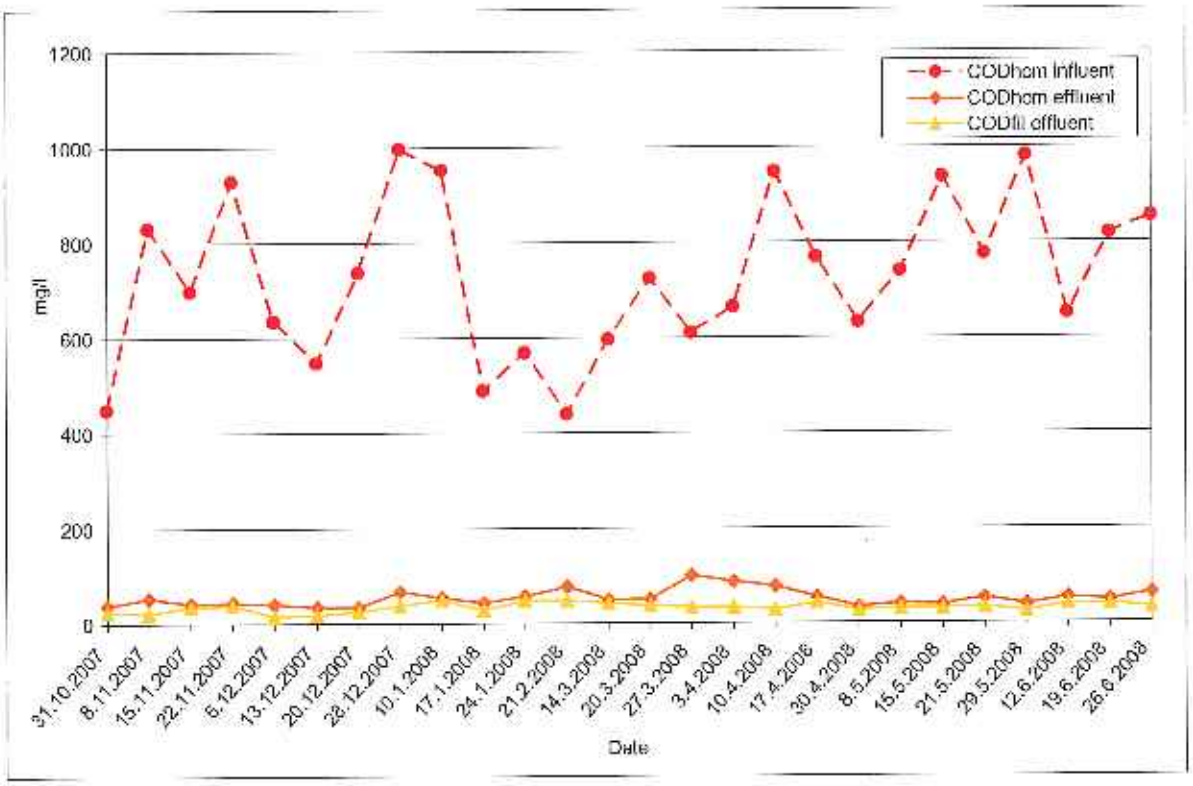


Figure 7: COD influent and effluent concentrations

The influent and effluent concentrations of BOD_5 are shown in Figure 8.

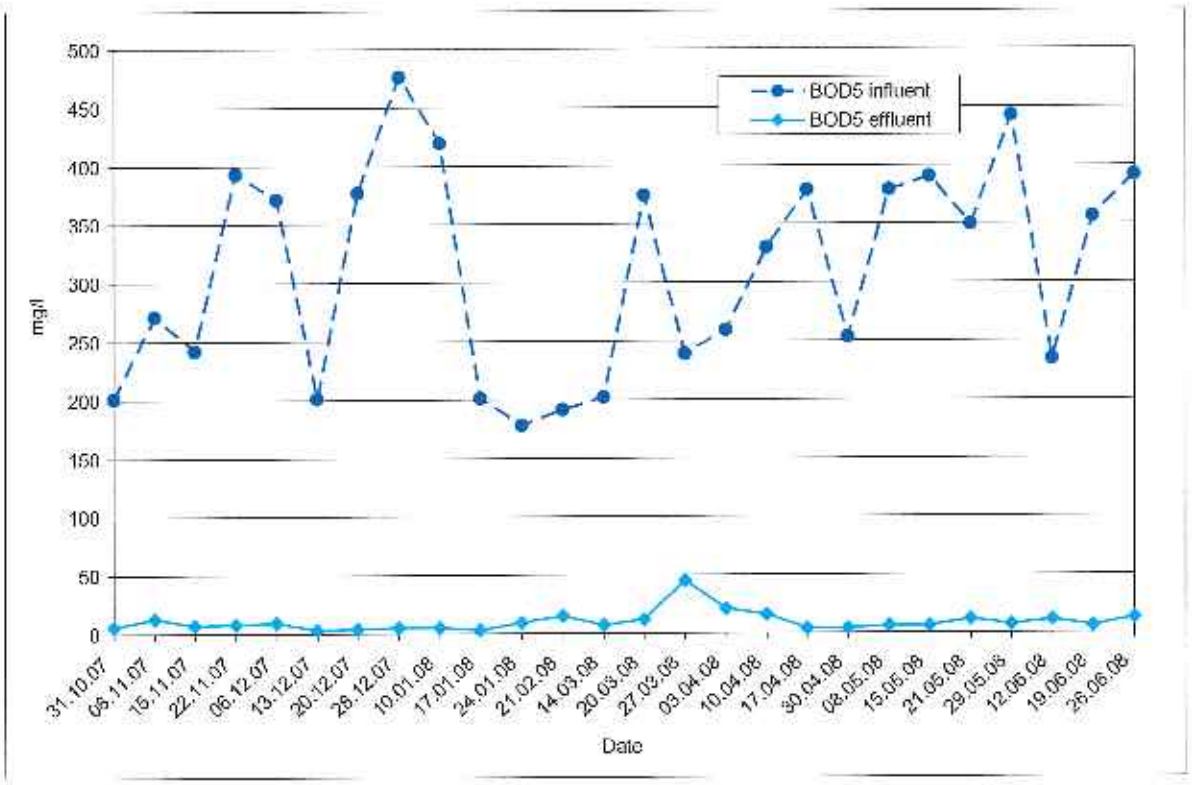


Figure 8: BOD_5 influent and effluent concentrations

The percental efficiencies resulting from the inflow and outflow of BOD_5 and COD are displayed in Figure 9.

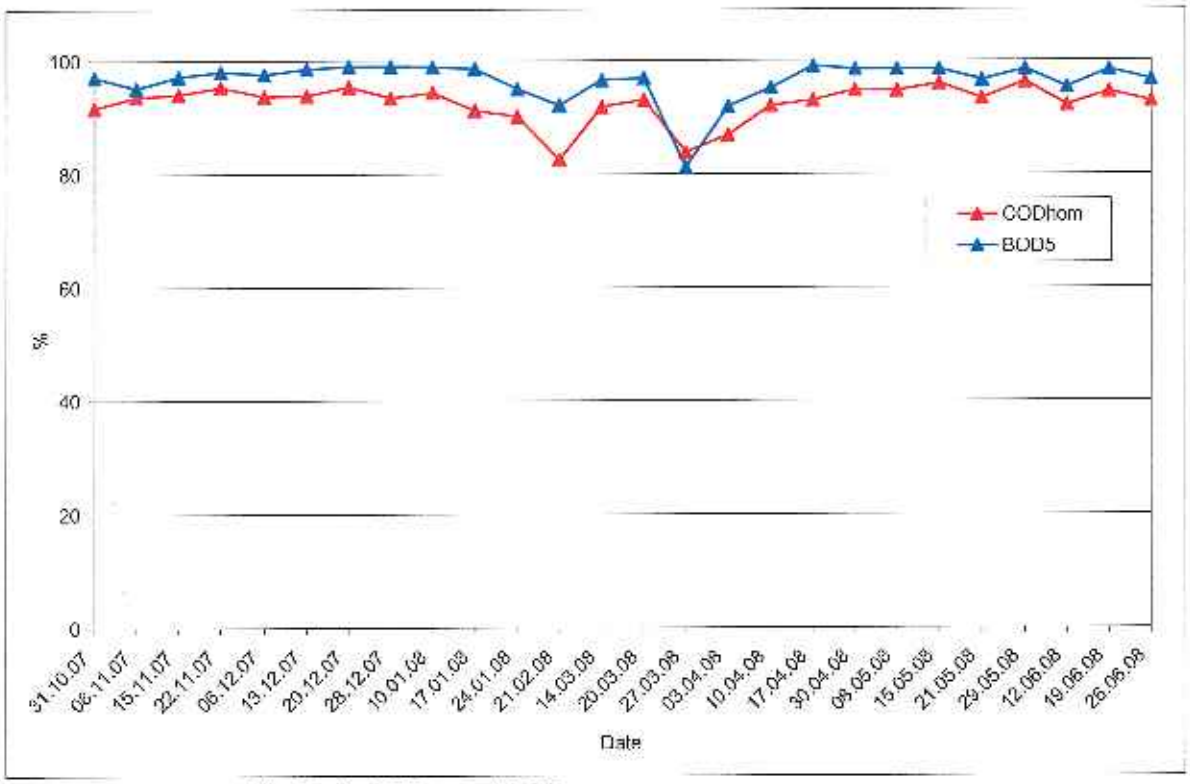


Figure 9: Treatment efficiencies BOD_5 and COD

Throughout the whole test (all sequences) the average treatment efficiencies of BOD_5 and COD resulted as follows:

	%
COD	92.4
BOD_5	96.4

The percental efficiencies resulting from the inflow and outflow of ammonium, nitrate und inorganic nitrogen are shown in Figure 10.

