Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services

Paul R. LePage, Governor Mary C. Mayhew, Commissioner

Department of Health and Human Services
Maine Center for Disease Control and Prevention
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Tel. (207) 287-5672 Subsurface Wastewater Unit Fax (207) 287-4172

November 27, 2012

Winkler Aqua-Service, Ltd.
Attn.: Joerg Winkler
16 carl Avenue
Newmarket, NB, E6K 2W9
Canada

Subject: Product Registration, Stahlermatic Biological Solution for Wastewater (BSW) STM 8 and AQUA percolation modules

Dear Mr. Winkler:

The Division of Environmental Health has completed a review of a registration application for your company's products. This information was submitted pursuant to Section 6.HH of the Subsurface Wastewater Disposal Rules for registration for use in Maine.

The Stahlermatic BSW STM 8 consists of an advanced treatment unit utilizing both aerobic and anaerobic processes. The device follows a conventional septic tank, from which it receives effluent. The device is approximately spherical in shape. The device contains a rotating biological contactor which is moved by a compressed air stream. The compressed air stream also aerates the septic tank effluent received from the preceding septic tank.

The disposal area is comprised of AQUA percolation modules. Each module is comprised of seven 12 inch by 48 inch by 16 inch tall devices arranged in an 8 foot by 6 foot rectangle, with one device bisecting the center of the rectangle. The space inside the module is filled with ½ inch compacted gravel. Each device is comprised of plastic cages with walls resembling grates, wrapped in non-woven geotextile fabric. The anterior device in a module is configured with a fitting for a 4 inch diameter inlet pipe. The posterior device in a module is configured for a 4 inch diameter vent pipe. A single module is rated at 72 square feet of effective disposal area and is intended specifically for use with the Stahlermatic BSW STM 8.

According to the information you provided, the Stahlermatic BSW STM 8 and AQUA percolation modules have been certified by the ***Prufinstitu fur Abwassertechnik GmbH*** and the ***Deutsches Institut fur Bautechnik*** (both located in Germany). The Department construes this as the functional equivalent of meeting ANSI/NSF Standard 40 for residential wastewater treatment systems.

On the basis of the information, the Division has determined that the Stahlermatic BSW STM 8 and AQUA percolation modules are acceptable for use in the State of Maine, provided that they are installed, operated, and maintained in conformance with the manufacturer's directions.

Because installation and owner maintenance has a significant effect on the working order of onsite sewage disposal systems, including their components, the Division makes no representation or guarantee as to the efficiency and/or operation of Stahlermatic BSW STM 8 and AQUA percolation modules. Further, registration of these products for use in the State of Maine does not represent Division preference or recommendation for this product over similar or competing products.

If you have any questions please feel free to contact me at (207) 287-5695.

Sincerely,

James A. Jacobsen

James A. Jacobsen
Project Manager, Webmaster
Division of Environmental Health
Drinking Water Program
Subsurface Wastewater Unit
e-mail: james.jacobsen@maine.gov

/jaj

xc: Product File

product review
recd 11/19/12
Jim

Maine Department of Health and Human Servi
Bureau of Health
Division of Health Engineering
Wastewater and Plumbing Control Program

APPLICATION FOR REGISTRATION OF EXPERIMENTAL SYSTEM/INNOVATIVE TECHNOLOGY OR ONSITE SEWAGE DISPOSAL SYSTEM PRODUCT

Please complete the following Sections. Please print or type.

Applicant

Winkler Aqua-Service Ltd.
16 Carl Ave
Newmarket, N.B.
E6K2W9

Company Name: _____
Contact Person: Joerg Winkler
Address: _____
Town/City: _____ State/Province: _____ Zip Code: _____
Country: Canada
Telephone: 506-363-2111 e-mail: aqua.winkler@gmail.com

Product

Product Name: Stachlermatic / BSW
Model: STM 8

Product Classification (choose one)

Primary or Secondary Treatment Unit

[ ] Septic Tank [ ] Extended Aerobic Treatment Unit [ ] Recirculating Aerobic Unit

[ ] Aerobic Fixed Film Unit [X] Other (specify) Aerobic and Anaerobic + Disposal System

Effluent Filter

[ ] Septic Tank Outlet Filter [ ] Post-Tank Filter [ ] Other (specify) _____

Disposal Device

[ ] Gravel-less Disposal Pipe [ ] Gravel-less Disposal Bed [ ] Chamber, Plastic

[ ] Chamber, Other [ ] Other (specify) _____

Miscellaneous

[ ] Pipe [ ] Effluent Flow Distribution Device [ ] Other (specify) _____

Claim

Describe the product's features (attach additional sheets if necessary).

The system consists of: 1. Septic Tank (according to Maine regulation), 2. Biological Tank (STM 8./BSW), 3. Aqua Percolation System

- for more information see attached documents

Describe the product's performance (attach additional sheets if necessary).

See attached PIA2007-010 document (European certification - similiar to NSF)

Has the product received National Sanitation Foundation or Canadian Standards Authority approval?

[X] No [ ] Yes (If "yes", enclose a copy of the certification.)

IMPORTANT NOTE!

Don't forget to enclose relevant product literature, engineering specifications, studies, and third party certifications with this application.

I, Joerg Winkler (print name), am the [ ] applicant [ ] agent for the applicant of the subject product.

I state that the information submitted is correct to the best of my knowledge and understand that any falsification is reason for the Department to deny registration for use of the product in Maine.

J. Winkler
[ ] Signature of Applicant
[ ] Signature of Agent for Applicant

11/18/2012
Date

PIA
Prüfinstitut für
Abwassertechnik
GmbH

STM Aquamatic GmbH & Co. KG

Bischofsweg 33
04779 Werfmsdorf

Datum und Zeichen Ihres Schreibens	Bei Antwort angeben Mein Zeichen	Telefon 0241 / 75082-20 Telefax 0241 / 75082-29	Datum
	Lan-Zim	+49 - 241 / 75082-21	21.08.2012

Percolation with drainage blocks after a small wastewater treatment plant by Aquamatic

Because the bacterial contamination in the effluent of the small wastewater treatment plant like for example the Aquamatic is considerably lower than in those of septic tanks, a percolation of wastewater out of small wastewater treatment plants with drainage blocks the bacterial contamination of the soil is to be considered inoffensive.

Generally the bacterial contamination in the effluent of a septic tank is 10^6-10^8 microbes/100ml. The bacterial contamination in the effluent of a biological small wastewater treatment plant is with a value around 10^3-10^5 microbes/100ml significantly lower.

We hereby confirm the evaluation of a practical 38-week treatment efficiency test of the small wastewater treatment plant Aquamatic of STM Aquamatic GmbH & Co. KG according to the standard EN12566-3.

With kind regards

Dipl.-Ing. Elmar Lancé

Anschrift
PIA GmbH
Geschäftsführung
Dr.-Ing.
Telefon
Telefax
E-mail
Internet
Amtsgericht Aachen
HRB
Bankverbindung

Winkler Aqua-Service Ltd.
Gunter Winkler BEng, President

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Winkler Aqua-Service Ltd.
Petra Winkler MBA, General Manager

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Email: aqua.winkler@gmail.com

Description of the AQUA Percolation System

as part of the residential Biological Solution for Wastewater (BSW) sewage purification system

Why to use AQUA percolation block modules?

Residential waste water discharged after treatment in the BSW Sewage Treatment unit is substantially cleaner than the discharge from a conventional septic tank. Floating solids are reduced by 95%, BOD reduction is around 93.7% and COD reduction is approx. 87.1% (data as per PIA test # 2007-101).

The pathogen count is reduced from between 10^6 and 10^8/100 ml down to between 10^3 and 10^5 /100 ml. (For details see PIA report dated Aug. 21, 2012). These reductions in solids reduce the tendency of the percolation areas being clogged over time, which in consequence allows to reduce the percolation areas in comparison to conventional septic fields.

The AQUA BLOCK percolation system is recommended for use in regions lacking municipal waste water infrastructure. Due to its high structural strength it can be installed in relatively low depth 16"– 32" below grade level, even underneath driveways. The percolation blocks are tested to take up to 80,000 lbs top load when installed at 32" below grade level or deeper.

Function of the AQUA block module

Waste water purified in the BSW unit is discharged into the percolation module, which is installed perfectly level, so the purified waste water distributes all across the percolation module evenly. The AQUA block percolation blocks are basically plastic cages with the dimensions of12" x 48" x 16". Their walls are strong grills of molded plastic with 90% openings < 1½". When installed the cages are wrapped in geo-textile to keep surrounding backfill out and to allow the purified waste water to percolate into the ground.

For design purposes only the side wall areas of the AQUA blocks are considered, leaving the remaining areas as a contingency reserve. 7 units of the AQUA block are assembled to form 1 percolation module (see drawing "Dimensions & Layout AQUA Percolation System").

Size Design

According to European Design criteria the following percolation areas are recommended depending on percolation capability of the surrounding soil:

1. **Gravel/Sand (= good percolation)** 1.0 - 1.5 sqm/person (10 – 15 sqft/person)
2. **Clay etc (= bad percolation)** 2.0 - 2.5 sqm/person (20 – 25 sqft/person)

The standard waste water for 1 person is rated at 150 L (40 US – gallons) per day

The following numbers **of percolation modules** are required depending on ***percolation capability*** of the surrounding soil and ***number of residents*** using the system :

- 1 module **1.** 72 sqft percolation area / 10 – 15 sqft/person => 5 - 7 persons /200-280 USG
  2. 72 sqft percolation area / 20 – 25 sqft/person => 2 - 3 persons /80- 120 USG

- 2 modules **1.** 144 sqft percolation area / 10 – 15 sqft/person => 9 – 14 persons / 360-560 USG
  2. 144 sqft percolation area / 20 – 25 sqft/person => 5 – 7 persons / 200 – 280 USG

- 3 modules **1.** 216 sqft percolation area / 10 – 15 sqft/person => 14 – 21 persons / 560-840 USG
  2. 216 sqft percolation area / 20 – 25 sqft/person => 8 – 10 persons / 320 -400 USG

- 4 modules **1.** 288 sqft percolation area / 10 – 15 sqft/person => 19 – 28 persons / 760- 1120 USG
  2. 288 sqft percolation area / 20 – 25 sqft/person => 11 – 14 persons / 440-560 USG

These numbers may require adjustment depending on local state/provincial/municipal regulations.

The side wall percolation area for 1 module is calculated as follows:
[2 x (6' + 8') + 4 x (4' + 2 ½')] x 1.33' high = **72 sqft of percolation area per module**

Location + Installation

The AQUA percolation system can be installed almost anywhere. The only pre-requisite is an area large enough to accommodate the required number of percolation modules as per design requirements. It is resistant against top load to allow full use of the surface area above it.

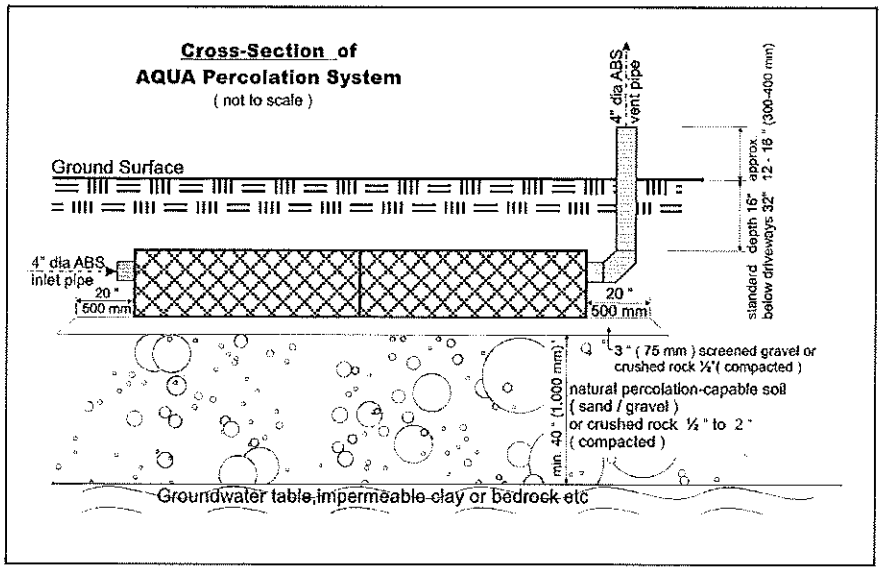
The AQUA percolation system can be adjusted to meet the requirements of an existing conventional septic field, if simultaneously a BSW purification unit is installed behind an existing septic tank.
AQUA percolation modules can be laid out in any number as needed per design criteria in sequence and connected by a 4" – 6" overflow/junction pipe. Each percolation module requires its own 4" vent pipe.

