

27 April 2010

## COLLECTED RESULTS OF EN TESTING

(Based on the test report of 26 April 2010, SYKE-2004-A-3-A4/37)

### Clewer septic tank 5m<sup>3</sup> + Clewer 800 S (= Clewer\* wastewater treatment plant) Clewer Oy

The Finnish Environment Institute (SYKE) has carried out initial type testing of the Clewer wastewater treatment plant in accordance with the standard EN 12566-3:2005/A1:2009 (CEN), including tests in accordance with Annexes A (watertightness) and B (treatment efficiency). This report includes the collated results of treatment efficiency testing. Testing was performed at SYKE's Suomenoja Research Station at Hyljeluodontie 5, FI-02270 Espoo, Finland. The watertightness test was performed and approved in March 2008.

SYKE has been found to fulfil the requirements of reliability and independence, as well as other general requirements set by the Act on the Approval of Construction Products (230/2003) for a body involved in assessing the conformity of products for CE marking, including the competence to carry out initial type testing of equipment for the treatment of domestic wastewater.

Clewer\* wastewater treatment plant is a biological-chemical continuous treatment plant made of polyethylene that is designed to treat all domestic wastewater. According to the manufacturer, the nominal hydraulic daily flow of the treatment plant is 1.2 m<sup>3</sup>/d and the nominal organic load 350 g BOD<sub>7</sub>/d.



**\*\*NOTE!** In addition to Clewer 800 S, the biological part shown in the picture, the treatment plant includes a septic tank (5m<sup>3</sup>).

### Test schedules

Sequence	Flow l/d	Duration weeks	Samples
1 Biomass establishment	1200	X	X
2 Nominal 100 %	1200	6	4
3 Underloading 50 %	600	2	2
4 Nominal 100 % + power breakdown 24h	1200	6	5
5 Low occupation stress 0 %	0	2	-
6 Nominal 100 %	1200	6	3
7 Overloading 150 % *	1800* / 1200	2	2
8 Nominal 100 % + power breakdown 24h	1200	6	5
9 Underloading 50 %	600	2	2
10 Nominal 100 %	1200	6	3
* 150% overload is organised for a duration of 48 h at the beginning of the sequence		38+X	26

### Treatment efficiency during nominal loading, underloading, and overloading

Parameter	Nominal* 1200 l/d	Underloading** 600 l/d			Overloading*** 1800 l/d	
Total chemical oxygen demand COD (%)	92	93	94	94	95	92 88
Total biological oxygen demand BOD (%)	95	96	98	96	97	88 91
Suspended solids SS (%)	93	95	96	94	96	92 87
Total nitrogen N <sub>tot</sub> (%)	65	83	87	58	55	55 60
Total phosphorus P <sub>tot</sub> (%)	89	85	88	92	93	83 86
* the mean value of 20 samples						
** 4 composite samples						
*** 2 composite samples						

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**The mean values for influent and effluent loads as well as influent and effluent concentrations**  
 (During nominal sequences 2, 4, 6, 8 and 10)

Parameter	BOD <sub>7</sub>	COD <sub>Cr</sub>	SS	P <sub>tot</sub>	N <sub>tot</sub>	NH <sub>4</sub> -N	pH	Wastewater temperature °C
The mean value of the influent load (g/d)	364	887	444	12,0	77	65	-	-
The range of variation (g/d)	240 - 468	588 - 1200	312 - 588	7,8 - 16,8	46 - 101	35 - 89	-	-
The mean value of the influent concentration (mg/l)	303	739	370	10,0	64	54	7,6	13,0
The range of variation (mg/l)	200 - 390	490 - 1000	260 - 490	6,5 - 14,0	38 - 84	29 - 74	7,3 - 7,8	9,0 - 16,1
The mean value of the effluent load (g/d)	18,1	66	29	1,3	27	7	-	-
The range of variation (g/d)	3,6 - 30,0	36 - 102	10 - 64	0,3 - 2,8	11 - 48	0,3 - 18	-	-
The mean value of the effluent concentration (mg/l)	15,1	55	24	1,1	22	6	6,4	14,6
The range of variation (mg/l)	3,0 - 25,0	30 - 85	8 - 53	0,26 - 2,3	10 - 40	0,3 - 15	5,3 - 7,1	8,1 - 18,0

**The use and maintenance of the Clewer\* wastewater treatment plant and observations during testing**

The operation of the Clewer\* wastewater treatment plant was monitored regularly and it was used and maintained in accordance with the manufacturer's instructions. The normal use and maintenance operations of the Clewer\* wastewater treatment plant are the removal of sludge, the addition of a precipitating chemical, and regular monitoring of the plant's operations by observing the control station monitor, indicator lights, and pumps. The treatment plant includes a 30-litre tank for the precipitating chemical, which with the test loading needs to be filled every 4 months. During the testing, the average consumption of the chemical was 0.181 l/m<sup>3</sup>. The septic tank was emptied once during the test, roughly 8 months after the test began.

The electrical equipment of the Clewer\* wastewater treatment plant include the fans (2) and the recycling, extraction, surface sludge, and chemical pumps. With the test flow, the treatment plant used 3.77 kWh/day on average, which means that the annual electricity consumption is 1 376 kWh.

The treatment plant started normally after power breakdowns that were part of the testing programme (sequences 4 and 8). No overflows were observed during the weekly peak flow discharges (= 400 l of wastewater during 6 minutes) that were conducted during normal loading. Operations started normally after a two-week low occupation stress (sequence 5), and no significant weakening was observed in treatment efficiency.

A final inspection was conducted on the plant once the testing was completed, in which the condition of the tanks, connections, and equipment was checked. The treatment plant was found to be in good order, with no deviations or weakening of condition.

**Verified:**

27 April 2010 Helsinki

Date and time



Responsible manager of the testing, research engineer Riikka Vilpas, SYKE