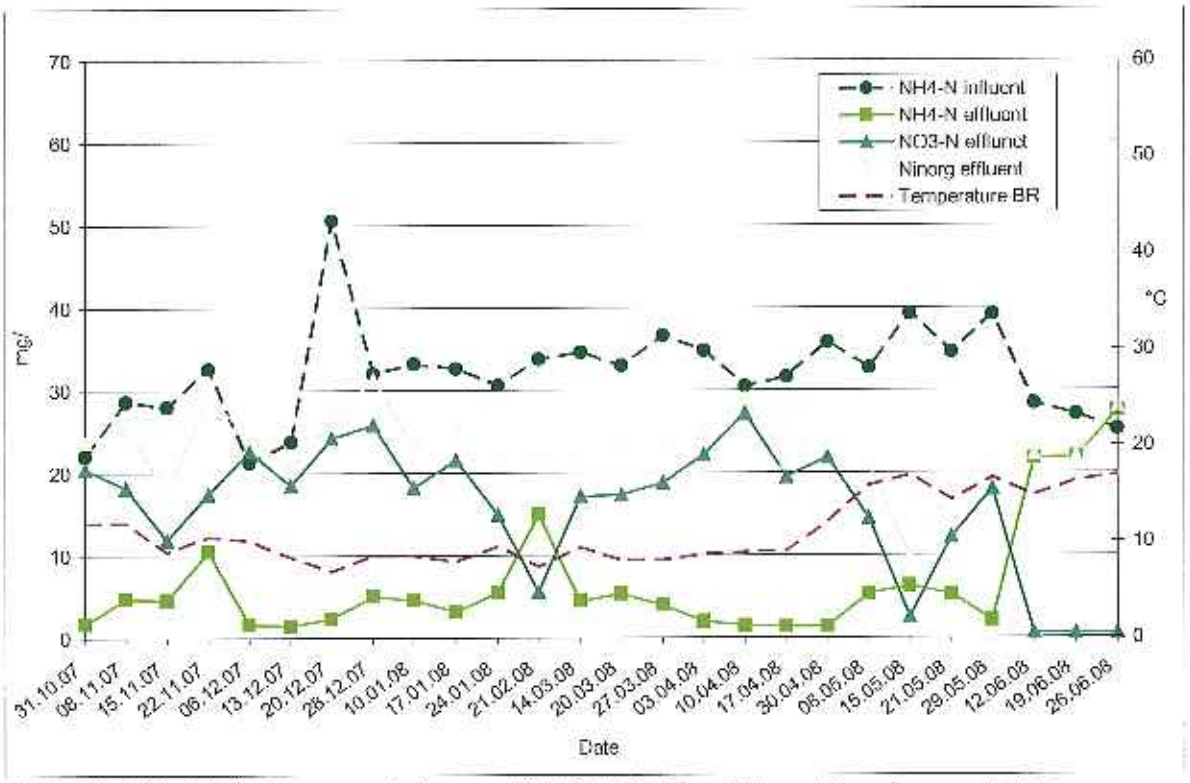


Figure 10: NH_4-N influent concentration and NH_4-N, NO_3-N and N_{inorg} effluent concentration

The effluent results of NH_4-N varied from 1.3 mg/l to 27.4 mg/l the entire test.

The treatment efficiencies of the nitrogen parameters are presented in Figure 11:

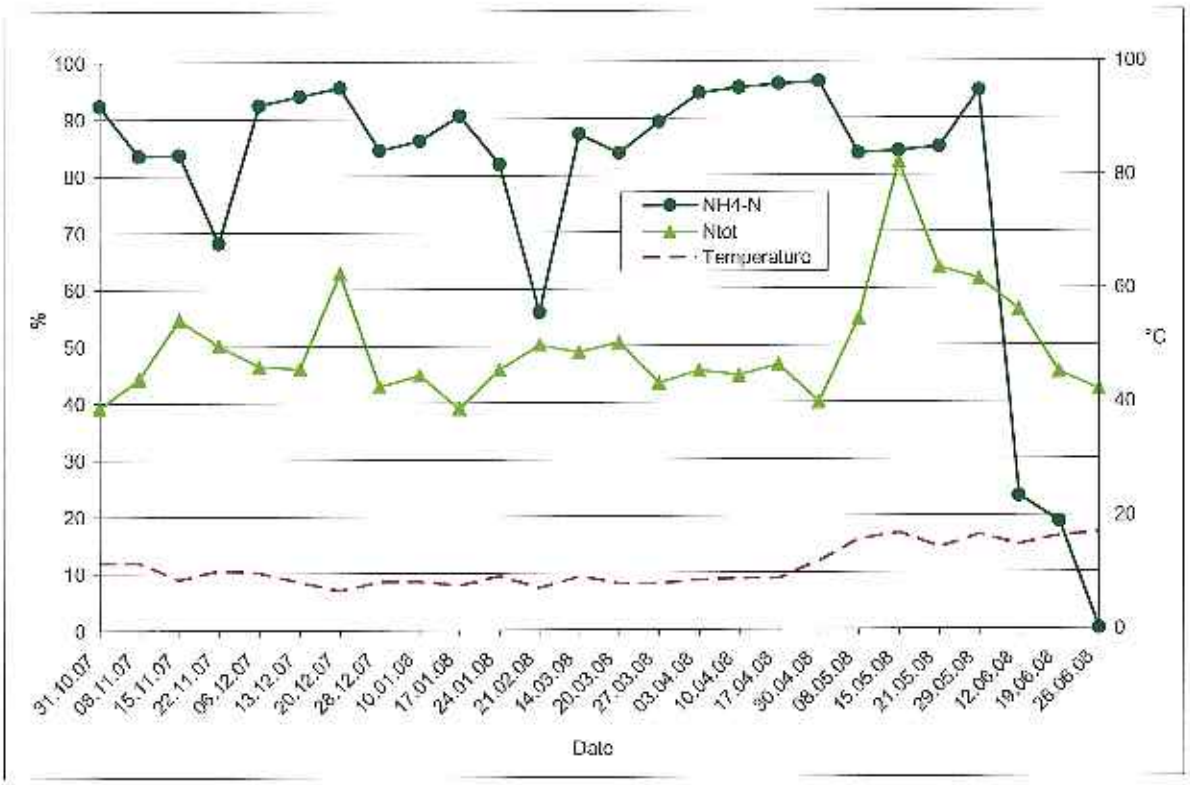


Figure 11: treatment efficiencies of NH_4-N und N_{total}

The average results of the parameters from Figure 11 for the complete test period are shown in the following table.

	%
NH_4-N	78.5
N_{total}	49.7

Figure 12 shows the concentrations of the filterable solids from the inlet and outlet of the ASP 06 treatment system.

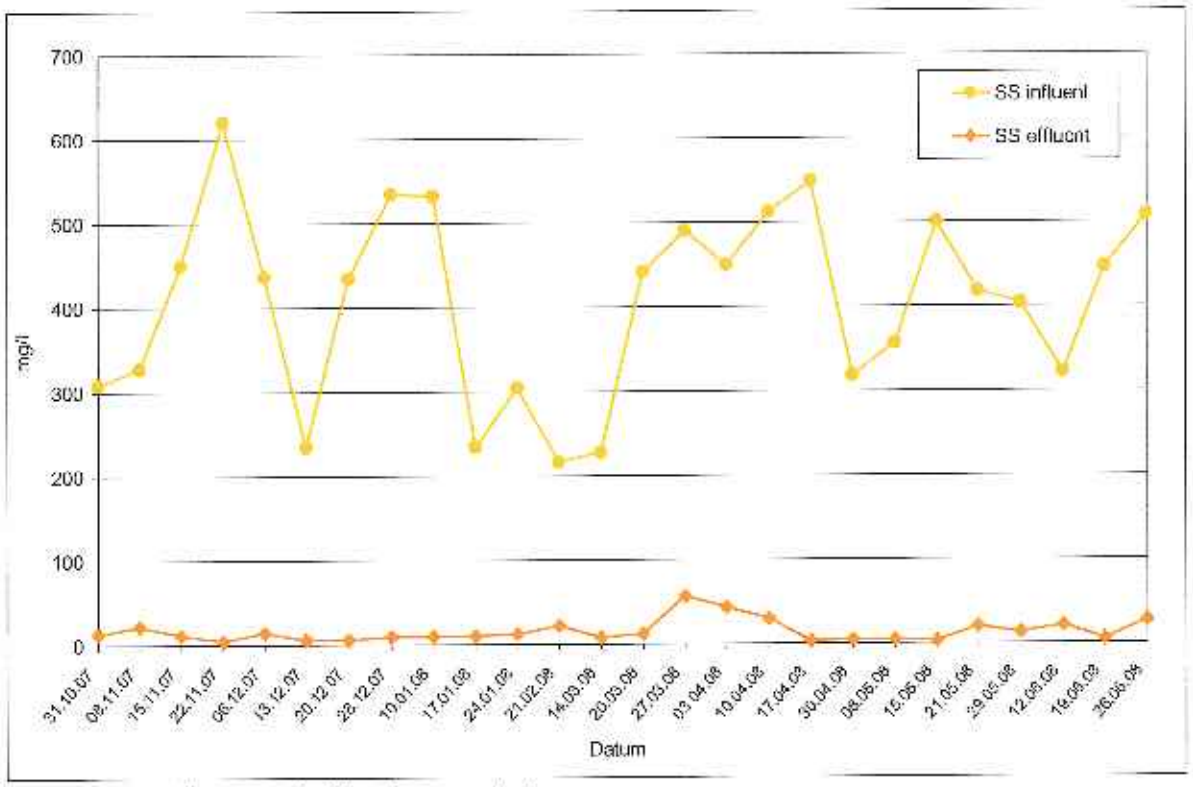


Figure 12: SS influent and effluent concentrations

The resulting treatment efficiencies of SS and total phosphorus are shown in Figure 13.