Each percolation module is supplied readily assembled and wrapped with geo-textile, so it just needs to be lowered onto the prepared, compacted and leveled 3" thick gravel bed. Proper leveling is important to assure that the purified waste water distributes evenly throughout the percolation modules.

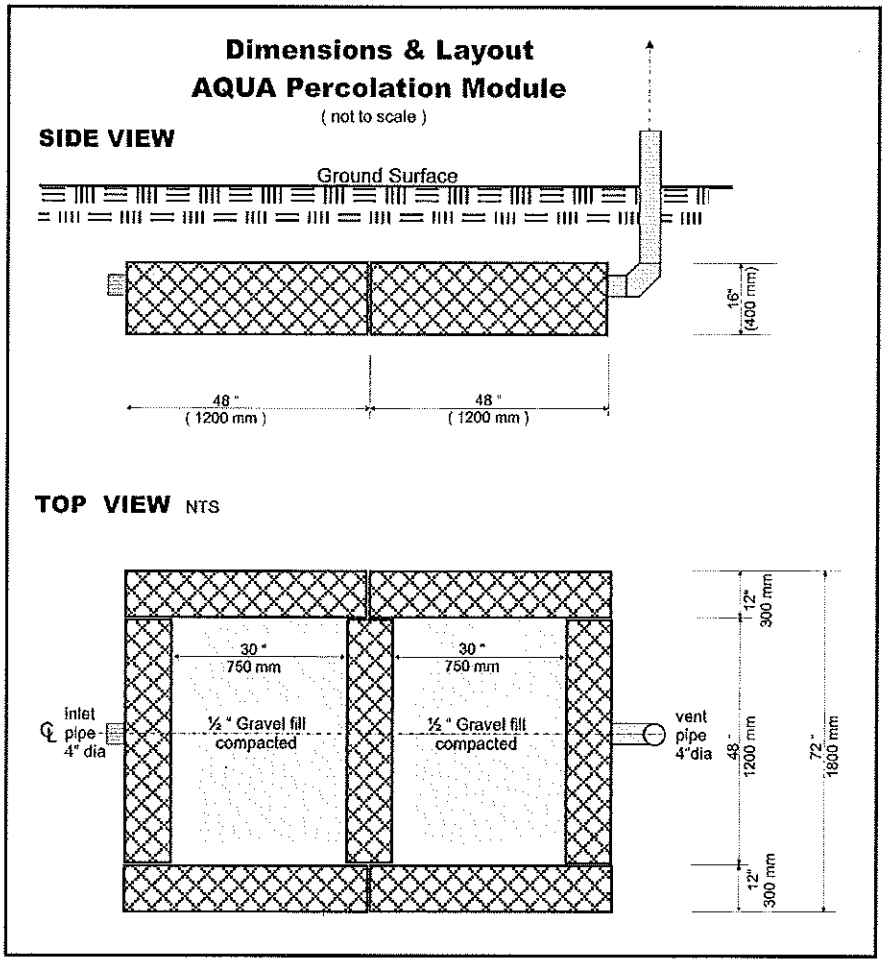
If more than 1 module needs to be installed in sloped terrain, each module must be horizontal in itself, but the second and further modules must be installed at the same level or lower. Under driveways the soil cover must meet or exceed 32", in other areas 16" depth is sufficient.

All components of this system are very light. No machinery or tools are required for the installation.
The 3" thick gravel layer is to be sized 136" x 112" per module, so it protrudes approx. 20" on all 4 sides beyond the edge of the percolation module. The space inside the module is to be filled with ½" gravel, the outside edges are to be banked @ a 45° angle with ½" gravel.

Winkler Aqua-Service Ltd.

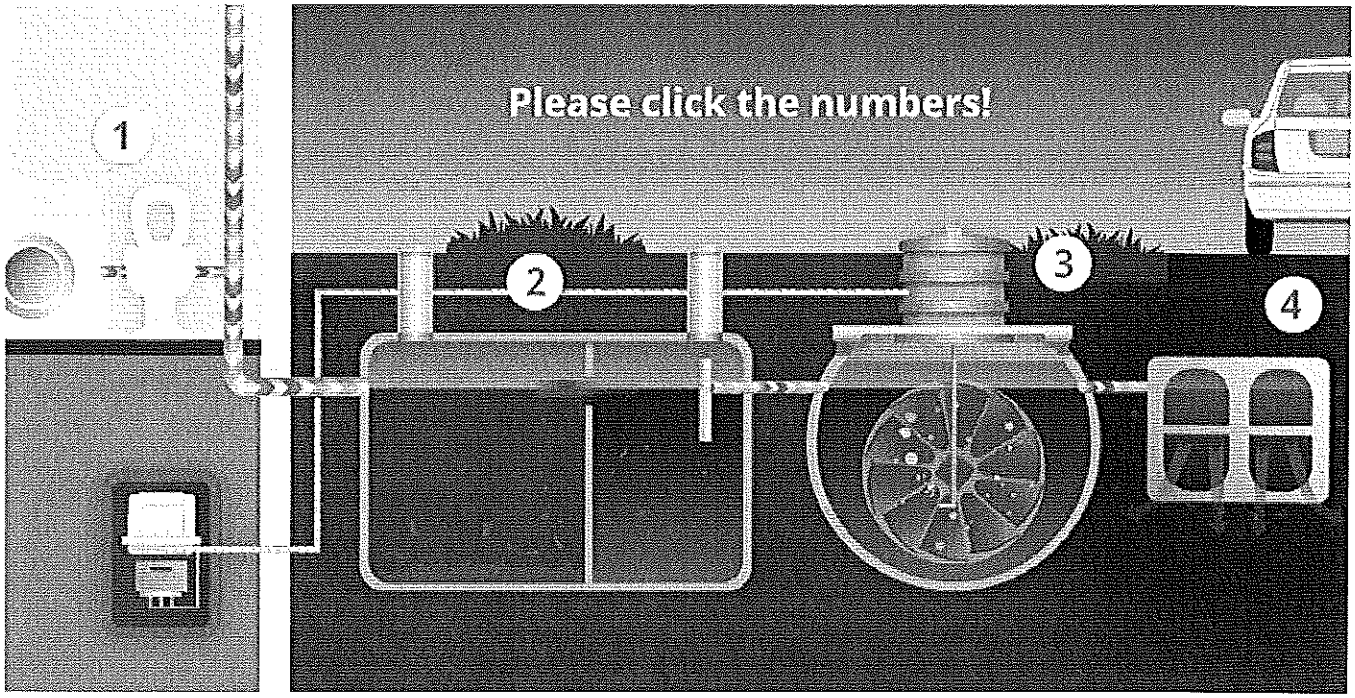


AQUA-crossection.jpg



DimsAQUApercolation.jpg

Overview of the system



1. Source of sewage water
2. Septic tank
3. Biological tank (STM 8/ BSW)
4. Aqua Percolation Block

Translation from German:

Sample of a German Regulation for a Conformity Mark [Ü-Zeichen] [Muster-Übereinstimmungszeichen-Verordnung – MÜZVO)][1] - in the version dated October 1997 –

Based on Section 81 (6) No. 1 of the German Model Building Regulations [Musterbauordnung (MBO)], the following has been decreed:

Section 1

(1) In accordance with Section 24 (4) of the German MBO, the conformity mark [Übereinstimmungszeichen (Ü-Zeichen)] consists of the letter "C" ["Ü"] and must include the following information:

1. Name of the manufacturer; in addition, the manufacturing company, if it is not possible to assign the building product unambiguously to the manufacturing company by means of the manufacturer's name; instead of the manufacturer's name, it is sufficient to give the name of the distributor of the building product, indicating the manufacturing company; the name of the manufacturing company may be encoded if the manufacturer or distributor and, if a conformity mark is required, the manufacturing company can be unambiguously determined at any time through the Certification Authority and the Monitoring Authority.
2. Basis for confirmation of conformity:
   a) short designation of the technical regulation that essentially rules the regulated building product,
   b) "Z" as the designation for general building supervision approval and the number of this approval,
   c) "P" as the designation for a general building supervision test certificate, its number and the name of the Testing Authority, or
   d) "ZiE" and the name of the authority as the designation for approval in individual cases.

[1] The obligations from Directive 83/189/EEC of the Council dated March 28, 1983 regarding an information procedure in the field of norms and technical requirements (Official Journal EC No. L109, pg. 8, last amended by Directive 94/10/EC of the European Parliament and the Council on March 23, 1994 (Official Journal EC No. L100, pg. 30) have been taken into account.

3. The key features for the intended purpose of the building product if they are not conclusively defined by entering the short designation for the technical regulation in accordance with No. 2, letter a.
4. The name or graphical symbol of the Certification Authority if it is mandatory that a Certification Authority be involved.

(2) The information in accordance with Item (1) must be placed either in the interior space surrounded by the letter "C" ["Ü"] or directly next to it. The letter "C" ["Ü"] and the information in accordance with Item (1) must be clearly legible. The shape of the letter "C" ["Ü"] must correspond to the following illustration:

(illustration of the letter "Ü")

(3) If the conformity mark is placed on an enclosed information leaflet, the packaging, delivery note or an enclosure to the delivery note, the letter "C" ["Ü"] may also be placed on the building product, either without or with part of the information in accordance with Item (1).

Section 2

This regulation shall take effect on ... .

Status: January 2010

Legal Basis for Granting General Building Supervision Approvals (Under Building Law) in Accordance with the Building Regulations of the Laender

Baden-Wuerttemberg:	Sections 18 and 21 of the State Building Regulation for Baden-Wurttemberg [Landesbauordnung für Baden-Württemberg (LBO)] dated August 8, 1995 (Legal Gazette ("LG") pg. 617), last amended by Art. 9 of the law dated December 17, 2009 (LG pg. 809)
Bavaria:	Art. 16 and 19 of the Bavarian Building Regulation [Bayerische Bauordnung (BayBO)] in the version published on August 14, 2007 (LG of Ordinances ("LGO") pg. 588), last amended by Section 5 of the law dated December 22, 2009 (LGO pg. 630)
Berlin:	Sections 18 and 21 of the Building Regulation for Berlin [Bauordnung für Berlin (BauO Bln)] dated September 29, 2005 (LGO pg. 495), last amended by Art. XVII of the law dated November 18, 2009 (LGO pg. 674)
Brandenburg:	Sections 15 and 18 of the Brandenburg Building Regulation [Brandenburgische Bauordnung (BbgBO)] in the version published on September 17, 2008 (LGO I pg. 226), last amended by Art. 2 of the law dated July 8, 2009 (LGO I, pg. 298)
Bremen:	Sections 21 and 24 of the Bremen State Building Regulation [Bremische Landesbauordnung (BremLBO)] dated March 27, 1995 (Bremen LG pg. 211), last amended by Art 3, 1st sentence of the law dated October 6, 2009 (Bremen LG pg. 401)
Hamburg:	Sections 20a and 21 of the Hamburg Building Regulation [Hamburgische Bauordnung (HBauO)] dated December 14, 2005 (Hamburg LGO pg. 525), last amended by Art. 5 of the law dated December 15, 2009 (Hamburg LGO pg. 444)
Hesse:	Sections 17 and 20 of the Hessian Building Regulation [Hessische Bauordnung (HBO)] dated June 18, 2002 (LGO I pg. 274), last amended by the law dated December 15, 2009 (LGO I pg. 716)
Mecklenburg-Western Pomerania:	Sections 18 and 21 of the State Building Regulation for Mecklenburg-Western Pomerania [Landesbauordnung Mecklenburg-Vorpommern (LBauO M-V)] dated April 18, 2006 (LGO M-V pg. 102)
Lower Saxony:	Sections 25 and 27 of the Building Regulation for Lower Saxony [Niedersächsische Bauordnung (NBauO)] in the version dated February 10, 2003 (Nds. LGO pg. 89), last amended by Art. 3 of the law dated December 10, 2008 (Nds. LGO pg. 381)
North Rhine-Westphalia:	Sections 21 and 24 of the Building Regulation for the Land of North Rhine-Westphalia – State Building Regulation [Bauordnung für das Land Nordrhein-Westfalen – Landesbauordnung (BauO NRW)] dated March 1, 2000 (LG NRW pg. 256), last amended by Art. 2 of the law dated December 17, 2009 (LG NRW pg. 863, 975)
Rhineland-Palatinate:	Sections 19 and 22 of the State Building Regulation for the Rhineland-Palatinate [Landesbauordnung Rheinland-Pfalz (LBauO)] dated November 24, 1998 (LGO 1998 pg. 365), last amended by Art. 8 of the law dated October 27, 2009 (LGO pg. 358)
Saarland:	Sections 19 and 22 of the Building Regulation for the Saarland [Bauordnung für das Saarland (LBO)] dated February 18, 2004 (Official Gazette ("OG") pg. 822), last amended by Art. 4 of the law dated November 21, 2007 (OG 2008, pg. 278)
Saxony:	Sections 18 and 21 of the Building Regulation for Saxony [Sächsische Bauordnung (SächsBO)] dated May 28, 2004 (Sächs LGO pg. 200), last amended by Art. 2 of the law dated August 13, 2009 (Sächs LGO p.g 438)
Saxony-Anhalt:	Sections 18 and 21 of the Building Regulation for the Land of Saxony-Anhalt [Bauordnung des Landes Sachsen-Anhalt (BauO LSA] dated December 20, 2005 (LGO LSA pg. 769)
Schleswig-Holstein:	Sections 19 and 22 of the State Building Regulation for the Land of Schleswig-Holstein [Landesbauordnung für das Land Schleswig-Holstein (LBO)] dated January 22, 2009 (LGO Schl.-H. pg. 6)
Thuringia:	Sections 21 and 23 of the Thuringian Building Regulation [Thüringer Bauordnung (ThürBO)] dated March 16, 2004 (LGO pg. 349), last amended by Art. 16 of the law dated July 8, 2009 (LGO pg. 592)

Table of Measurements for Small Wastewater Treatment Plants
Using the Staehlermatic® System - Types STM 5 / STM 8

Basis for measurement			STM 5	STM 8	STM 10	
Type of plant						
Inhabitants		iN	5	Up to 8	10	The calculation applies for the following standard design:
Specified amount of wastewater		l/(IN x d)	150.00	150.00	150.00	Container organic basin D=1700mm
Daily amount of sewage water		m³/d	0.75	1.20	1.50	Wheel of immersed contactor D=1200mm
Amount of waste-water in the peak hour	10	m³/h	0.075	0.120	0.15	Dimension of Drawing No. P10274 (1998-02-10)
Organic pollution load	24	m³/h	0.03 l	0.050	0.06	Distance between discs: 20 mm Surface/disc 3.38 m²
Organic pollution load without preliminary clarification	Basis:	60 g BSB_5(Ewd)	0.3	0.48	0.6	2 end plates (2 mm)
Organic pollution load with preliminary clarification 1.5 h	Basis:	40 g BSB_5(Ewd)	0.2	0.32	0.4	Surface of end plate 2.26 m²
Type of plant			STM 5	STM 8	STM 10	Specification DIN 4261
Mechanical treatment stage with joint mixed sludge storage						Part 1 and 2
Building form: sed-imentation plant with 2 chambers			1 container	1 container	1 container	
Specified usable vol-ume for preliminary clarification	spec. V_{VK}	m³/IN	0.300	0.300	0.300	
Specified usable volume for machine sludge storage	spec. V_{SP}	m³/IN	0.074	0.074	0.074	50% for immersed contactor and activated sludge plants
Total specified vol-ume for prelim. clarif./ sludge storage	m³/V_{VB}	m³/IN	0.374	0.374	0.374	Minimum volume 2 m³ for
Total volume required	req. V_{VB}	m³	2.00	2.99	3.74	preliminary treatment
Selected total volume	V_{VB}	m³ up to	2.00 3.00	3.00	3.81	Size of preliminary treatment for STM 5, depending on application
Type of plant			STM 5	STM 8	STM 10	
Organic basin						
Diameter	D	mm	1700	1700	1700	[Stamp of the DIBt]
No. of discs	N		5	10	14	
Biofilm growth area of 2 end plates	A	m²	none	none	4.562	
Biofilm growth area of discs	A	m²	16.9	33.8	47.32	
Total growth area of immersed contactor	A tot.	m²	16.9	33.8	51.84	
Depth of water	H	m²	1.2	1.2	1.2	
Usable volume	V	m³	1.03	1.03	1.03	V_{min} = 1 m³
BSB_5 surface load	B_A	g/(m²xd)	4	4	4	< = 4 g (m²xd)
BSB_5 decomposition immersed contactor	B_r	kg BSB_5/d	0.068	0.135	0.207	
BSB_5 decomposition of activated sludge components	B_{BB}	kg BSB_5/d	0.132	0.185	0.193	
Content of solids	TS_{BB}		4.00	4.00	4.00	
BSB_5 sludge loading	B_{TS}	kg/(kgxd)	0.032	0.045	0.047	< = 0.05 (kgxd)
BSB_5 volume load	BR	kg/m³/d)	0.129	0.179	0.187	< = 0.20 kg (m³xd)
Oxygen supply when operating		kg O_2/d	0.280	0.560	0.784	
Oxygen in activated sludge components		kg O_2(kg BSB_5d)	2.11	3.03	4.07	
Type of plant			STM 5	STM 8	STM 10	
Final sedimentation tank						
No. of final sedimen-tation basins	N		1	1	1	
Surface	A_{NK}	m²	0.87	0.87	0.87	
Volume	V_{NK}	m³	0.51	0.51	0.51	> = 0.7 m²
Surface flow rate	Q_A		0.086	0.138	0.172	< = 0.3 m³/(m² x h)
Depth of water	H_{NK}	m	1.10	1.10	1.10	> = 1.0 m
Flow time	T_{NK}	h	6.80	4.25	3.50	> = 3.5 h

Enclosure 4
of General Building Supervision
Approval No. Z-55.5-42
dated 2010-01-26

Description, Process Technique, Construction
Small Wastewater Treatment Plant Using the Staehlermatic® System

1. Description of the system

Biological wastewater clarification by means of the Staehlermatic system is carried out using the following processing steps:

- mechanical preliminary clarification consisting of:
  multi-chamber sedimentation tank with joint mixed sludge storage

[Stamp of the DIBt]

- Staehlermatic combined basin consisting of:
  organic basin and final sedimentation basin with gravimetrical feedback of the deposited sludge to the organic basin and removal of the surplus sludge by means of an air-lift pump.

The core of the entire wastewater clarification process is the Staehlermatic ("STM") organic basin into which the STM immersed contactor has been installed. The STM immersed contactor is rotated around the shaft axis by a compressed air drive.
The immersed contactor is implemented for small wastewater treatment plants in the form of extensive discs (STM 5/8/10). It is made up of a system of hollow parts that are formed by a predefined number of discs with a special surface profile, measured according to the number of inhabitants.

Enclosure 5
of General Building Supervision
Approval No. Z-55.5-42
dated 2010-01-26

3. Process Technique

To carry out preliminary treatment mechanically, i.e. to separate settleable and floating matter, the wastewater to be clarified is pumped into a multi-chamber sedimentation tank constructed as a single container. The plant is used for biological partial clarification of the wastewater. The construction of the plant corresponds to DIN 4261, Part 1. Storage of the primary, secondary and floating sludge is carried out jointly in the multi-chamber sedimentation tank. The secondary and floating sludge that arises is fed into the first chamber of the multi-chamber sedimentation tank.
The pretreated wastewater flows into the combined organic and final sedimentation basin, made of plastic, which uses the Staehlermatic system.
Organic clarification of the wastewater is carried out in the organic space located in the middle section of the basin. To a great extent, the wastewater is purified biologically by the combination of a fixed film and the activated sludge process.

The mixture of water and activated sludge flows through the opening in the lower section of the side wall of the activation stage into the final sedimentation basin, which is located at the side of the activation stage. In this settled area, the activated sludge settles and flows along the (60°) slope of the outside wall back to the activation basin, where it is whirled up by the air pump and distributed in the organic basin.
The clarified wastewater flows out through a plastic pipe with drain holes. A tee prevents the floating sludge from flowing out.
Waste sludge is pumped by means of an air-lift pump through a connecting pipe directly into the multi-chamber sedimentation tank. The sludge settles here and is disposed of periodically.

5. Technological description

Air drive:

[Stamp of the DIBt]

The rotating movement is carried out using a compressed-air drive. Air is blown in below the wheel by a compressor.
On its way to the water's surface, the air is caught by the hollow cavity system and causes a lifting force. This lifting force begins to rotate as desired.
The sessile sludge, which is significantly involved in the biological wastewater purification process, is automatically and optimally supplied with sufficient oxygen from the air when the immersed contactor surfaces as well as during the entire rotation of the wheel by means of the air that is guided into and increasingly compressed in the immersed contactor, without any additional expenditure of energy.
The oxygen from the parcel of air is freed on the wet surfaces of the plates covered with a biofilm growth and supplies the microorganisms accordingly with oxygen for decomposing the contents of the wastewater.
During rotation, part of the air that has already been carried in escapes and is carried towards the centre of the wheel in the form of medium-sized bubbles. The free-floating activated sludge is, therefore, also supplied with oxygen.

When the hollow body dives once again into the mixture of wastewater and activated sludge, the air is caught in the submerging air chambers and, at first, is unable to escape. The parcels of air in the submerging hollow bodies are smaller than those in the surfacing hollow bodies. This alone causes the lifting force.

The Staehlermatic immersed contactor is built symmetrically like a wheel around a propeller shaft. More than ¾ of the wheel's diameter dips into the body of water. The immersed contactor is offered in various standard sizes. It consists of numerous extensive discs with a special surface profile that serves as a biofilm growth area for the sessile microorganisms. The plastic discs are injection-moulded using fully recyclable, permanently stable polypropylene.

A system of hollow bodies is formed by connecting the discs into a bundle of parcels, with which air is taken in by rotating the wheel. Forcing the air into this bundle of parcels compresses it so that the transfer of oxygen is increased. All of the microorganisms are supplied with oxygen by slowly turning the wheel. This is done using a compressed-air drive, which drives the wheel by means of air bubbles that rise from below.
When, during this rotating movement, an immersed contactor surfaces above the water, the mixture of wastewater and activated sludge in the hollow bodies flows out.
In its place, the immersed contactor is filled with ambient air.
The oxygen required for oxidizing the wastewater contents is freed on the wet surfaces of the plates covered with biofilm growth. Since these large surfaces are directly exposed to the full partial pressure of the air, oxygen saturation is immediately achieved here. Then, by means of diffusion, the oxygen infiltrates through the concentration gradient beginning to build up to the lower layers of the biofilm growth.

Translation from German:

General

Building Supervision

Approval

DIBt
Deutsches Institut für Bautechnik
ANSTALT DES ÖFFENTLICHEN RECHTS
[German Institute for Building Technology
INSTITUTION UNDER PUBLIC LAW]

German Licensing Agency for Building Products and Building Methods
Government Agency for Building Tests
Member of the European Organization for
Technical Approvals (EOTA) and the Union Européenne
pour l'Agrément Technique dans la Construction (UEATC)

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Date: January 26, 2010

Ref.: II 31-1.55.5-14/98.6

Approval number:
Z-55.5-42

Valid until:
December 31, 2014

Applicant:
Stähler GmbH
Mühlenhof, 65589 Hadamar

Object for approval:

Small wastewater treatment plants with wastewater aeration using polyethylene;

combination of fixed film with activated sludge process
Staehlermatic® system for 5 to 10 IN;
Filtration level C (carbon decomposition)

General building supervision approval is hereby granted for the above named object for approval.
This General Building Supervision Approval includes nine pages and eight appendices.
General building supervision approval for this object was first granted on May 26, 1999.