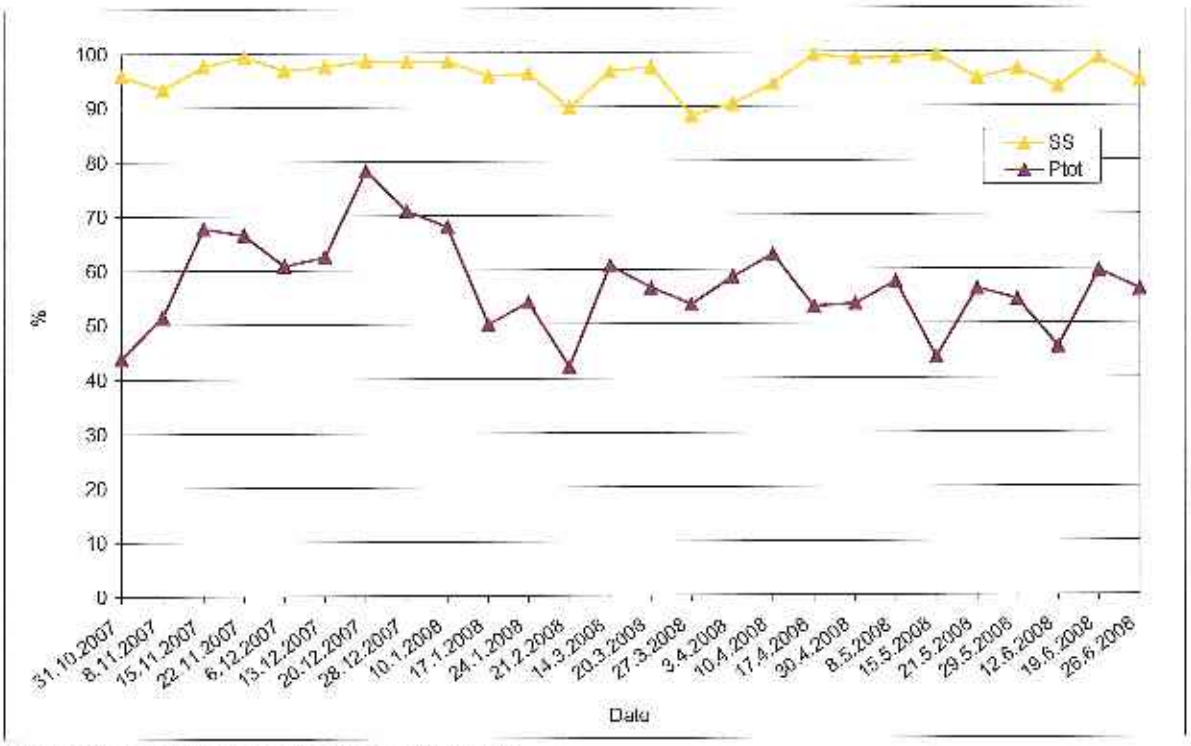


Figure 13: treatment efficiencies of SS und P_{tot}

The average treatment efficiencies of SS and P_{tot} throughout the whole test were as follows:

	%
SS	96.1
P_{total}	57.3

6 Assessment of the general plant safety

6.1 Operational safety of system components

An alarm signal as requested by the EN 12566-3 was not existent for the tested treatment plant. The manufacturer declares that he has changed the blower design on all plants of the range to incorporate the alarm function.
There were no mechanical or electrical malfunctions during the whole 38-week test procedure.

6.2 Sludge removal

Throughout the complete 38-week test period a sludge removal was not necessary.

6.3 Maintenance and self-checking

Time and effort for maintenance and self-checking for the tested ASP 06 treatment system meet the usual time and effort for a small sewage treatment plant.

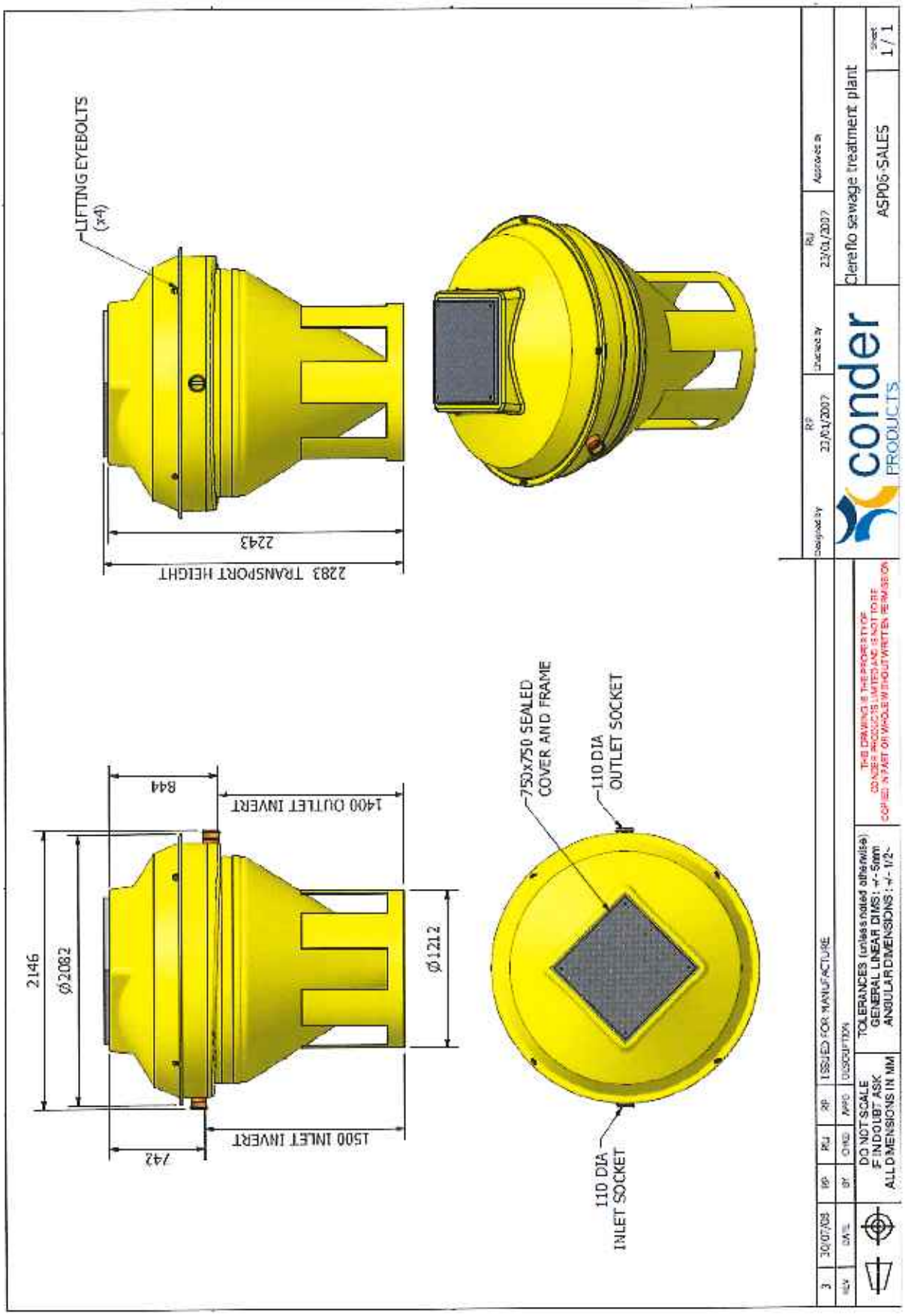
6.4 Accessibility

All plant components were accessible in a satisfactory way. There is one access manhole on the tank top. The size of its cover is 75 cm × 75 cm.

7 Annex

Technical drawings and information about the sizing and design of the ASP 06 small wastewater treatment system (manufacturer's information):

Manufacturer's information



Plant: ASP 6 to 20PE

Process Calculations

conder ENVIRONMENTAL SOLUTIONS

Compiled By:	Alan Ford		Date:	Jan-08

INPUT DATA

Plant Size Range

6PE
12PE
16PE
20PE

Design Flows and Loads

Item	*Flow*	*BOD*	*BOD*	*NH3*	*NH3*
	l/d	*g/d*	*mg/l*	*g/d*	*mg/l*
Per Capita	200	60	300	8	40
	m3/d	*kg/d*		*kg/d*	
6PE	1.2	0.36		0.048	
12PE	2.4	0.72		0.096	
16PE	3.2	0.96		0.128	
20PE	4	1.2		0.16	

Note: Peak hourly flow = 3 x design flow - for a maximum period of 2 hours

Design Discharge Consent

Plant to achieve	20:30:20	BOD:SS:NH3/4

Plant Volumes & Areas

	Inner Biozone	*Outer Biozone*	*Total Biozone*	*Settlement Volume*	*Settlement Area*
	m3	*m3*	*m3*	*m3*	*m2*
6PE	0.8	0.147	0.947	0.876	1.2
12PE	1.139	0.147	1.286	1.264	1.2
16PE	1.252	0.147	1.399	1.393	1.2
20PE	1.365	0.147	1.512	1.522	1.2

Plant Operating Range

MLSS	2500 - 15000 mg/l
Temperature (effluent)	10 - 20 degrees C

Plant Airflow Rates

	m3/h
6PE	6
12PE	7.8
16PE	9.6
20PE	12

Manufacturer's information

Plant: ASP 6 to 20PE

Process Calculations

conder ENVIRONMENTAL SOLUTIONS

Compiled By: Alan Ford Date: Jan-08

PROCESS DESIGN

Biozone Design

Design Basis

1. Calculate required minimum biozone volume based on required f:m loading with minimum MLSS concentration @ compare with actual volumes
2. Calculate actual f:m at minimum & maximum MLSS concentrations
3. Calculate biozone plant hydraulic retention time
4. Calculate maximum oxygen requirement @ maximum MLSS concentration
5. Calculate oxygen provided and compare with 4.

1.

Minimum f:m ratio to achieve final effluent consent = 0.33

Minimum MLSS concentration = 2500 mg/l

	BOD	Required Volume	Actual Volume	
	f	m3	m3	
6PE	0.36	0.44	0.947	Volume Sufficient
12PE	0.72	0.87	1.286	Volume Sufficient
16PE	0.96	1.16	1.399	Volume Sufficient
20PE	1.2	1.455	1.512	Volume Sufficient

2.