[Stamp of the German Institute for Building Technology (DIBt)]

II. SPECIAL PROVISIONS

1 Object for approval and field of application

1.1 The object for approval is a small wastewater treatment plant with wastewater aeration using polyethylene for underground installation, except in traffic areas, which is operated as a combination of fixed film with an activated sludge process using the Staehlermatic® system, in various sizes for 5 to 10 inhabitants ("IN"), in accordance with Appendix 1.

Small wastewater treatment plants with wastewater aeration are used for the aerobic biological treatment of domestic and industrial wastewater collected in a separation process (provided the industrial wastewater is comparable with domestic wastewater).

1.2 The following may not be fed into the small wastewater treatment plant:
- industrial wastewater, unless it is comparable with domestic wastewater
- external water, such as
  coolant
  discharged water from swimming pools
  rainwater
  drainage water

[Stamp of the DIBt]

1.3 Apart from building supervision requirements, this General Building Supervision Approval also fulfills the requirements in accordance with the German law concerning water within the meaning of the Laender ordinances for determining the suitability of building products and types of construction in accordance with the German law concerning water by providing proof as defined by the Laender building regulations [Verordnung zur Feststellung der wasserrechtlichen Eignung von Bauprodukten und Bauarten (WasBauPVO)].

1.4 General Building Supervision Approval is granted irrespective of the reservations set out in other legal fields with regard to testing or granting approval (first regulation concerning the German Product and Devices Safety Act (regulation concerning the marketing of electrical equipment for use within specific voltage ranges) [Erste Verordnung zum Geräte- und Produktsicherheitsgesetz (Verordnung über das Inverkehrbringen elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen – 1. GPSGV)], German law on the electromagnetic compatibility of equipment [Gesetz über die elektromagnetische Verträglichkeit von Geräten – (EMVG)], eleventh regulation concerning the German Product and Devices Safety Act (explosion protection directive) [Elfte Verordnung zum Geräte- und Produktsicherheitsgesetz (Explosionssschutzverordnung – 11. GPSGV)], ninth regulation concerning the German Product and Devices Safety Act (machine directive) [Neunte Verordnung zum Geräte- und Produktsicherheitsgesetz (Maschinenverordnung – 9. GPSGV)]).

2 Provisions for the Building Product

2.1 Features and Requirements

2.1.1 Features

In accordance with the description of functions in Appendices 5 to 7, the small wastewater treatment plants were inspected according to Supplement B of the German DIN [German Standards Institute] EN 12566-3[1] at a trial station with regard to clarification performance and assessed according to the guidelines for approval set out by the DIBt (status: May 2009).

Therefore, the plants fulfill at least the requirements set out in Supplement 1, Part C, No. 4 of the German Wastewater Ordinance [Abwasserverordnung (AbwV)]. Within the framework of building supervision approval, the small wastewater treatment plants met the following testing criteria for the filtration level:

[1] DIN EN 12566-3:200907 "Small wastewater treatment plants for up to 50 IN, Part 3: prefabricated treatment plants and/or assembled on site for treating domestic wastewater"

- BSB_5: ≤ 25 mg/l from a 24 h composite sample, homogenized
  ≤ 40 mg/l from a qualified sample, homogenized
- CSB: ≤ 100 mg/l from a 24 h composite sample, homogenized
  ≤ 150 mg/l from a qualified sample, homogenized
- Filterable materials: ≤ 75 mg/l from a qualified sample

Therefore, the requirements for filtration level C (treatment plants with carbon decomposition) have been met.

2.1.2 Requirements

2.1.2.1 The technical measurement of clarification for each plant size can be found in the table in Appendix 4.

2.1.2.2 Setup of the small wastewater treatment plants
The design and measurements of the building components and of the range within which the small wastewater treatment plants with wastewater aeration function must correspond to the specifications in Appendices 1 to 3.
With regard to the materials used, reference is made to the product documentation recorded at the DIBt.

2.1.2.3 Proof of stability
Proof of stability was provided for the installation conditions set out in this General Building Supervision Approval. Installation specifications in Section 3 as well as the manufacturer's specifications in Enclosure 8 of this German Building Supervision Approval must be observed.

2.2 Manufacture, identification marks

2.2.1 Manufacture
Only polyethylene (PE) that meets the parameters according to DIN EN 1778[2] or the DVS Guideline 2205-1[3], as recorded at the DIBt and specified in detail, including the trade name and manufacturer, may be used as a moulding material for manufacturing the tanks.

2.2.2 Identification marks
The small wastewater treatment plants with wastewater aeration (combined fixed film and activated sludge plants) must be identified by the manufacturer with the conformity mark in accordance with the Laender regulations for conformity marks. This identification may only be made if the requirements set out in Section 2.3 have been fulfilled. Furthermore, the following information must be marked on the small wastewater treatment plants in such a way that it is permanent and easily recognizable at all times:
- designation of type
- maximum IN
- connected load or wattage
- usable volumes of the pre-settlement facility
  of the activated sludge basin
  of the final sedimentation basin
  usable surface of the immersed contactor
  filtration level: C

[Stamp of the DIBt]

[2] DIN EN 1778:1999-12: "Characteristic parameters for welded thermoplastic constructions – provisions for permitted tensions and module for the calculation of thermoplastic building components"

[3] Guideline DVS 2205 Part 1:1985-06 "Calculation of tanks and apparatuses made of thermoplastics" – parameters -

2.3 Proof of conformity

2.3.1 General

Confirmation of conformity of the small wastewater treatment plants with wastewater aeration with the provisions of this General Building Supervision Approval must be given for each facility manufactured, together with a statement of conformity by the manufacturer based on its own production control at the factory. The manufacturer shall give its statement of conformity by marking the manufacturing products with a conformity mark, indicating the purpose of this mark.

2.3.2 Manufacturer's own production control at its factory

The manufacturer shall set up and carry out its own production control in each factory where the small wastewater treatment plants are manufactured. "Production control at the manufacturer's own factory" refers to the continuous monitoring of production to be carried out by the manufacturer, which is used to ensure that the building products it manufactures correspond to the provisions of this General Building Supervision Approval.

The manufacturer's own production control at its factory consists of:

- Description and inspection of the source materials and building components:

  Based on Certificates 2.3/3.1.B in accordance with DIN EN 10204[4] that were issued by the manufacturer of the source material, the manufacturer of the tank must prove that the moulding material conforms to the defined requirements.
  The melt-flow index and density of the moulding material (container) must be checked when individual sections of the workflow (e.g. nozzles, openings) occur or when charges are switched, but at least once in every production month to ensure that the following requirements are met.

Feature	Unit	Basis for inspection	Requirement
Melt-flow index	g/(10 min)	DIN EN ISO 1133[5]	Max. MFR = MFR $190/2{,}16_{(a)}$ + 15 %
Density	g/cm³	DIN EN ISO 1183-1[6]	$D_{(e)} = D_{(a)} \pm 15$ %

Index a = measured value before processing (moulding materials)

Index e = measured value after processing (on the container)

Controls and inspections to be carried out on the finished products:

The
- relative measurements of the container,
- diameter and heights of any arrangement of openings,
- cross-sectional dimensions and heights of any arrangement of openings,
- depth of installation and height above the water level of the submerged pipe and wall,
- arrangement and position of the assembly parts

must be determined and inspected to ensure that they conform with the specifications in the appendices to this General Building Supervision Approval.

[Stamp of the DIBt]

[4] DIN EN 10204:2005-01 "Metal products; types of test certificates"
[5] DIN EN ISO 1133:2000-02 "Plastics: determination of the melted mass flow rate (MFR) and the melted volume flow rate (MVR) of thermoplastics"
[6] DIN EN ISO 1183-1:2000-07 "Plastics: method for determining the density of non-foamed plastics"

- Checking the impermeability to water:
  An authorized expert named by the manufacturer of the container must check the interior of the container for possible leakage in accordance with the requirements as per Item 7 of DIN 4261-101[7].

The results of production control carried out at the manufacturer's own factory are to be recorded and evaluated. The records must include at least the following information:

- designation of the building product or source materials and components
- type of control or inspection
- date of manufacture and inspection of the building product or source materials or components
- result of the controls and inspections and, as far as this applicable, comparison with the requirements
- signature of the person responsible for production control at the manufacturer's own factory

If the results of the inspection are unsatisfactory, the manufacturer must arrange for the necessary measures to remedy the defect without undue delay. Building products that do not correspond to the requirements must be handled in such a way that there can be no confusion with those that correspond to the requirements. After the defect has been remedied, the inspection in question must be repeated without undue delay, as far as this is technically possible and necessary for proving that the defect has been remedied.

The records must be kept for at least five years. Upon request, they must be presented to the DIBt, the responsible highest German Building Supervisory Authority or the responsible Water Authority.

3 Provisions for Installation

[Stamp of the DIBt]

3.1 Place of installation

When selecting the place for installation, it is important to take into consideration that small wastewater treatment plants must be accessible at all times and the removal of sludge must be ensured at all times. The distance between the plant and existing or planned plants for the procurement of water must be large enough that the latter will not be impaired. The individual Laender regulations for areas reserved for the preservation of water must be observed.

Small wastewater treatment plants may only be installed outside traffic areas. The place of installation must be secured against unintentional crossing by means of suitable measures (enclosure, warning signs).

If the plant is installed in groundwater areas, measures must be taken to safeguard against buoyancy. In this case, proof that stability has been adjusted to local conditions is required.

3.2 General provisions

Installation may only be carried out by those companies that have the necessary expertise, suitable equipment and facilities as well as sufficient trained personnel. To avoid danger to personnel and third parties, the relevant accident prevention regulations must be observed.

Installation must be carried out according to the manufacturer's installation instructions, in which the marginal conditions of the proof of stability are taken into consideration (for an excerpt of the main points from the installation instructions, please refer to Enclosure 8 of this General Building Supervision Approval). The installation instructions must be available at the building site.

The coverings must be secured to ensure they are not opened without authorization.

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[7] DIN 4261-101:1998-2 "Small wastewater treatment plants, plants without wastewater aeration, principles for production control at the manufacturer's own factory as well as external supervision"

[Stamp of the DIBt]

3.3 Checking the impermeability of water after installation

The external walls and bases of the parts of the treatment plant as well as the pipe connections must be leakproof. To check this, after installation, the plant must be filled with water up to the top edge of the container (which corresponds to the lower edge of the covering). No water loss is permitted in containers made of polyethylene.

Comparable test procedures in accordance with DIN EN 1610 are permitted.

3.4 Initial operation

When the plant is operated for the first time, the operator must be briefed on how to operate it by the applicant or another person who is experienced in operating the plant. The person giving these instructions must certify that they have done so.

The operator must be given an operation log with instructions on how to operate and maintain the plant.

4 Provisions for use, operation and maintenance

4.1 General

The features confirmed in Section 2.1.1 can only be achieved during on-site use when operation and maintenance of the plant are carried out in accordance with the following provisions.

Small wastewater treatment plants must always be ready for operation. Interruptions to the technical facilities must be indicated acoustically and/or optically.

The small wastewater treatment plants must be equipped with off-grid monitoring of mains failure that gives off an acoustic and/or optical alarm.

Only wastewater that neither damages the plant nor impairs its function may be fed into the small wastewater treatment plants (see DIN 1986-3[8]).

The manufacturer of the treatment plant must draw up instructions for its operation and maintenance, including sludge removal, which must include at least the provisions of this General Building Supervision Approval, and hand them over to the plant operator.

All of the parts of the treatment plant that must be maintained on a regular basis must be safely accessible at all times.

Operation and maintenance must be set up in such a way that

- no danger need be expected for the environment; this applies especially for the removal, transportation and storage of sludge from small wastewater treatment plants;
- the existence and specified function of the small wastewater treatment plants are not impaired or endangered;
- the water that is meant to be fed into the plant is not contaminated or otherwise detrimentally altered beyond the permitted measure;
- no lasting offensive odours arise.

Special care must be taken if, for the purpose of repairs or maintenance, it should be necessary to climb into the small wastewater treatment plant. The corresponding rules for accident prevention must be observed.

4.2 Use

The maximum number of inhabitants whose wastewater may be fed into the small wastewater treatment plants (maximum IN) is based on the specifications in Enclosure 4 of this General Building Supervision Approval.

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[8] DIN 1986-3: "Drainage systems for buildings and properties, rules for operation and maintenance"

4.3 Operation

4.3.1 General

If he himself does not have the necessary technical knowledge, the operator must have the work carried out by an expert[9] he has commissioned to do so.

At regular intervals, the operator must carry out all of the work that is basically concerned with checking the functions of the plant and, if necessary, measuring the most important operating parameters, whereby the operating instructions must be observed when doing this.

4.3.2 Daily checks

The plant must be checked to determine whether it is operating.

4.3.3 Monthly checks

[Stamp of the DIBt]

The following checks must be carried out:

- visual check of the filtration for sludge overflow
- checking inflow and outflow to see if they are plugged up (visual check)

  determining if there is any build-up of scum and, if necessary, removing the scum (in the sludge storage tank)
- noting the operating hours clocked on the fan and pumps and entering the figure in the operation log.

Any defects or interruptions that have been determined must be remedied without undue delay by the operator or a specialist he has authorized, and entered in the operation log.

4.4 Maintenance

Maintenance must be carried out by a specialized company (experts)[10] at least twice a year (approx. every six months).

Maintenance must include at least the following:

- inspection of the operation log and determination that operation is regular (target/ actual comparison)
- checking the function of mechanical, electrotechnical and other parts of the plant, such as fan and pumps or air-lift pumps, which are necessary for operation
- maintaining the fan and pumps according to the manufacturer's specifications
- checking the function of the control unit and the alarm
- adjusting optimum operating values such as the supply of oxygen and percentage of sludge volume
- checking the sludge level in the septic tank with sludge storage tank. If necessary, instigating that the operator has the sludge removed. Disposing of the sludge by a means tailored to suit individual needs ensures that the small wastewater treatment plant will operate correctly. The sludge should be disposed of no later than when the sludge storage tank is 50 % full of sludge.
- checking the final clarification for surface and bottom sludge. If necessary, transporting it to the septic tank.
- carrying out general cleaning, e.g. removal of deposits

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[9] "Experts" are people working for the operator or commissioned third parties who, due to their training, knowledge and experience gained through practical work, ensure that they can check small wastewater treatment plants themselves.

[10] Specialized companies are companies that are independent from the operator, whose employees (experts), because of their professional training and participation in relevant measures for further qualification, have the necessary qualifications for operating and maintaining small wastewater treatment plants.

- checking the physical condition of the plant
- checking that there is sufficient supply and exhaust air ventilation
- the maintenance that has been carried out must be recorded in the operation log.

Within the scope of maintenance, a sample must be taken of the filtration, whereby the following values must be checked:

- temperature
- pH
- settleable solids
- COD

The values that have been determined and the work that has been carried out are to be recorded in a maintenance report. This maintenance report is to be sent to the operator. The operator must store the maintenance report with the operation log and, upon request, present it to the responsible Building Supervision Authority or the responsible Water Authority.

Herold

Certified

[Stamp of the DIBt]

(Signature)

EgC

Prüfinstitut für Abwassertechnik GmbH

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

PIA GmbH

DIN EN ISO 9001:2000

Bericht über die Prüfung der Kleinkläranlage Stählermatic

der Firma

Stähler GmbH
Mühlenhof 1, 65589 Hadamar

Prüfberichts-Nr. PIA2007-010

Aachen, im August 2007

PIA GmbH Prüfinstitut für Abwassertechnik Hetzgenrather Weg 52074 Aachen

Dipl.-Ing. Elmar Lancé

EN 12566

TABLE OF CONTENTS

1. REASON

Stähler GmbH
Mühlenhof 1
65589 Hadamar

engaged

PIA GmbH
Hergenrather Weg 30
52074 Aachen

to do a practical test (38 weeks) on a STM wastewater treatment system with PE tanks for 5 inhabitants according to the guidelines of the DIBT and EN 12566(3) to reach a building permission.

The test began after the run-in-phases on 4th September, 2006 and finished the 27th May, 2007.

The elimination of carbon and nitrogen was checked in the STM wastewater treatment system by the company Stähler GmbH in accordance to the principles of the DIBT.

PIA GmbH is certified for testing wastewater treatment systems (DIN EN ISO 9001:2000) and accepted as notified body (BauPG) for testing building products like wastewater treatment systems until 50 inhabitants[1].

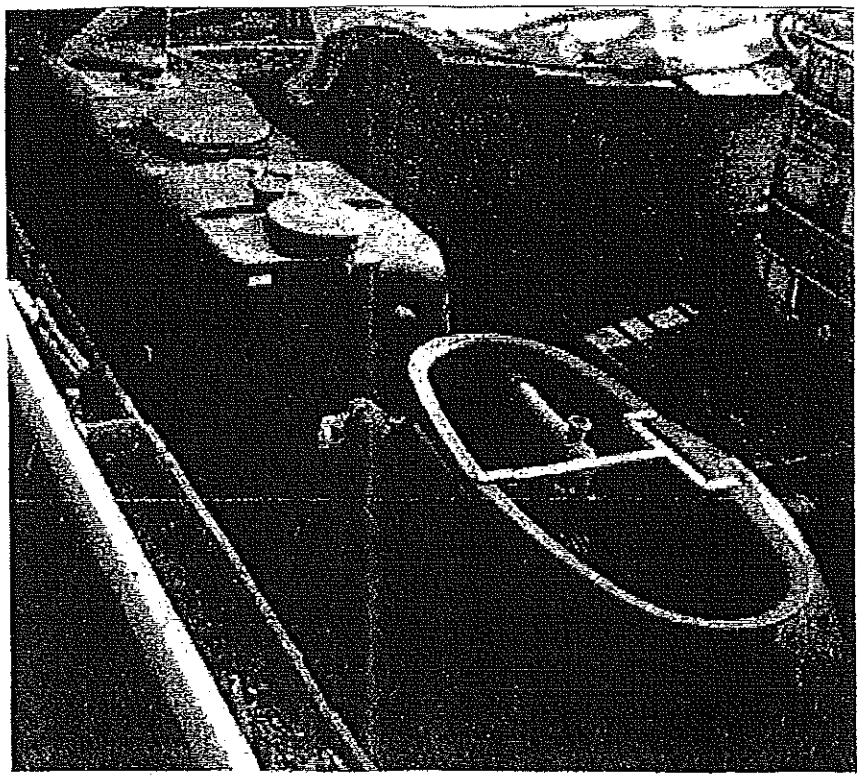
[1] EN 12566-1 and EN 12566-3 (chiffre NB1739)

2. DESCRIPTION OF THE WASTEWATER TREATMENT SYSTEM

The wastewater treatment system Stählermatic by the company Stähler GmbH works on immersed contractor system with profiled PE discs. Look up the appendix for a detailed description.

2.1 Description of the tanks

The checked system based on two PE tanks. The measurements an volumes of the tanks are checked by the PIA GmbH and correspond to the required growth for STM8 system.



Ill.1: PE tanks of Stählermatic wastewater treatment system on the testing area

2.2 Tests about the water tightness

The PE tanks were checked with water about their water tightness on 18th April, 2007, in accordance to appendix A of EN 12566-3. A loss of water wasn't measurable during 30 minutes.

3. TEMPORY CHECKS AN ANALYTICS

During the test of the STM wastewater treatment system all wastewater samples were taken as 24-hours spot checks out off the inflow / outflow and the floating tank.
The outflow of the system was checked continuously during the process.
All factors were determined by the required process of DIBT and EN 12566-3.

Inflow: T, ph, COD, BOD. NH_4N. $N_{ent.}$ $P_{ent.}$ conductivity, AFS, dulling, AS_{120}

Bio-tank: T, O_2, SV_{30}

Outflow: pH, $COD_{hom.}$ BOD, NH_4N, NO_3N, NO_2-N, $N_{ent.}$ $P_{ent.}$ conductivity, AFS, Dulling, AS_{120}

The analysis of the factors $COD_{ent.}$ $COD_{home.}$ BOD, NH_4N, NO_3N, NO_2-N, $N_{ent.}$ $P_{ent.}$ Feakalcoliforme and AFS was made by the IWA^2. The IWA is certified after DIN EN ISO / IEC 17025 : 2000-04.

4. COURSE AND FEATURES OF THE TEST

The test of the purification performance was carried out by STM5 and a hydraulic load of 0,75 m³/d.

The process is shown in table 1.

Tab.1: Testing phases of the wastewater treatment system Stählermatic

Testing phase	Lasting/Date
Start	4th September, 2006
Nominal	6 weeks
Underload	2 weeks
Nominal/ power failure	6 weeks
Little load/ holiday	2 weeks
Nominal	6 weeks
Overload	2 weeks
Nominal/ power failure	6 weeks
Underload	2 weeks
Nominal	6 weeks
End	27th May, 2007

The lading of the wastewater treatment system occurred following table 2:

Tab. 2: Daily line: wastewater treatment system Stählermatic

Time	Burden
6 a.m. – 9 a.m.	30 %
9 a.m. – 12 a.m.	15 %
12 a.m. – 6 p.m.	0 %
6 p.m. – 8 p.m.	40 %
8 p.m. – 11 p.m.	15 %
11 p.m. – 6 a.m.	0 %

During the testing phase a medium power consumption about 1 kwh/d (0,75 m³/d)was locked.

5. PURIFICATION PERFORMANCES

All results like the corresponding deviations and other characteristics of the systems are shown in the tables 3a, 3b an 3c. Pay attention, only results over 12°C in the bio tank were taken into consideration for the calculation of all elimination performances.

5.1 Evaluation of the testing phases

All results of the testing phases with 100 % load as well as the corresponding deviations and other characteristics are shown in table 3a.

Tab. 3a: Characteristics of the system nominal phases (100%) with power failure

	Medium	Minimum	Maximum	Deviation
Sludge burden**(kg/kg+d)	0,01	0,01	0,02	0
Space burden**(kg/m³+d)	0,16	0,09	0,25	0,05
Effectiveness BSB_5 (%)	93,7	85,4	99,3	4,1
Effectiveness CSB (%)	87,1	72,4	92,9	5,2
Effectiveness AFS (%)	93,3	81,5	98,3	4,9
Effectiveness NH_4-N (%)*	23,2	0	93,0	25,5
BSB_5 in outflow (mg/l)	15	3	36	9,6
CSB in outflow (mg/l)	68	35	123	23,6
AFS in outflow (mg/l)	18	5	44	10,8
NH_4-N in outflow (mg/l)*	23,7	2,0	37,8	9,3
NO_3-N in outflow (mg/l)*	3,8	1,0	14,8	4,6
N_{anarg} in outflow (mg/l)*	26,4	14,7	39,0	6,7

* *Determined under consideration the temperature in the bio tank*

** *The determination of the sludge burden and space burden occurs only in relation to the biomass in the tank.*

In table 3b all outflow results of the overload and underload are put together.

Tab. 3b: Characteristics of the system – underload (50%) and overload (150%)

	Phase	50 %	50 %	150%	150 %	50%	50 %
date		19th Oct 06	26th Oct 06	8th Feb 07	15th Feb 07	5th Apr 07	12th Apr 07
CSB_{hom}	(mg/)l	60	60	87	68	83	62
CSB_n	(mg/l)	45	46	59	42	44	49
BSB_5	(mg/l)	8	9	20	21	7	14
NH_2-N	(mg/l)	28,9	4,5	32,4	22,8	27,8	18,3
NO_3-N	(mg/l)	<1,0	19,3	<1,0	1,1	1,6	6,1
NO_2-N	(mg/l)	<1,0	0,5	<1,0	1,1	1,8	6,1
N_{anorg}	(mg/l)	30,8	24,7	32,9	23,9	30,1	25,6
N_{ent}	(mg/l)	31	26	37,7	27,7	33	29,4
P_{ent}	(mg/l)	3,9	3,9	5,4	4,2	4,9	4,9
pH	(-)	7,7	7,1	7,7	7,6	7,7	7,7
conductivity	(uS/cm)	784	645	833	744	813	760
AFS	(mg/l)	11	2	7	9	15	18
AS_{120}	(ml/l)	<0,1	0,3	<0,1	0,5	<0,1	0,5
dulling	(FNU)	7,0	4,2	14,2	13,4	21,9	4,9

In table 3c all effectiveness results of the over and under burden are put together.