Maximum MLSS concentration = 15000 mg/l

	Actual Volume	maximum actual	minimum actual
	m3	f:m	f:m
6PE	0.947	0.15	0.03
12PE	1.286	0.22	0.04
16PE	1.399	0.27	0.05
20PE	1.512	0.32	0.05

3.

	Actual Volume	Flow	Hydraulic Rention	
	m3	m3/d	Hours	
6PE	0.947	1.2	18.94	Retention Sufficient
12PE	1.286	2.4	12.86	Retention Sufficient
16PE	1.399	3.2	10.4925	Retention Sufficient
20PE	1.512	4	9.072	Retention Sufficient

Manufacturer's information

Plant: ASP 6 to 20PE

Process Calculations

Compiled By:		**Alan Ford**		**Date:**	**Jan-08**				
4.									
Oxygen requirement @ 20 degrees C and 15,000mg/l MLSS									
	=	(0.6 x BOD) + [4.57 x (NH3 - 10% (cell mass) - effluent NH3)] x (0.05 x MLVSS)							
	BOD	*BOD pf*	*NH3*	*Net NH3*	*NH3 pf*	*MLVSS MLSS ratio*		*O2 Requirement*	
	kg/d		*kg/d*	*kg/d*				*kg/d*	
6PE	0.36	1.1	0.048	0.031	1.1	0.6		0.82	
12PE	0.72	1.1	0.096	0.062	1.1	0.6		1.37	
16PE	0.96	1.1	0.128	0.083	1.1	0.6		1.68	
20PE	1.2	1.1	0.16	0.104	1.1	0.6		2	
pf = peaking factor									
5.									
	Air Provided	*Oxygen Provided*	*Diffuser Efficiency Clean Water*		*Diffuser Submergence*		*Alpha Factor*	*Oxygen Transferred*	
	m3/d	*kg/d*	*% / m submergence*					*kg/d*	
6PE	144	40.09	2.5		1.262		0.7	0.89	OK
12PE	187.2	52.12	2.5		1.562		0.7	1.42	OK
16PE	230.4	64.14	2.5		1.662		0.7	1.87	OK
20PE	288	80.18	2.5		1.762		0.7	2.47	OK
Settlement Zone Design									
1.	Calculate settlement zone rise rate & retention - compare with required - normal flow condition								
	Normal Flow	*Zone Area*	*Zone Volume*	*Actual Rise Rate*	*Required Rise Rate*		*Actual Retention*	*Required Retention*	
	m3/d	*m2*	*m3*	*m/h*	*m/h*		*h*	*h*	
6PE	1.2	1.2	0.876	0.04	0.7	OK	17.5	2	OK
12PE	2.4	1.2	1.264	0.08	0.7	OK	12.6	2	OK
16PE	3.2	1.2	1.393	0.11	0.7	OK	10.4	2	OK
20PE	4	1.2	1.522	0.14	0.7	OK	9.1	2	OK
	Calculate settlement zone rise rate & retention - compare with required - peak flow condition								
	Peak Flow	*Zone Area*	*Zone Volume*	*Actual Rise Rate*	*Required Rise Rate*		*Actual Retention*	*Required Retention*	
	m3/d	*m2*	*m3*	*m/h*	*m/h*		*h*	*h*	
6PE	3.6	1.2	0.876	0.13	0.7	OK	5.8	2	OK
12PE	7.2	1.2	1.264	0.25	0.7	OK	4.2	2	OK
16PE	9.6	1.2	1.393	0.33	0.7	OK	3.5	2	OK
20PE	12	1.2	1.522	0.42	0.7	OK	3	2	OK

conder PRODUCTS

Installation, Operating and Maintenance Manual

For

Clereflo ASP Package Sewage Treatment Plants

Discharge consent:
20BOD/30SS/20NH3-N

Note to the End-user:

Householders are guided to read the sections in the yellow boxes on pages 2 and pages 26 to 31

Unit Installed (please tick) ☑

ASP06 ☐

ASP12 ☐

ASP16 ☐

ASP20 ☐

Approved Service Provider

HYDROserve

Tel: 08704 050902

Fax: 08704 050903

Email:enquiries@hydroserve.net

Web: www.hydroserve.net

Conder Products Limited, 2 Whitehouse Way, South West Industrial Estate, Peterlee, County Durham, SR8 2HZ
Tel:0870 264 0004. Fax:0870 264 0005
Email: sales@conderproducts.com. Web:www.conderproducts.com

conder PRODUCTS

Regulations & your responsibilities

A package sewage treatment plant is an essential component of the home or workplace. It provides safe and hygienic wastewater treatment and disposal to make sure your family and colleagues have a pleasant place to live and work and that the local community and environment is protected. So you must treat your package sewage treatment plant with the respect it deserves and make sure it is operated and maintained properly so it can continue to provide outstanding performance.

Building regulations

1.0 Notices are required to be displayed in the household stating that the plant is connected to a private treatment plant. Notices in toilets and bathrooms would also inform guests.

2.0 Planning and building control departments of you local council should be informed of the work being undertaken.

What responsibilities do I have?

3.0 Users of a packaged treatment plant have a responsibility under the terms of the Water Resources Act (1991) to ensure that the plant meets the standards set by the Environment Agency. The plant is designed to ensure that the final effluent discharged back into the water table (Ground Water) or water course meets these requirements. Once your plant is commissioned and operating efficiently, the Environment Agency may sample the discharge from the plant to check it meets the agreed standards. **The Environment Agency also has the right to alter the consent standard every two years. It is therefore essential to regularly maintain and service the plant to make sure it is running efficiently.** You can do a lot to ensure you get the best out of your plant. This manual offers a simple and practical guide to help you do just that.

4.0 The plant must be emptied of sludge as required by the operating instructions, ensuring that the waste is disposed of by a tankering company that is licensed to do so. **All documentation relating to the sludge disposal should be kept with the servicing records.**

5.0 **The plant must be serviced in accordance with the Operation and maintenance manual. The annual service must be carried out by an approved service provider.** Record of all services must be kept by the consent holder.

6.0 **When a house is sold evidence that the treatment plant has been properly installed and maintained will be required.**

Table of Contents

Introduction

This installation, Operation and Maintenance (O&M) manual includes descriptive literature, specifications and drawings relating to the principal mechanical and electrical equipment incorporated in the unit. It is the responsibility of the installer and operator to read and fully understand these instructions before installing, commissioning or operating the plant. In the unlikely event of problems occurring with your plant you may either refer to this manual, your equipment supplier or directly to Conder Products Ltd.

The plant comprises two treatment stages, an aerobic biological zone and a final clarification zone. The design combines the benefits of a well proven treatment process with our engineering expertise to produce a high quality system which is robust and reliable. The plant will provide long and trouble free operation providing the simple maintenance procedures laid out in this manual are regularly carried out.

Your attention is drawn to the 'Health and Safety' section at the beginning of this manual. It is IMPERATIVE that you read these instructions BEFORE working on the plant.

The plant has been designed to treat the volume and strength of sewage specified in the original quotation. Please note the following points:

- The maximum design loadings must not be exceeded (see original quotation and order acknowledgement for details).
- The plant is designed for gravity feed and should not be pumped to.
- Surface water, from roofs etc, must not enter the plant and or sewerage system.
- High volume discharges from swimming pools or Jacuzzi's must not enter the plant.
- Large quantities of chemicals such as water softener regenerant, disinfectants, strong acids or alkalis, oil and grease, pesticides or photographic chemicals must not enter the system.
- Do not use chemical or biological emulsifiers in grease traps.
- Do not dispose of nappies, sanitary towels and incontinence pads via the toilet.
- Do not dispose of medicines down the toilet or sink.
- Waste disposal units should not be used unless accounted for within the original specification.

If you have any doubt about a particular substance, please contact Conder Products Ltd.

Health and Safety

(Important - Please Read This Before Starting Any Work on the Plant.)

United Kingdom Health and Safety at Work Act 1974

Section 6(a) of this Act requires manufacturers to advise their customers on the safety and the handling precautions to be observed when installing, operating, maintaining and servicing their products.

The user's attention is therefore drawn to the following:

1. The appropriate sections of this manual must be read before working on the equipment.
2. Installation and servicing must only be carried out by suitably trained or qualified personnel.
3. Normal safety precautions must be taken and appropriate procedures observed to avoid accidents.

Refer to Conder Products Ltd or your local supplier for technical advice or product information.

Health

The following is extracted from a health warning card supplied to Conder Products staff. It is the customer's responsibility to ensure that all necessary protective clothing/equipment is available.

Leptospirosis - what is Leptospirosis and are you at risk?

Two types of Leptospirosis infection affect people in the UK:

1. Weil's Disease - this is a serious and sometimes fatal infection that is transmitted to humans by contact with soil, water or sewage contaminated with urine from infected rats.
2. Hardjo-type Leptospirosis - this is transmitted from cattle to humans.

What are the symptoms? → Both diseases start with a flu-like illness with a persistent and severe headache, muscle pains and vomiting. Jaundice appears about the fourth day of the illness.

How might I catch it? → The bacteria can enter the body via cuts and scratches and through the lining of the mouth and throat or through the eyes.

How can I prevent it? → After having worked in contact with sewage or anything contaminated with sewage, wash your hands and forearms thoroughly with soap and water. If your clothes, boots or tools are contaminated with sewage, wash thoroughly after handling them.

- **Take immediate** action to wash thoroughly any cut, scratch or abrasion of the skin as soon as possible. Apply antiseptic to the wound, cover with cotton wool or gauze, and protect with a waterproof plaster.
- **DO NOT** handle food, drink or smoking materials without first washing your hands.

If you contract the symptoms described above after coming into contact with sewage, report it to your doctor immediately and advise him/her of the circumstances.

Safety

Sewage gases are potentially hazardous. **DO NOT** enter the unit or any sump.

Before carrying out any maintenance work, the equipment must be electrically isolated by unplugging the blower socket.