Tab. 3c: Effectiveness results – underload (50%) and overload (150%)

		Testing phases	
Factors		50 %	150 %
CSB	(%)	90,1	83,8
BSB_5	(%)	96,6	91,7
AFS	(%)	96,5	97,3
NH_4-N*	(%)	41,2	9,9

* *Determined for all temperature in the bio tank.*

5.2 Partial results

The partial results of all checked factors are put together in the following tables.

Tab.4: Test results from 7th September, 2006 to 19th October 2006

Testing phase:		1	1	1	1	2
		100 %	100%	100%	100%	50 %
Date		7th Sep 06	14th Sep 06	28th Sep 06	5th Oct 06	19th Oct 06
Temperature	(°C)	13/24	19/26	11/21	6/17	8/17
Inflow						
Temperature	(°C)	16,7	20,3	17,2	15,4	15,6
CSB	(mg/l)	474	738	412	540	384
BSB_5	(mg/l)	385	410	325	330	185
NH_4-N	(mg/l)	27	33	29	37	35,6
N_{ges}	(mg/l)	47	55	53	54	50
P_{ges}	(mg/l)	7,4	11,6	7,7	7,5	7,0
pH	(-)	7,1	6,8	7,2	7,1	7,4
Conductivity	(uS/cm)	798	820	801	760	812
AFS (SS)	(mg/l)	238	602	228	340	188
AS_{120}	(ml/l)	6	38	6	17,5	6
Dulling	(FNU)	-	-	145	170	114
Outflow						
CSB_{hom}	(mg/l)	52	63	45	97	63
CSB_{fil}	(mg/l)	47	42	44	49	45
BSB_5	(mg/l)	10	4	10	33	8
NH_4-N	(mg/l)	17,8	20,4	23,6	36,8	28,9
NO_3-N	(mg/l)	1,7	1,3	1,4	<1,0	<1,0
NO_2-N	(mg/l)	0,4	<0,1	<0,1	<0,1	1,4
N_{anorg}	(mg/l)	19,9	21,7	25,0	37,3	30,8
N_{ges}	(mg/l)	22	26	27	42	31
P_{ges}	(mg/l)	4,3	4,9	5,5	6,1	3,9
pH	(-)	7,7	7,7	7,7	7,7	7,7
Conductivity	(uS/cm)	694	733	737	840	784
AFS (SS)	(mg/l)	8	17	11	37	11
AS_{120}	(ml/l)	<0,1	<0,1	<0,1	0,2	<0,1
dulling	(FNU)	-	4,3	2,4	23,2	7,0
Biology						
Temperature	(°C)	17,6	18,0	15,9	15,1	14,6
SV (30)	(ml/l)	20	30	30	140	380
O_2	(mg/l)	1,6	0,8	1,3	0,8	2,9

Tab.5: Test results from 26th October, 2006 to 23rd November 2006

Testing phase:		2	3	3	3	3
		50 %	100%	100% PF[3]	100%	100 %
Date		26th Oct 06	3rd Nov 06	9th Nov 06	16th Nov 06	23d Nov 06
Temperature	(°C)	9/19	2/13	1/11	9/12	4/9
Inflow						
Temperature	(°C)	17,1	12,1	13,0	14,9	13,0
CSB	(mg/l)	798	388	380	472	822
BSB_5	(mg/l)	430	240	210	230	415
NH_4-N	(mg/l)	40,0	28,4	28,4	23	29
N_{ges}	(mg/l)	60	45	46	39	51
P_{ges}	(mg/l)	8,7	6,6	7,3	7,9	9,1
pH	(-)	7,2	7,4	7,4	7,3	7,0
Conductivity	(uS/cm)	765	716	763	692	742
AFS (SS)	(mg/l)	432	230	198	270	344
AS_{120}	(ml/l)	35	7	7	12	28
Dulling	(FNU)	192	128	122	171	285
Outflow						
CSB_{hom}	(mg/l)	60	35	41	51	58
CSB_{fil}	(mg/l)	46	24	31	29	49
BSB_5	(mg/l)	9	10	8	10	3
NH_4-N	(mg/l)	4,5	2,0	9,1	12,6	16,2
NO_3-N	(mg/l)	19,3	14,8	11,6	1,2	5,1
NO_2-N	(mg/l)	0,9	0,7	1,2	0,9	0,9
N_{anorg}	(mg/l)	24,7	17,5	21,9	14,7	22,2
N_{ges}	(mg/l)	26	18,8	23,8	23,9	21,7
P_{ges}	(mg/l)	3,9	3,8	4,5	3,8	3,6
pH	(-)	7,1	7,2	7,3	7,5	7,4
Conductivity	(uS/cm)	645	489	601	610	600
AFS (SS)	(mg/l)	2	16	14	5	6
AS_{120}	(ml/l)	0,3	1,3	<0,1	<0,1	<0,1
dulling	(FNU)	4,2	4,9	3,1	6,2	8,6
Biology						
Temperature	(°C)	14,6	11,6	12,6	13,3	11,4
SV (30)	(ml/l)	600	360	600	560	400
O_2	(mg/l)	1,3	1,5	0,9	1,0	2,1

[3] Check after power failure

Tab.6: Test results from 7th December, 2006 to 8th February, 2007

Testing phase:		3	4	4	4	5
		100 %	100%	100%	100%	50 %
Date		7th Dec 06	4th Jan 07	18th Jan 07	25th Jan 07	8th Feb 07
Temperature	(°C)	5/14	5/9	6/9	-4/1	-4/6
Inflow						
Temperature	(°C)	13,5	11,1	14,2	6,5	9,8
CSB	(mg/l)	372	602	446	504	442
BSB_5	(mg/l)	203	200	247	255	240
NH_4-N	(mg/l)	19	24	31	25	40
N_{ent}	(mg/l)	42	40	46	45	45
P_{ent}	(mg/l)	5,0	5,9	6,6	6,5	6,2
pH	(-)	7,4	7,4	7,5	7,2	7,5
Conductivity	(uS/cm)	676	704	677	723	745
AFS (SS)	(mg/l)	172	242	246	248	262
AS_{120}	(ml/l)	7	12	13	14	13
Dulling	(FNU)	128	125	150	182	155
Outflow						
CSB_{hom}	(mg/l)	80	87	123	86	87
CSB_{fil}	(mg/l)	55	62	57	56	59
BSB_5	(mg/l)	24	26	36	22	20
NH_4-N	(mg/l)	26,4	25,0	32,6	23,6	32,4
NO_3-N	(mg/l)	<1,0	<1,0	<1,0	<1,0	<1,0
NO_2-N	(mg/l)	<0,1	0,1	<0,1	<0,1	<0,1
N_{anorg}	(mg/l)	26,9	25,6	33,1	24,1	32,9
N_{ent}	(mg/l)	28	28	34	31	38
P_{ent}	(mg/l)	3,3	4,4	5,1	3,2	5,4
pH	(-)	7,8	7,5	7,7	7,5	7,7
Conductivity	(uS/cm)	736	689	749	669	833
AFS (SS)	(mg/l)	19	9	44	13	7
AS_{120}	(ml/l)	1,5	0,1	5	0,2	<0,1
dulling	(FNU)	10,7	14,5	26,3	15,6	14,2
Biology						
Temperature	(°C)	11,8	9,9	10,7	7,9	8,0
SV (30)	(ml/l)	100	290	50	50	150
O_2	(mg/l)	2,5	3,8	2,8	4,9	4,2

Tab.7: Test results from 15th February, 2007 to 15th March, 2007

Testing phase:		5	6	6	6	6
		150 %	100%	100%	100% PF[4]	100 %
Date		15th Feb 07	22nd Feb 07	1st Mar 07	8th Mar 07	15th Ma 07
Temperature	(°C)	4/9	1/12	6/11	4/14	-1/12
Inflow						
Temperature	(°C)	11,1	10,2	12,2	10,9	11,4
CSB	(mg/l)	536	562	380	614	604
BSB_5	(mg/l)	254	196	175	294	230
NH_4-N	(mg/l)	20	57	19	25	13
N_{ent}	(mg/l)	42	58	33	48	52
P_{ent}	(mg/l)	6,4	7,94	5,1	8,9	7,7
pH	(-)	7,4	7,6	7,5	7,5	7,5
Conductivity	(uS/cm)	696	894	612	773	813
AFS (SS)	(mg/l)	340	290	146	364	362
AS_{120}	(ml/l)	22	23	14	23	20
Dulling	(FNU)	146	201	95,7	188	149
Outflow						
CSB_{hom}	(mg/l)	68	91	66	63	63
CSB_{ni}	(mg/l)	42	65	43	35	46
BSB_5	(mg/l)	21	19	17	19	13
NH_4-N	(mg/l)	22,8	37,8	22,8	23,3	37,2
NO_3-N	(mg/l)	1,1	<1,0	1,0	<1,0	1,4
NO_2-N	(mg/l)	<0,1	<0,1	<0,1	<0,1	0,3
N_{anorg}	(mg/l)	23,9	38,3	23,8	23,8	38,9
N_{ent}	(mg/l)	28	44	26	27	41
P_{ent}	(mg/l)	4,2	4,9	3,6	3,9	4,5
pH	(-)	7,6	7,7	7,6	7,7	7,7
Conductivity	(uS/cm)	744	894	653	731	784
AFS (SS)	(mg/l)	9	31	7	15	29
AS_{120}	(ml/l)	0,5	0	<0,1	<0,1	<0,1
dulling	(FNU)	13,4	15,3	9,5	9,6	9,9
Biology						
Temperature	(°C)	9,0	9,3	9,6	9,6	10,1
SV (30)	(ml/l)	180	130	60	220	180
O_2	(mg/l)	3,5	3,4	3,9	3,7	5,1