DO NOT leave manways open for any longer than is necessary. Temporary barriers and warning signs should be erected around any open covers or manways as appropriate.

Owner's responsibilities

The owner of the Sewage Treatment Plant is entirely responsible for plant operation and ensuring that the effluent quality does not breach the Discharge Consent Standards.

The offloading of the treatment plant and the correct installation is the responsibility of the owner. We would strongly recommend that the plant should be installed by a contractor that understands sewage and drainage systems. The chosen method of discharge remains with the client in consultation with the environment agency. The design, installation and maintenance of the same remains with the client. Conder Products accepts no liability for any damage or loss, including consequential loss, caused by the failure of any pumping equipment

Process and Plant Description

The Clerefio ASP treatment plants have an inner central chamber and an outer settlement tank. The plant treats sewage using the extended aeration principle in the central bio-zone chamber. A simple course bubble diffuser, housed in a draft tube, introduces the air that provides the oxygen to the bacteria that then treats the sewage. The bio-zone retains the mixture of water, sewage and air until a level of treatment has been achieved. The treated effluent then enters the conical clarifier tank where settlement takes place and the settled solids are drawn back towards the draft tube with the diffuser in it and returned to the bio-zone. The effluent finally leaves the plant over a weir that extends around the circumference of the tank at the outlet level. The movement of fluid through the whole system is by gravity displacement. There are no moving parts in the treatment plant.

A) Inlet, flow from the house (s)

B) zone chamber

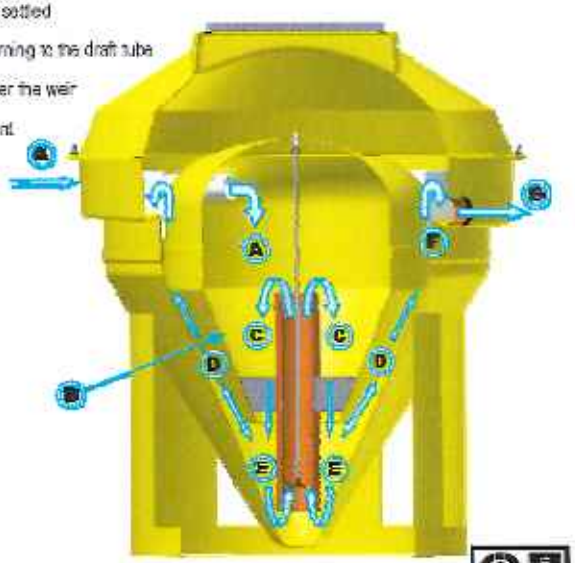
C) Flow around the draft tube

D) Treated effluent being settled

E) Settled Bio-solids returning to the draft tube

F) Final effluent going over the weir

G) Effluent exiting the plant



Clereflo Unit		ASP06	ASP12	ASP16	ASP20
Population Equivalent		6	12	16	20
Hydraulic Load (l/day)		1200	2400	3200	4000
Organic Load (g BOD5 per day)		360	720	960	1200
NH3 (g per day)		49	96	128	160
O/A diameter (mm)	A	2080	2080	2080	2080
Standard Inlet Invert (mm)	B	780	780	780	780
Inlet Invert To Base (mm)	C	1570	1670	1970	2070
Outlet Invert To Base	D	1470	1770	1970	1970
O/A Depth (mm)	E	2350	2650	2750	2850
Pipework Fitting (mm)		110	110	110	110
Max Rated Power (Watts)		135	225	225	300
Estimated power consumption at working pressure (Watts)		100	170	165	220
Cover Size		750 SQ	750 SQ	750 SQ	750 SQ
Plant weight		230kg	260kg	300kg	360kg

Installation Guide

IMPORTANT! PLEASE READ HEALTH AND SAFETY INSTRUCTIONS BEFORE ATTEMPTING ANY WORK.

The following instructions are offered for guidance only. Consult a suitably experienced and qualified ground worker for site specific assistance.

Materials

It is strongly recommended that concrete and/or backfill materials are not ordered until the treatment plant is on site. No liability will be accepted for losses incurred by the unlikely event of a late delivery of the treatment plant.

Offloading

The contractor is responsible for offloading the tank and any accessories using one of the following two methods:

- using straps through the eyebolts (Any chains or steel ropes used in rigging ***must not*** be in contact with the tank)
- using a forklift through the provided pallet.

Do not lift the tank if it contains any water. Maintain control over the tank when lifting by use of guide ropes. ***Do not*** allow the tank to impact against other objects. If the tank is stored on site prior to installation, it must be upright on a flat and level ground where it cannot be punctured or otherwise damaged. Chock with tyres or other cushioning material to prevent moving, and tie down if high winds are expected.

Supplied items

The usual extent of supply is:

(i) Treatment plant ready for installation

(ii) Housing and air compressor

(iii) Air hose (10m) and connections

(iv) Installation, operation and maintenance manual

(v) Compressor manual

See delivery note for items ordered.

Concrete Specification

The specification for the concrete mix to surround the tank may be taken from BS 5328 : Part 1 : 1991 (including amendments), taking into account the site conditions and application requirements. For a typical non-structural application in non aggressive soils a Standard Mix ST4 with a 50mm slump is generally suitable, but also permits the equivalent Designated Mix GEN3 can be specified as an alternative. **If for non typical applications, structural or other reasons a higher than normal designation is required, the purchaser of the fresh concrete can use table 6 in BS 5328: Part 2: 1991 (amendment 8759/October 1995) for guidance.**

Lift height (rate of rise)

Determine the lift height (m), or rate of rise (m/h) for the specific concrete type used, to ensure that a design pressure (*P max*) of 25kN/m² on the tank is not exceeded.

Vibration

The design of the tank assumes minimal compaction of the surrounding concrete. Where necessary, this may be extended to include careful use of light internal vibration. *Never* use deep revibration which will substantially increase the pressure on the tank, possibly causing failure.

Impact of Concrete on Discharge

The effects of impact on discharge are considerable. These are controlled by the vertical form height, the tank diameter and the method of discharge. Under no circumstances should concrete be discharged directly onto the tank.

Loadings

If the tank is installed in an area where traffic or other superimposed loadings can be applied, it may be necessary to consult a structural engineer for the design of a reinforced concrete slab to prevent the load being transmitted to the tank (or its concrete surround). If this slab is constructed immediately above the tank, it should be separated from the concrete surrounding.

Ventilation

Before installing the tank, care has to be given on how to provide adequate ventilation across the plant. As each site is different we can offer the following advice as guidance only (see BS8301, BS6297 and Building Regulation Section H for further details). Ensure that an existing vent stack is in place or is supplied to the building serving the treatment plant.

Clenaflo ASP O&M Issue G JAN08.doc

General Installation Procedure

Installation procedures must be in accordance with the Health and Safety at Work Act 1974, and other relevant legislation. Your procedures must also align with good building practice.

This procedure is issued as a guide only. Conder accept no liability for incorrectly installed units. If the customer has any concerns then a suitably qualified groundworker who has full access to all site conditions should be consulted.

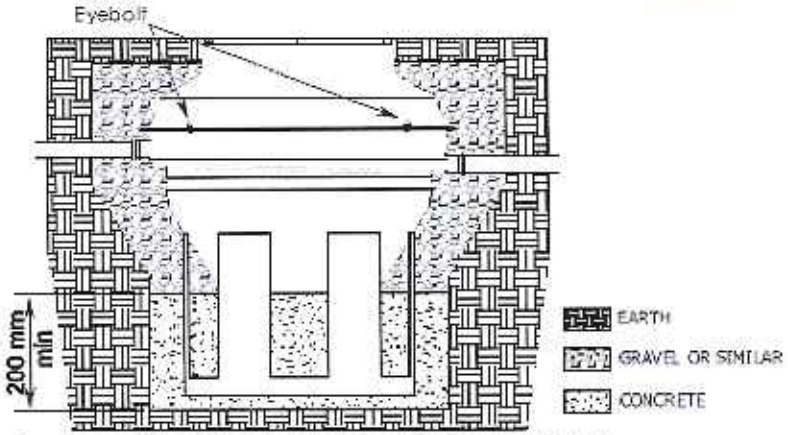
During installation it is important to check that the treatment plant remains level across all planes. The performance of a mis-aligned unit may be affected.

1. The installer must determine the existence, or otherwise, of a water table taking into account the conditions at the time. Excavate to the tank dimensions allowing a minimum clearance of 250mm between the tank and the sides of the excavation. The depth of the excavation will be determined by the inlet/outlet invert levels and the tank dimensions. The base of the unit should sit on a firm levelled surface. ***Important – the base should be level across all planes***. Care should be taken not to dig too deep a hole.

2. For deep invert installation, install the plant as below and consult appendix.

3. If the installer is confident that the water table, at any time of the year, is not an issue then the back fill material may be sand, small rounded gravel or other such inert material at the discretion of the installer. The plant must be anchored by means of a minimum 200mm deep lean mix concrete poured over and between the base framework of the treatment plant. ***Important – check that the treatment plant is level across all planes during installation.*** If in doubt then assume a water table will be present and install and backfill appropriately.

4. It is recommended that the hole is excavated to a diameter of 1.9m – 2.0m. Measure approximately 850mm from the bottom and widen the hole to a diameter of 2.5m – 2.6m. (see table on page 9)



5 It is suggested that the inlet and outlet connections are temporarily blanked.

6 The eyebolts can be used to lift the plant slowly into the hole. The plant should have no water in it at any stage when it is being lifted.

7 Continue checking the level of the plant. Ensure the inlet and outlet connections of the unit are in alignment with the incoming and outgoing sewer connections. Consult local building regulations to clarify inlet and outlet gradients and BS6297.

8 Backfill with your chosen method, filling internally at the same rate with water to the same depth as the back fill and continue to check the plant remains level. Continue to add water and backfill at the same rate to 250mm below the inlet/outlet pipes.

9 Check the plant is level and connect the inlet and outlet connections, first removing the temporary blanks.

10 Backfill up to a minimum of 50 mm below the access cover which must be exposed at all times. Connect the air hose to the compressor with a jubilee clip and to the connection in the tank.

11 The authorities will probably insist upon an effluent sampling point downstream of the treatment plant, for which Conder can supply a Sample Chamber. Please contact Conder on 0870 264 0004 for details.

Blower housing installation.

1 The air compressor is supplied in a green housing which will need a 13 amp single phase electrical supply. The housing should be within 10 metres of the treatment plant to allow the air hose to connect to the treatment plant.

2. It is important <u>not</u> to locate the housing in direct sunlight, a shady place is preferred as this will extend the life of the compressor. We strongly recommend that an outside building or garage is used with plenty of space around the housing.

3. The Housing needs to be placed on a firm base.

4 If the housing has to be installed outside then we do not recommend it should be done in a flower bed or where soil is exposed. Plants must not block the ventilation around the lid of the Housing or cover the dome on the top. Pollen and dust may require the filter on the compressor to be cleaned more often.

5. Note: if the compressor overheats due to poor installation it may invalidate the warranty.

6. Access to the housing is required for periodic maintenance. Locating the housing away from areas that may flood is essential.

7 The air hose (10m supplied) needs to be placed in a duct (typically at least 50mm diameter hard plastic pipe) so that the air hose is not squashed or bent. When the air hose needs replacing, having it in a duct enables easy replacement.

8. Do not forget to place a draw string in the duct.

9. Cut a hole in for the duct pipe in the upper lid, in the flat section above the rim that joins the lower and upper parts of the tank, together. Slide the duct through the hole allowing 50mm to project into the inside of the tank. Seal the gap between the duct pipe and the tank with a suitable silicone or acrylic sealant.

10. The other end of the duct should finish by the housing.

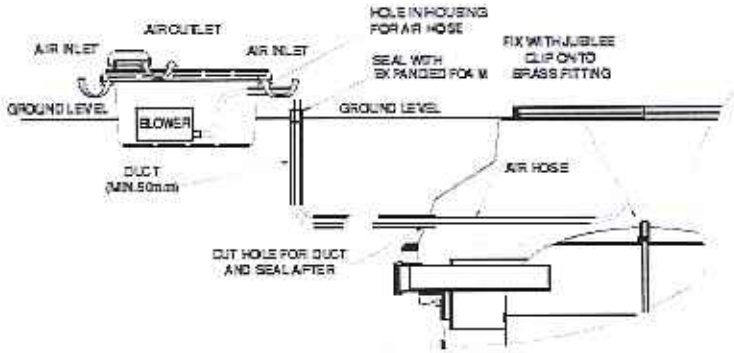
11. Drill a hole in the housing just larger than the diameter of the air hose.

12. Pass the air hose from the treatment plant to the compressor.

13. Secure one end of the air hose to the connection in the treatment plant with a jubilee clip.

14. Check that the air hose is not bent, kinked or squashed and then connect the hose to the compressor with a jubilee clip.

15. Seal the ducts with suitable expanding foam to stop rodents or insects entering the duct.



Electrical Installation

In order to achieve a safe and cost effective installation, it is not possible to state a specific installation configuration that would suit all sites. The selection of current protection devices must remain the responsibility of the installer as the person qualified to assess site conditions and supply configuration. It is therefore imperative that electrical installation of this equipment is entrusted to a fully qualified electrician.

When installing the electrical supply the following points should be considered:

1. The supply to the unit should be provided by a dedicated circuit via isolation and protection devices consistent with the requirements for fixed equipment and in accordance with the latest regulations issued by the Institute of Electrical Engineers.

2. The supply to the unit should be an independent single phase 13-amp supply that can be isolated and has some form of protection.

Failure to comply with the following could result in the invalidation of warranty:

3. All connections to the compressor should be made via the enclosure using correctly sized and rated glands. Ensure the glands (supplied by others) and ducts are sealed to prevent the ingress of moisture and rodents.

4. When drilling the housing, care must be taken to prevent the ingress of swarf into the electrical components, air line or compressor.

Start-up and Commissioning

The unit MUST be commissioned before sewage is allowed to enter the system. Electrical connections and cabling should be checked by a qualified electrician.

Check that the air line from the Compressor to the plant is unobstructed ☐

Ensure there is no dirt or materials in the tank. ☐

Ensure the unit is filled with clean water and there is a discharge from the outlet. This is best done by using a hosepipe in the inlet manhole or by running several taps in the connected household(s). ☐

Check the electrical supply has been installed by a qualified electrician ☐

Switching the Isolator to the ON. Check the aeration pattern in the bio-zone ☐

Checked by.....

Signature..... Date.....

The Treatment Plant is now operational. However, the process relies on the growth of micro organisms in the Biological Zone. The time taken for these naturally occurring organisms to develop is dependant on temperature and is typically 8 - 10 weeks. However this may be up to six months in winter. When the biology has 'matured' in this way, the treatment process will be completely established. During this time, do not allow any strong cleaning agents or bleaches to enter the system.

Shutdown Procedure

Temporary absence of flow will not be detrimental, as the plant will continue to recycle the activated sludge within the system. However, in circumstances where the flow may be interrupted for more than **2 MONTHS**, the plant should be shutdown by the following procedure

De-sludge the system in accordance with the instructions in the Appendix C section of this manual. ☐

Refill the system with clean water as described on previous page. ☐

Switch off the mains supply to the blower. ☐

WARRANTY

5 year Parts and Workmanship guarantee on the Blower and Plant respectively. The Blower supplied with your Treatment Plant contains serviceable parts, these MUST be replaced in line with the maintenance guide supplied by a qualified person. Failure to comply with the above Terms and Conditions will invalidate the warranty. Proof of purchase of parts and servicing MUST be retained in the event of any warranty claim.

Approved Service Specialists: Hydroserve (Tel: 0870 169 9007).

Date replaced.....

Signed:.....

Stamp

Maintenance Schedule

Weekly Inspections

- Check that the compressor is operating by listening for a gentle hum.
- Check the final effluent discharging from the unit at the sample point. If it is cloudy or contains suspended particles contact your maintenance provider.

6 Monthly Check (or as stated otherwise)

We recommend that the unit is checked by an approved service technician at the first 6 monthly check.

As for weekly, plus:

- Any signs that the compressor is overheating.
- Air Leaks and excessive heat in the air hose, and the fittings are secure.
- Is there any evidence of water or moisture entering the housing.
- Check the aeration chamber has a vigorous air supply.
- Are there any foul odours when the lid is lifted.

If this is the first 6 month check, then carry out the annual service at the same time.

Year service

Conder recommend that the yearly service be carried out by **an approved service technician**.

As for 6 monthly, plus:

- Obtain a sample of the final effluent to check that the plant is operating correctly. This may require introducing a small flow into the treatment unit to obtain the sample. **It is important that this procedure is done before anything else.**
- If the discharge is into a watercourse such as a stream or ditch then check the vicinity for any visible signs of pollution. If the discharge is to a drainage field then check that as far as possible the effluent from the plant is soaking into the ground.
- The activated sludge should be inspected to determine the settle ability of the sludge see (appendix C). The settle ability test will determine when the plant needs emptying of sludge (de-sludging).

- Inspect the top surface of the biozone for any grease balls, soap suds, foaming or any non biodegradable materials. These materials are best removed from the plant and correctly disposed of.
- Check that the air supply is operating in the correct pressure range of 300mb +/- 50mb. The compressors should be checked : see appendix B.
- Remove any scum from the outer clarification chamber and place it carefully in the inner bio-zone chamber.
- Check that all the airways to the housing are clear and the compressor has adequate ventilation.
- Clean the blower air filter.
- Check that the air pipe from the compressor to the plant is not blocked , crushed or kinked.
- Ensure that all the lids and covers are correctly secured before leaving site.
- Check that the air diffuser is operating by inspecting the bio-zone turbulence. We recommend that the diffuser is removed and cleaned annually as this may block in hard water areas with scale.

Every 2 ½ years

- De-sludge the plant.
- Carry out maintenance on the blower unit in accordance with the manufacturer's instruction. (the diaphragm should be replaced every 2 ½ years).

Appendix A: ASP Specification & CE mark

Clerette CT Unit	ASP 06	ASP12	ASP 16	ASP 20
Design Loadings (max.)				
Population Equivalent (P.E.)	6	12	16	20
Hydraulic Load (l/day)	1200	2400	4000	4800
Organic Load (gBOD/day)	360	720	1200	1440
Dimensions	See page 9 for dimensions			
Drain inlet invert (m)	See page 9 for dimensions			
Depth from inlet invert (m)	See page 9 for dimensions			
Pipe work Fitting	100 Socket			
Approximate Weight (empty) (kg)	200	250	270	300
Blower				
Power consumption	See page 9 for details			
Power Supply	Single Phase 240V 50Hz			

Tank

Material Specification:	Glass Reinforced Polyester Resin with interior and exterior Gel Coat - 1: 2.5 Glass/Resin Ratio
Colour:	Canary Yellow BS 4800

Appendix B: Compressors details

Refer to the blower manual supplied.

Appendix C: Settle ability test & emptying sludge

Settle ability test.

Take a turbidity tube or transparent 1 litre cylinder (Jar can be used) with 10 equal divisions up the vertical side. Then follow the next sequence.

A) Fill the tube with the liquor taken from the central aerated biozone.

B) Allow to stand and observe over a period of 30 minutes.

C) The sludge should settle into a layer at the bottom and above the sludge layer should be clear liquid.

D) In ideal circumstances the colour of the sludge should be brown towards a coffee colour and settlement should usually occur within 10 to 15 minutes. The supernatant (clearer liquid above the sludge) should not be cloudy or have any large suspended particles in it. There should be no offensive odour.

Settlement test trouble shooting guide.

Colour Grey: There may be too much laundry effluent going into the plants. Ask the residents to check they are not putting in too much detergent. Check that the Laundry use is not all on one day of the week and it is spread out. Try to limit the use to 1 to 2 clothes washings per day. Another possibility is that surface water from the roof etc. is entering the plant.