[4] Check after power failure

Tab.8: Test results from 22nd March, 2007 to 16th May, 2007

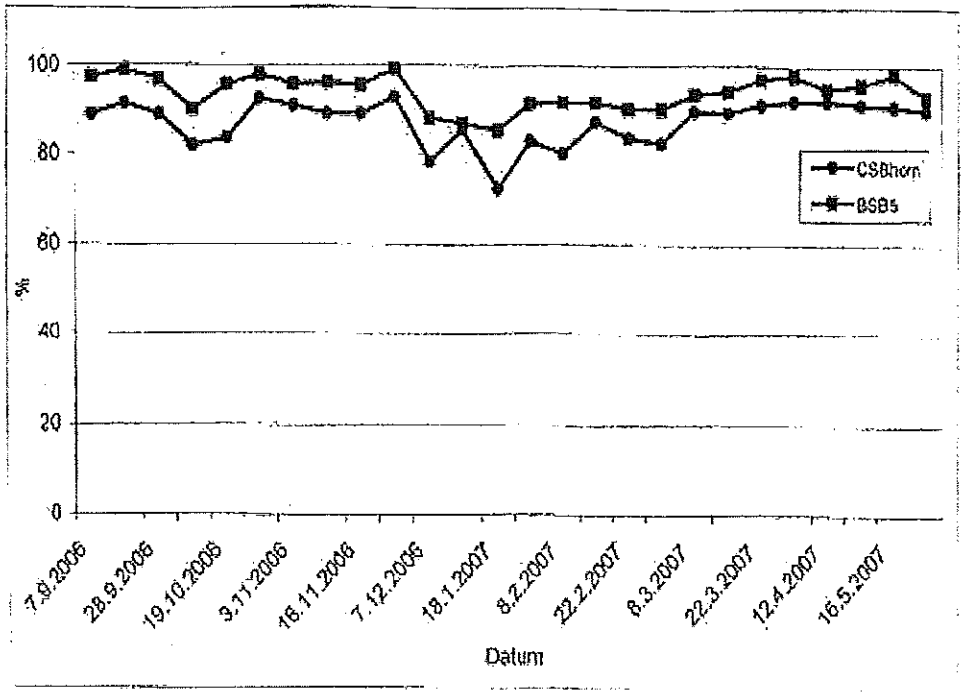
Testing phase:		6	7	7	8	8
		100 %	50%	50%	100%	100 %
Date		22nd Mar 07	5th Apr 07	12th Apr 07	10th Max 07	16th May 07
Temperature	(°C)	1/9	-1/11	4/17	11/19	4/8
Inflow						
Temperature	(°C)	10,6	11,6	13,3	15,6	14,8
CSB	(mg/l)	810	1052	786	464	464
BSB_5	(mg/l)	302	3019	276	142	160
NH_4-N	(mg/l)	28	32	34	31	33
N_{ent}	(mg/l)	46	51	53	40	43
P_{ent}	(mg/l)	9,7	9,9	9,2	6,0	7,8
pH	(-)	7,3	7,2	7,4	7,4	7,4
Conductivity	(uS/cm)	851	807	860	777	743
AFS (SS)	(mg/l)	770	342	516	182	228
AS_{120}	(ml/l)	32	26	31	9	10
Dulling	(FNU)	241	148	237	136	108
Outflow						
CSB_{hom}	(mg/l)	71	83	62	40	42
CSB_{ni}	(mg/l)	63	44	49	34	42
BSB_5	(mg/l)	9	7	14	6	3
NH_4-N	(mg/l)	26,9	27,8	18,3	22,4	25,7
NO_3-N	(mg/l)	1,6	1,8	6,1	2,5	1,8
NO_2-N	(mg/l)	<0,1	0,5	1,2	<0,1	0,3
N_{anorg}	(mg/l)	28,5	30,1	25,6	24,9	27,8
N_{ent}	(mg/l)	29	33	29	26	29
P_{ent}	(mg/l)	4,4	4,9	4,9	1,6	3,4
pH	(-)	7,7	7,7	7,7	7,8	7,9
Conductivity	(uS/cm)	780	813	760	798	899
AFS (SS)	(mg/l)	15	15	18	8	8
AS_{120}	(ml/l)	<0,1	<0,1	0,5	<0,1	<0,1
dulling	(FNU)	7,9	21,9	4,9	6,4	5,9
Biology						
Temperature	(°C)	7,7	10,4	12,0	14,3	12,8
SV (30)	(ml/l)	480	660	66	20	50
O_2	(mg/l)	9,2	5,9	4,9	3,0	5,2

Tab.9: Test results from 24th May, 2007

Testing phase:		8
		100 %
Date		24th May 07
Temperature	(°C)	10/26
Inflow		
Temperature	(°C)	17,3
CSB	(mg/l)	968
BSB_5	(mg/l)	233
NH_4-N	(mg/l)	40,6
N_{ges}	(mg/l)	50
P_{ges}	(mg/l)	6,6
pH	(-)	7,4
Conductivity	(uS/cm)	846
AFS (SS)	(mg/l)	108
AS_{120}	(ml/l)	13
Dulling	(FNU)	132
Outflow		
CSB_{hom}	(mg/l)	96
CSB_{ab}	(mg/l)	37
BSB_5	(mg/l)	16
NH_4-N	(mg/l)	32,4
NO_3-N	(mg/l)	<1,0
NO_2-N	(mg/l)	<0,1
N_{anorg}	(mg/l)	32,9
N_{ges}	(mg/l)	41
P_{ges}	(mg/l)	5,8
pH	(-)	7,0
Conductivity	(uS/cm)	938
AFS (SS)	(mg/l)	20
AS_{120}	(ml/l)	0,7
dulling	(FNU)	34
Biology		
Temperature	(°C)	14,8
SV (30)	(ml/l)	110
O_2	(mg/l)	0,8

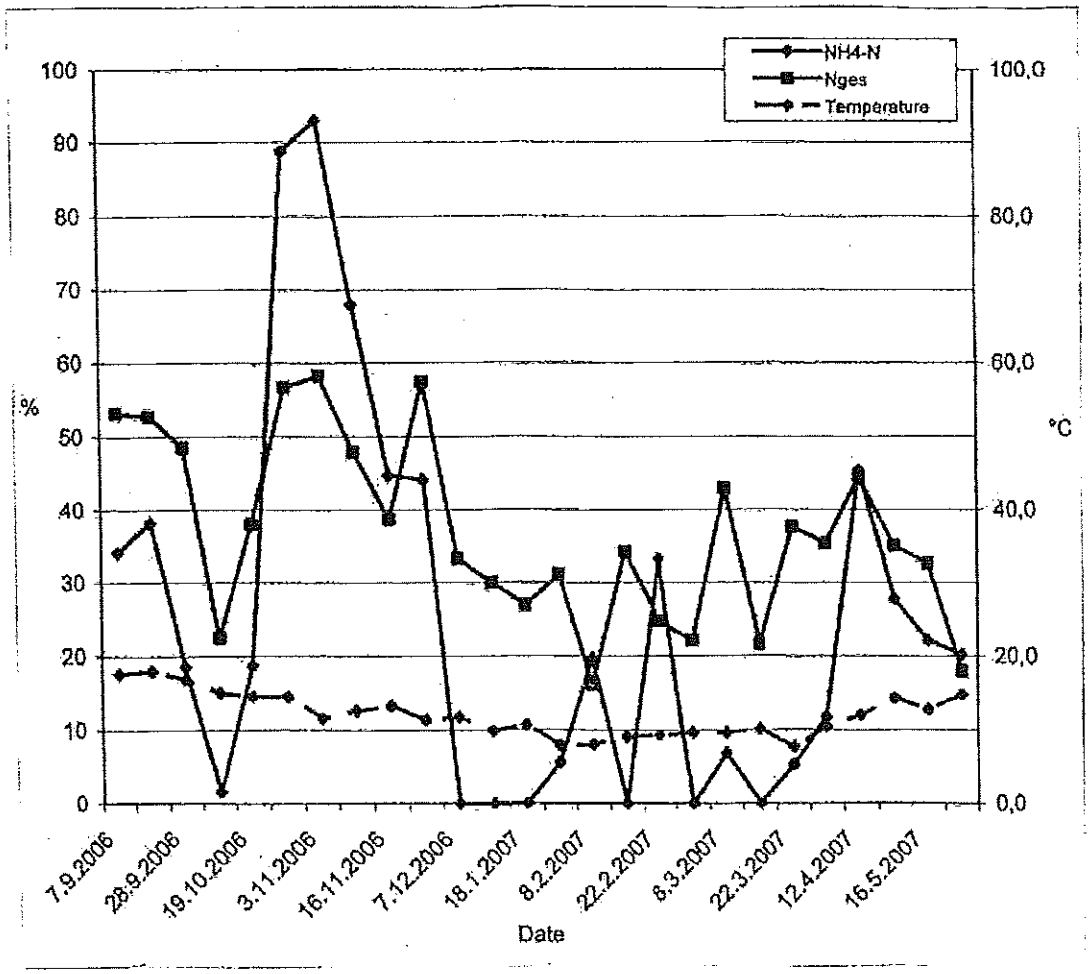
5.3 Graph of the results

To clarify the results all factors are made together in graphs. The following illustrations content all phases.



III.2: Effectiveness of CSB and BSB_5

The average purification performances of 100%-phases were for CSB 87,1 % and for BSB 93,7%.



Ill. 3: Effectiveness of Nh4-N and Nent.

The average purification performances of the 100%-phases are for NH_4-N 23,2% and for N_{ent} 36,8%.

In the beginning there were some difficulties to regulate the sludge return. The nitrification and denitrification worked not before October and November 2006, so that the temperature had sunk as far as the biomass wasn't able anymore to facilitate a nitrification. The temperature went up over 12°C not before April 2007, in the end of the test.

7. EXPENSE OF MAINTAINS AND INDEPENDENT CONTROL

The expense of maintains and control correspondent to the conventional wastewater treatment system.

8. APPENDIX

Description of wastewater treatment system Stählermatic (production statements).

Table of measurements for the wastewater treatment system Stählermatic®

in PE tanks

Type STM8

Purification class C

Type of system		**unit**	**STM8**
Inhabitants			**Until 8 inh.**
Spec. wastewater volume		**1/(inh x d)**	**150,00**
Daily dirty water volume		**m³/d**	**0,75**

Mechanical treatment step with a common mixed-up-sludge-storage:

Two-chamber settlement			1 tank
Volume of pre-clarification			3,00 m³
Measurement of pre-clarification (LxWxH)		mm	2630x1650x880

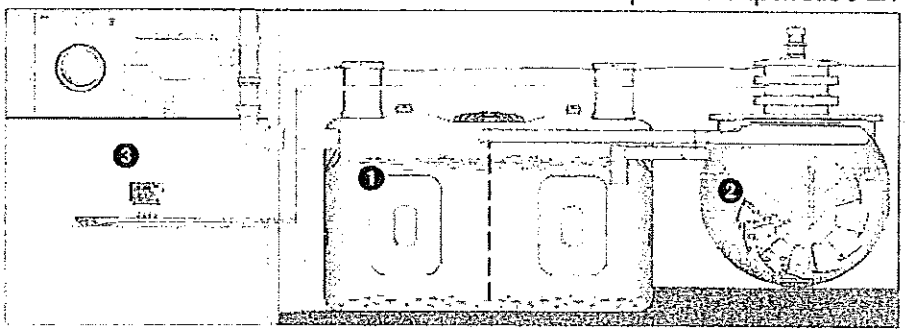
<u>Bio-tank/ final clarification</u>			1 tank
Diameter	D	1.700	1.700
Number of discs	n	pieces	10
Diameter of discs	D	mm	1.200

Bio-tank with integrated final clariication		m³	1,03

<u>Final clarification tank</u>			
Volume	V_{NK}	m³	0,51
Compressor for driving the discs and airation	P	W	30

Function principle of the STM® wastewater treatment system

Beispiel einer Aquamatic 5 EW



*)

The whole domestic wastewater is carried into the pre-clarification tank (1). Here, settleable and floating solids are precipitated in two chambers. At the same time, the wastewater is pre-treated by way of anaerobic micro-organisms (micro-organisms living without oxygen). This pre-treated wastewater then flows into the spherical bio-tank (2) with integrated final clarification.

In this tank, biological degradation of the harmful substances is achieved primarily by way of the oxygen delivered continuously into the bio-tank with the air from the compressor and thanks to the rotating immersed contactor. The air from the compressor enters the tank at the bottom, and drives the rotation of the contactor as it rises up through the wastewater. The immersed contactor comprises a multitude of profiled plastic discs whose extensive surfaces serve as bases for growth of the biologically active film (sessile micro-organisms). The number of contactors is determined by the required film growth surface specified in the technical approval.

The special surface profile of the contactors helps to maintain a supply of oxygen to the bio-film and at the same time to the activated sludge in the wastewater as the contactors rotate.

The air input to "drive" the rotating contactors is supplied from a quiet, low-maintenance diaphragm compressor; this compressor is accommodated as a plug-in unit in the control cabinet (3).

The combination of contactor and activated sludge provides for biological purification of the arising wastewater. Subsequently, the treated wastewater passes into the integrated final clarification section (4), where it comes to rest. The remaining activated sludge, the excess sludge, settles at the bottom of the spherical tank and is from there returned to the first chamber of the pre-clarification by way of an air-lift pump. The air is supplied to this pump from the same diaphragm compressor. The opening of a solenoid valve permits the air to activate the pump for sludge return. The control is thus properly speaking the control for a solenoid valve, which in turn performs the function "sludge return" in the system.

The whole system is factory-set (see also the section ***Control***).

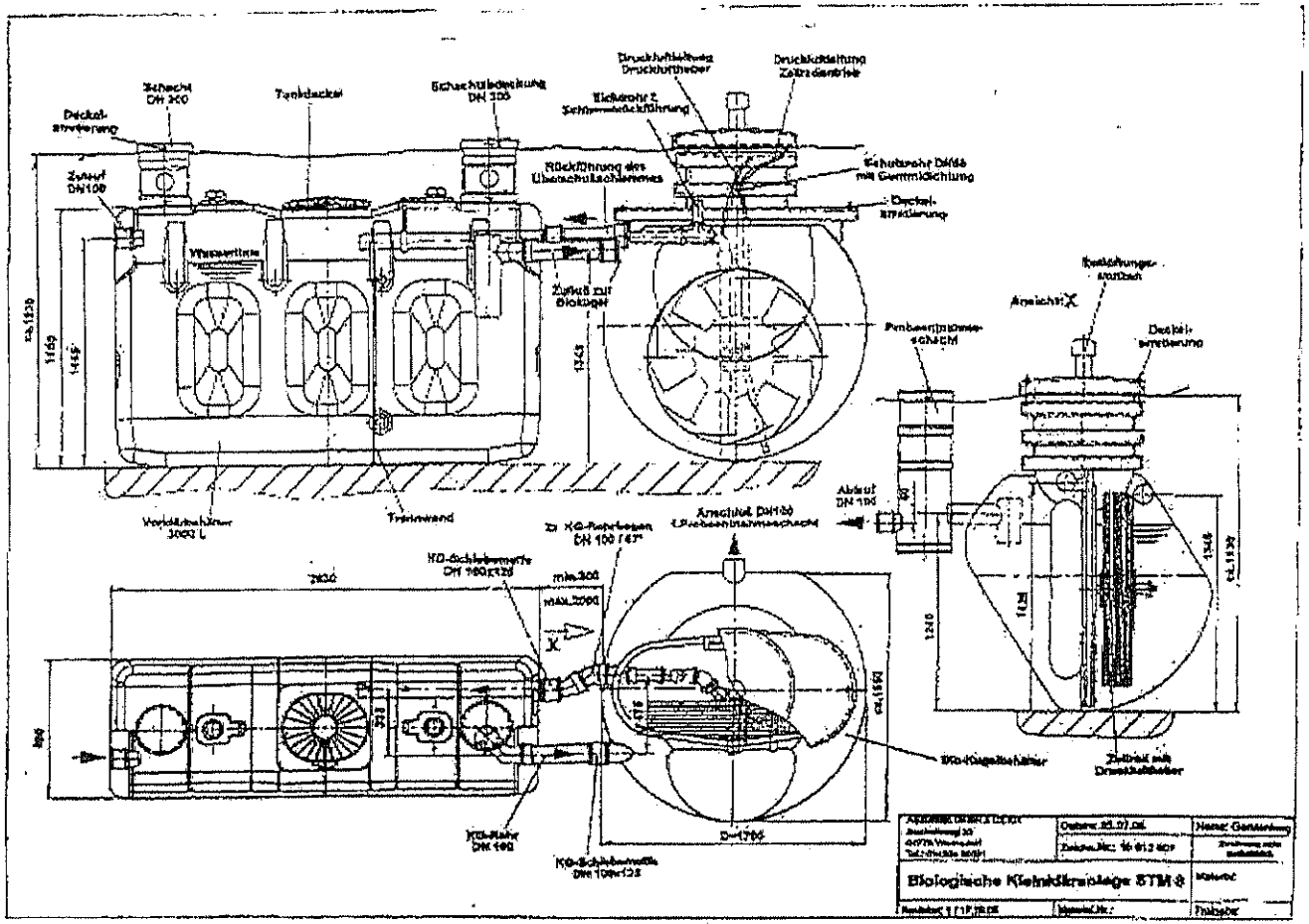
The controller is installed in the small control cabinet (3) and is pre-mounted as a plug-in unit. It is only necessary to connect a normal 230 V AC power supply. The control cabinet also accommodates the air compressor, the power consumption of which is relatively low. To start up the system, the compressor must be plugged in at the socket in the control cabinet, the plug of the control cabinet plugged into a normal socket-outlet in or on the wall of the house, and the switch in the control cabinet set to "ON". If changes are to be made to the settings of the controller, the switch must be set to "OFF" and the plug removed from the socket. A warning signal sounds after a delay of approx. 15 seconds if, while the system is in operation, the power supply is suddenly interrupted or air could escape. The warning signal is fed via batteries in the controller. If such an alarm sounds and the system is temporarily stopped, you must determine and rectify the cause of the fault, or else report the fault to the maintenance contractor. Simple disconnection of the power supply has no negative influences for the system provided it does not last for several days or weeks.

The treated wastewater flows over a weir element (holding back any floating sludge) into the drain or subsequent infiltration module. It is recommended to provide a sampling cover after the system.

Fully biological wastewater treatment systems must only be used to treat domestic wastewater. Wastewater containing disinfectants or large amounts of fat and grease must not be fed into the system (see section ***What does not belong in a biological wastewater treatment system?***).

The operator must perform independent checks (in accordance with the operating instructions). The results are to be documented in a system operation logbook: Read hour counter, check air input and sludge return. The maintenance personnel have received corresponding, system-specific ***maintenance notes*** from the manufacturer. In addition to a function check, the discharge quality is analysed. The actual scope of maintenance is to be based on technical necessities and the legal requirements of the corresponding permission to discharge wastewater into the main drains. Proper maintenance enhances the purification performance and safeguards the warranty given by the manufacturer!

*) Note: The spherical bio-tanks of the systems STM 5, 8 and 10 are identical in size; the systems differ by way of the size of the pre-clarification


Schacht DN 300
Tankdecke
Schachtabdeckung DN 300
Druckluftleitung Druckluftwächter
Druckleitung Zeitrelaisventile
Deckel-Erweiterung
Zulauf DN100
Rückführung des Überschußschlammes
Schutzrohr DN50 mit Gummidichtung
Deckel-Erweiterung
Wasserlinie
Zufluß zur Biologie
Probenentnahme-schacht
Anschluß X
Deckel-Erweiterung
Vorklärbehälter 3000 L
Trennwand
Abfluß DN 100
Anschluß DN150
KG-Schiebemuffe DN 160x125
KG-Rohr DN 160
KG-Schiebemuffe DN 100x125
KG-Kugelschieber
Zuluftrohr mit Drucksicherung
D=1700
Biologische Kleinkläranlage 5TM-S

Aquamatic GmbH & Co KG, Bischofsweg 33, 04779 Wermsdorf

Installation of wastewater treatment systems STM 5, STM 8 and STM 10

Before purchasing a small-scale wastewater treatment system, the future operator should determine whether operation of a decentralised wastewater treatment system is actually permissible, or whether the local authorities are planning to introduce mandatory connection to a collecting drain for central wastewater disposal. The contact partners in connection with operation of a treatment system are the relevant municipal wastewater treatment association and the local water authority which grants permission for the discharging of treated wastewater into the main drains. The applicable ***technical approval certificate 55.5-42*** can be requested or else downloaded via the Aquamatic web site. The tanks are designed for self-installation; the STM components are already pre-mounted.
The requirements of DIN 4261-2 and DIN 1986-3 have been observed.
Each customer receives an installation drawing from which he can derive the necessary excavation dimensions for the installation pit under the given ground conditions. Even though the system is designed for self-installation, there are still several points which the customer must note. It is the responsibility of the customer to plan, install and connect the inflow and outflow piping, or else to have this work done by a corresponding building contractor.
The tanks must stand on a stable base and must be levelled and aligned both horizontally and vertically. It may even be necessary to pour a concrete foundation in the installation pit if a well compacted 30 cm layer of gravel is still not sufficient to guarantee a firm standing. When burying the spherical bio-tank, the following points must be observed:
The space around the tank must not simply be filled with sand and compacted. Instead, a layer of approx. 50 cm of sand is to be filled around the spherical bio-tank after levelling. Once a firm standing is guaranteed, the tank must be filled up to the level of the outlet with water. Now the remaining space can be filled and compacted (using a hand ram). The tanks must be installed at least 50 cm under the ground or else covered appropriately as protection against frost and heat.
It is not only necessary to check the gradient for the flow through to the outlet. The pre-clarification tank must be bedded progressively to preventing denting of the PE tank, i.e. water/wastewater is to be filled into the tank to the same level as dry gravel is filled and compacted in the tank pit. When compacting the individual layers, it is not permissible to use a plate vibrator against the tank walls. The gravel jacket around the tank must be at least 20 cm thick.
When burying a complete system, it must be noted that the spaces between the pre-clarification tank and the spherical bio-tank must also be filled with dry gravel and properly compacted. The gravel should be well graded and should not contain sharp-edged stones. It is advisable to plan installation during a frost-free and dry weather period.
When laying hoses, ensure that no water sacks are possible and thus that no condensation can be formed.
If an existing concrete pit is used for pre-clarification, then the minimum treatment volume appropriate to the number of persons must be guaranteed. The proper sealing of the old pit must be checked, and if necessary restored, and the piping and pipe connections are to be matched accordingly. A protective pipe is to be laid for the hoses. If necessary, the PE tank can either be shortened or else extended with a dome attachment - to permit installation at a higher or deeper level. Where a tank is extended with a dome for deeper installation, the corresponding lightweight filler plates must be installed.
The tanks are for walk-on installation, but are not designed to withstand vehicle traffic! To achieve optimum ventilation of the bio-tank, the shaft cover should preferably stand 10 cm above the ground level. In green areas, lighter filler plates can be used to compensate height differences. Compensation of ground height differences with earth, however, should not exceed approx. 20 cm, so as not to place additional loads on the tanks. If the customer wishes the area around the tank to be paved, then a supporting covering must be chosen and the customer/contractor must supply proof that any arising loads have been distributed away from the tanks, as otherwise the warranty is voided. The technical approval specifies that the overall system is not buoyancy-proof. The system can be ventilated above the roof gutter.
Provisions must be made to prevent vehicles accidentally driving over the system. The covers must be bolted firmly, as prescribed, for reasons of child safety.
It is recommended to have the tanks delivered sufficiently early to enable the tanks to be buried and filled before system installation and commissioning begins.
If the system is combined with infiltration modules, they cannot be installed using the sand used to bed

Aquamatic GmbH & Co KG, Bischofsweg 33, 04779 Wermsdorf

Operating instructions for an STM wastewater treatment system

Successful commissioning of the system is assumed to mean that all prerequisites are provided for continuous operation. The owners and operators of the system are encouraged to themselves verify the proper functioning of the system on a weekly basis and to document these checks in written form in or as an annex to the system logbook.
Regular maintenance is to be performed in accordance with the applicable statutory regulations.
The system maintenance must be entrusted to an authorised maintenance contractor, and wastewater samples are to be taken at the discharge (sampling cover after final clarification) as prescribed by the local regulations. Samples may also be taken directly from the final clarification!
The stipulated intervals for sampling will be specified in the correspondence received from the local water authority regarding wastewater discharge into the main drains (at least once per year!).
The analysis reports must be kept for at least 5 years – unless the authority stipulates otherwise.
The system operator must make visual checks of the proper functioning and must document the checks in the enclosed report. It can be calculated from the hour counters, whether or not the system is functioning continuously.
No code has been saved to prevent changes at the controller, but modifications with regard to the return pumping of sludge should nevertheless only be made by the maintenance personnel.
If irregularities are noticed in operation, then the responsible maintenance contractor and/or the manufacturer should be informed without delay, see also the maintenance notes for maintenance personnel and the warranty terms".

You should note that a fully biological system which functions with activated sludge requires a certain time before a bio-film is formed and a biological balance is achieved in the bio-tank. It takes this period of time for the desired discharge parameters to be attained. Various factors accelerate or hinder this process. A positive effect is already achieved, if you observe the notes regarding waste which should not be introduced into the wastewater treatment system.
The bio-system will be hampered, or even destroyed, if antibacterial substances are introduced. Please note, therefore, that illnesses in the family may also influence the discharge parameters temporarily. Longer periods with heavy frosts and a very low water consumption similarly impair the functioning of a biological wastewater treatment system.