White deposits in the activated sludge. These are probably due to grease and fat getting into the plant, which should be discouraged. The deposit may form into balls.

Light Brown: This is due either to the plant just starting up or that it is lightly loaded. The settlement may be poor and "fluffy" in texture. Do not confuse the lack of settle ability with the need to de-sludge the plant. In a lightly loaded plant this is not the right action to take.

Black colour: The plant may have some septic sludge in it. In this case the best solution is to have the plant de-sludged.

No clear supernatant. If there is only a small amount of clear liquid above the sludge layer, 8 or 9 if the container is divided into 10 parts vertically, then the unit needs emptying of sludge.

A record of the test and the results should be kept.

Emptying the plant of sludge (de-sludged)

Note: If a water table is present or local flooding has taken place then we recommend that the plant is not emptied at this time.

The procedure is as follows:

A) Turn off the compressor.

B) Remove the access cover above the plant.

C) If access is obstructed remove the tray with the compressor in.

D) The hose removing the sludge should be gently lowered into the plant taking care not let the hose go down the central draft tube.

E) The hose should rest on the bottom of the cone.

F) The liquid should then be removed form the tank. When the level drops the scum layer from the clarifier will be removed. It may require a fresh water hose to help it flush away and to clean up the plant.

G) It is recommended that the plant be filled as soon as possible with water or sewage from the serving properties.

Appendix D: Fault finding

Symptom	Cause	Action
Strong Odour	Excess chemicals in the plant	See appendix E
	Excessive laundry use	See appendix E
	Carry out a settlement test	See appendix C
	Drains inadequately venting	Check that a high level vent is fitted to the house and is working correctly
	Nothing obvious can be found	Carryout 12 month service and correct any faults found.
	Lack of aeration	Check Compressors
Compressor stopped	Switched off at the mains isolator	Switch on
	Power Failure	Check the supply board for a trip or fuse.
Compressor is running but no turbulence	Air pipe has been blocked or squashed or has a problem such as the hose is split	Inspect pipe and check all joints for any leaks or splits
Poor final effluent	Check the compressor is operating and delivering air to the bio-zone	Check and repair any faulty parts
	Carry out a settlement test in appendix C	Follow the fault finding guide in appendix E
Bio-zone chamber has grey colour	Check there is good supply of air to the plant.(turbulent pattern in Bio-zone)	Check compressors are operating correctly
Bio-zone has greyish to black colour and an offensive odour	Excessive laundry use	See do & don'ts section of this manual, laundry detergents

Bio-zone has a very light brown colour and has few suspended solids. White suds.	Lightly loaded	If plant has just started or the effluent quality is OK no further action. Otherwise contact Conder for advice Check that no surface water is entering the plant.
Bio-zone is black in appearance	Plant is organically over-loaded Not enough air is getting to the bio-zone	Check load to plant or if a de-sludge is required. Check compressors and air lines
Grease balls in the bio-zone.	Too much grease in effluent Excessive laundry use	Reduce grease in kitchen waste See laundry section of do & Don'ts.
Final effluent contains many Solids.	Carry out 12 month service	Only empty the plant of sludge if required

Appendix E: Household practices: Do & Don'ts

Introduction

When we take a bath, put the washing machine on or flush the toilet few of us stop to consider what happens to the waste water and sewage. It simply goes down the drain or waste pipe and is no longer our concern. But if your drains lead to a packaged treatment plant, particularly one using a biological treatment system, then it's worth paying some attention to what happens next.

If you don't you could easily end up with a treatment plant which is not working efficiently and eventually run the risk of polluting your local environment and even facing possible prosecution as a result.

What is sewage?

Sewage is made up of not just the organic waste from toilets but also the chemicals and waste water from everyday activities such as washing, cleaning, cooking and washing clothes and dishes. The sewage from bathrooms, kitchens and toilets collects in a series of drains that feed to a sewer. In most households or commercial premises the sewage flows away through a series of sewers and is treated at a large-scale sewage treatment works. However, for houses and premises in remote or isolated locations where no mains drainage is available, other options such as cesspools or septic tanks and treatment plants have traditionally been used.

conder PRODUCTS

Do's and Don'ts

Do:

Weekly inspections

- Check that the compressor is operating by listening for a gentle hum.
- Check the final effluent discharging from the unit at the sample point. If it is cloudy or contains suspended particles contact your maintenance provider

Think before you put **anything** down the sink, toilet or drains

Tell your guests/visitors/staff that you have a specialist sewage treatment plant and tell them how they can avoid harming it.

Read the label and use the **manufacturers' recommended doses** for all household cleaning products

Use cleaning products little and often so the plant isn't overloaded

Spread your clothes washing throughout the week

Stick to the same washing, dishwasher powders and other cleaning products - the bacteria in the plant will work more efficiently with products they are used to

Use liquid cleaners for clothes washing and for dishwashers, use sparingly

Clenaflo ASP O&M Issue G JAN09.doc

conder PRODUCTS

Don't:

Spring clean and use large amounts of cleaners and chemicals in one day

Have a "washing day" - spread your washing throughout the week

Use household bleach and other strong chemicals indiscriminately

Keep changing your brands of household cleaners and washing powders

Tip bottles of medicine, mouth wash etc. down the toilet

Put sanitary towels, tampons, disposable nappies, baby wipes, cotton wool, incontinence pads etc down the toilet

Over flush the toilet unnecessarily - use a water saving flush if it's fitted

Pour fat or grease from cooking down the sink or drains

Change the oil in your chip pan and pour it down the sink

Use your waste disposal unit like a rubbish bin - use it sparingly

Pour garden chemicals or car engine oil down the drains

So how should I use cleaning products ?

Laundry detergents

Firstly you need to find out the level of hardness of your local water (see section on water softeners). Once you know how hard or soft your water is you can read the label on your laundry detergent and decide how much to use. The aim is to minimise the amount of detergent you use to limit its impact on the treatment plant whilst ensuring you get the best results from your wash.

- It is recommended that you use washing liquids in an in-machine ball dispenser, rather than powders. You get the best results from having the liquid in the heart of the wash, a liquid is already in suspension and therefore "gets to work" quicker and it reduces the amount of product left in the washing machine dispenser or lost on its journey to the drum.
- For normal "coloured" washes try to use a washing product without added bleach. For white washes add a separate bleach (such as the one produced by Ecover).
- Read the label and stick to the dosage recommended for the level of hardness of your water and to match the level of dirtiness of your washing. This is particularly important if you are using "concentrated" or "compact" liquids or powders because it is easy for your hand to slip and for you to use far too much.
- Try to ensure you have a full load each time or use an energy-saving "half load" programme if you have one. Don't be tempted to overload as this will not produce a good wash and could damage your machine in the longer term. A correctly loaded machine should have enough space for you to put your hand in to place the liquid ball on top of the washing.
- Normal wash temperatures, with the occasional very hot or "boil" wash, are not a problem for the treatment plant. However, it is not a good idea to do regular very hot washes as this could raise the plant temperature and affect the bacterial process.
- Your washing machine produces the largest quantity of waste water your treatment plant has to deal with. Don't have a "wash day" as this could produce too much water for the plant to handle in one go. Try to spread your washing throughout the week.

- ## Dishwasher products

Your dishwasher cleaner is probably the most "aggressive" cleaning product in your household. It needs to be to make greasy plates sparkling and "squeaky" clean as the advertisers promise. **It is therefore all the more important that you stick carefully to the manufacturers' recommended dosage.** It is recommended that you use a liquid, rather than powder or tablet cleaner as these are understood to be more efficient.

Most dishwashers use salt as a water softener - try to ensure the salt dispenser is always topped up because soft water increases the efficiency of the cleaning product and enables you to use only the minimum dosage of cleaner.

German dishwasher manufacturers, who pride themselves on their low-water energy-saving machines, recommend that you **do not rinse** your washing up under the hot tap before putting it in the dishwasher. Although this is a traditionally common practice dishwashers and their cleaning products are now so effective that this is unnecessary - you are merely wasting energy and hot water.

- ## Other cleaning products

It is most important that you always follow the manufacturers' recommended dosage on all household cleaning products. Read the label - don't be tempted to use guesswork. Try to avoid using large amounts of cleaning products in one go. If you follow the recommended dosage and use only small quantities on a regular basis they should not have any adverse effect on the treatment plant. However, a day's spring cleaning using massive amounts of household cleaners and disinfectants indiscriminately will affect the efficiency of the plant and destroy some of the bacteria. If the bacteria are harmed or killed they will eventually breed and come back but in the meantime your plant would not be operating for days - depending on the amount of chemicals used.

- ## Water softeners

To reduce the quantity of laundry detergents you use you need to find out how hard your water is. **You could phone your local water company** (see Yellow Pages). They would be able to tell you where your water comes on the hardness scale.

The hardness of water is determined by the amount of calcium and other minerals it contains. Hard water is rich in calcium which reduces the effectiveness of soap and detergents. There is a scale of water hardness in England: 0 - 5° very soft, 5 - 10° soft, 10 - 15° medium hard, over 15° hard. In line with EC recommendations, all fabric washing products now carry advice on how much to use according to these levels of water hardness. Once you have identified where your water fits on the scale you can work out exactly how much detergent to use. If in doubt you could phone the manufacturer for advice - most offer a customer-care phone service.

But to help you reduce the quantity of detergent still further - and save you money - you could use a separate water softener.

- **Commercial Water Softeners**

Water softeners that involve a "salt" regeneration process can be very harmful to biological treatment systems. As the softener regenerates a very concentrated salt solution is used. This will be toxic to the micro-organisms in your biological sewage treatment plant. Domestic water softeners for single household should not present a problem. Please contact Conder Products if in doubt.

- **Waste disposal units**

These do not inhibit the micro-organisms, but, depending on use, they can present the treatment plant with considerable extra load. Much better to compost your vegetables peelings etc - its cheaper and more environmentally friendly

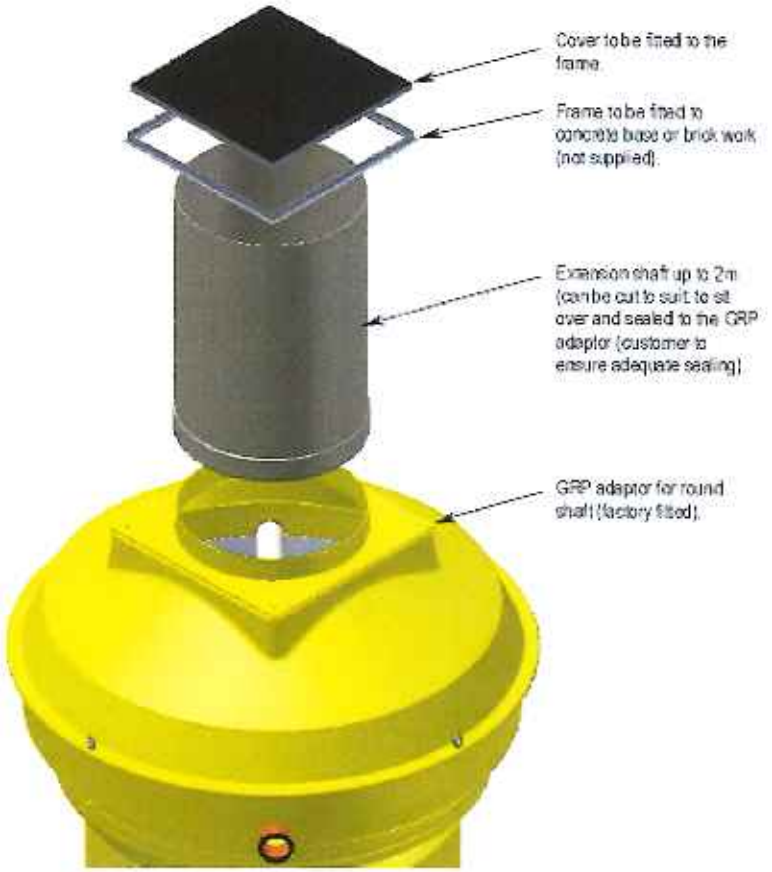
• Harmful substances

The following list consists of known process inhibitors, though not limited to. Under no circumstances should they enter the treatment plant:

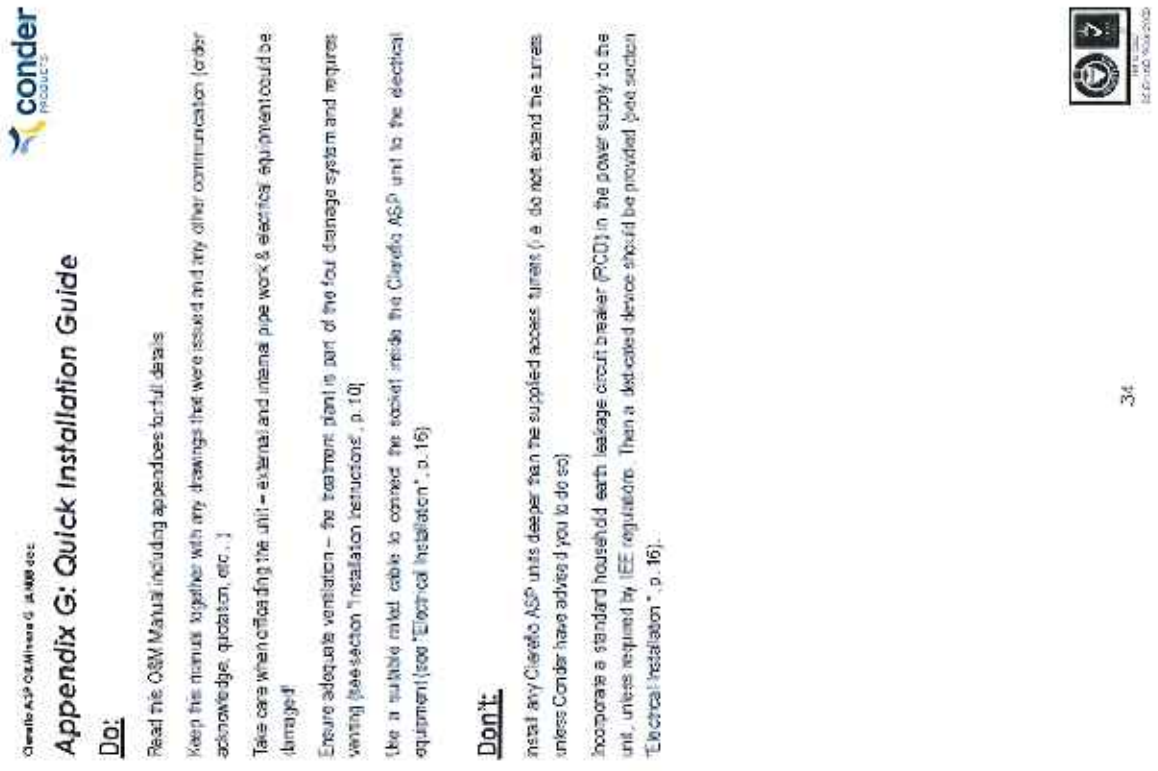
Joyes Fluid; medicines; cooking oil or melted fat e.g. from a grill tray or chip pan; motor oils or other car products; garden chemicals such as weed killers or fertilisers; DIY products such as paints, white spirit, paint thinners and other solvents, glue, antifreeze, engine oil dairy waste.

Just think before you throw any chemicals into the system - if in doubt always dispose of it elsewhere.

Appendix F: Extension kit install



Manufacturer's information



conder PRODUCTS

Clarefio ASP O&M Manual G (A1400.doc

Appendix G: Quick Installation Guide

Do:

Read this O&M Manual including appendices for full details

Keep this manual together with any drawings that were issued and any other communication (eg acknowledge, quotation, etc...)

Take care when offloading the unit – external and internal pipe work & electrical equipment could be damaged!

Ensure adequate ventilation – the treatment plant is part of the foul drainage system and requires venting (see section "Installation Instructions", p. 10)

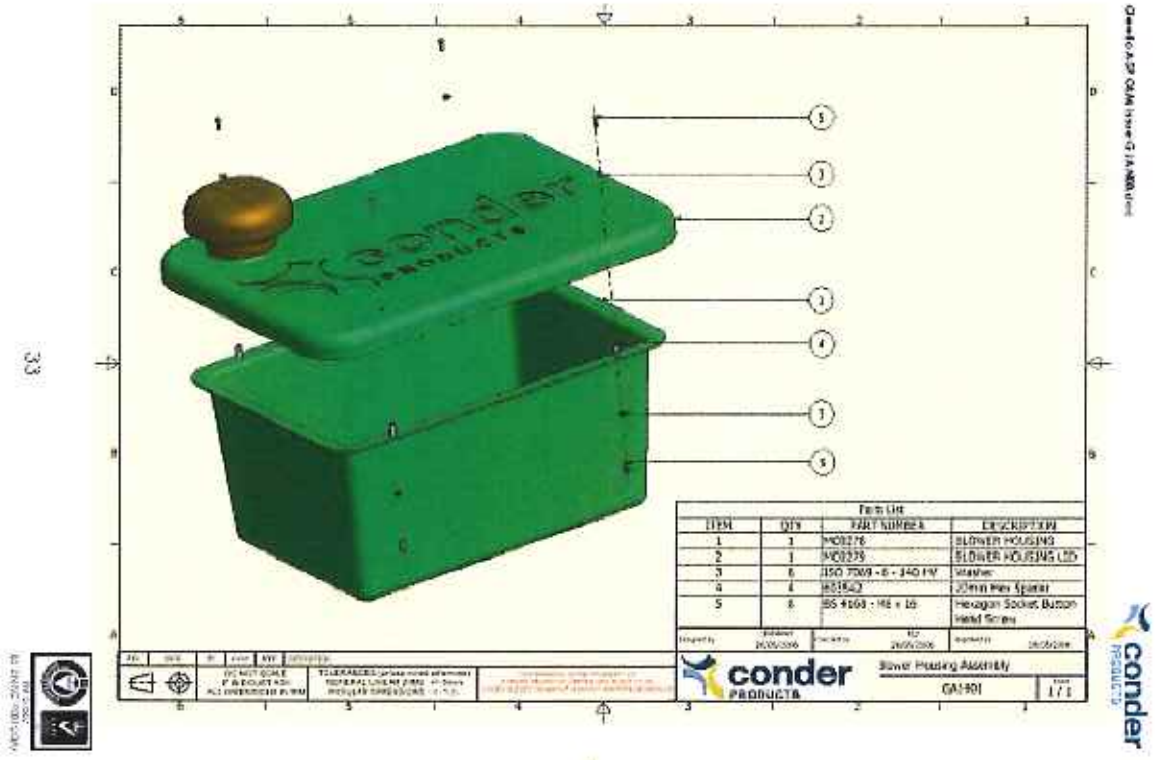
Use a suitable mixed cable to connect the socket inside the Clarefio ASP unit to the electrical equipment (see "Electrical Installation", p. 16).

Don't:

Install any Clarefio ASP units deeper than the supplied access risers (i.e. do not extend the risers unless Conder have advised you to do so)

Incorporate a standard household earth leakage circuit breaker (RCD) in the power supply to the unit, unless required by IEE regulations. Then a dedicated device should be provided (see section "Electrical Installation", p. 16).

34



Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	A00276	BLOWER HOUSING
2	1	A00279	BLOWER HOUSING LID
3	6	ISO 7089 - 6 - 140 HV	Washer
4	4	A01642	20mm Hex Spacer
5	6	BS 4168 - 46 x 16	Hexagon Socket Button Head Screw

conder PRODUCTS

Blower Housing Assembly

GA1401

1 / 1

33

Clarefio ASP O&M Manual G (A1400.doc