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Male ļ istilne naprave do 50 PE - 5. del: Filtrirne naprave za predļ iģļ ene hiģne odpadne vode

Small wastewater treatment systems up to 50 PT - Part 5: Pre-treated effluent filtration systems

Kleinkläranlagen für bis zu 50 EW - Teil 5: Filtrationsanlagen für vorbehandeltes häusliches Schmutzwasser

Petites installations de traitement des eaux usées jusqu'a 50 EH - Partie 5 : Systemes de filtration d'effluent prétraité

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Small wastewater treatment systems up to 50 PT - Part 5: Pre-treated Effluent Filtration systems

Petites installations de traitement des eaux usées jusqu'à 50 EH - Partie 5 : Systèmes de filtration d'effluent prétraité

Kleinkläranlagen für bis zu 50 EW - Teil 5: Filtrationsanlagen für vorbehandeltes häusliches Schmutzwasser

This Technical Report was approved by CEN on 7 April 2008. It has been drawn up by the Technical Committee CEN/TC 165.

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Foreword

This document (CEN/TR 12566-5:2008) has been prepared by Technical Committee CEN/TC 165 “Wastewater engineering”, the secretariat of which is held by DIN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

The standard series EN 12566 "Small wastewater treatment systems for up to 50 PT" contains the following parts:

— Part 1: Prefabricated septic tanks;

NOTE 1 This part specifies the requirements and test methods for prefabricated septic tank units.

— Part 2: Soil infiltration systems;

NOTE 2 Code of Practice for in-situ constructed soil infiltration systems. No treatment requirements are specified.

— Part 3: Packaged and/or site assembled domestic wastewater treatment plants;

NOTE 3 This part specifies the requirements and test methods used to evaluate packaged wastewater treatment plants which are required to treat wastewater to a declared quality.

— Part 4: Septic tanks assembled in situ from prefabricated kits;

— Part 5: Pre-treated effluent filtration systems (this Technical Report);

— Part 6: Prefabricated treatment units for septic tank effluent (in preparation);

— Part 7: Prefabricated tertiary treatment units (in preparation).

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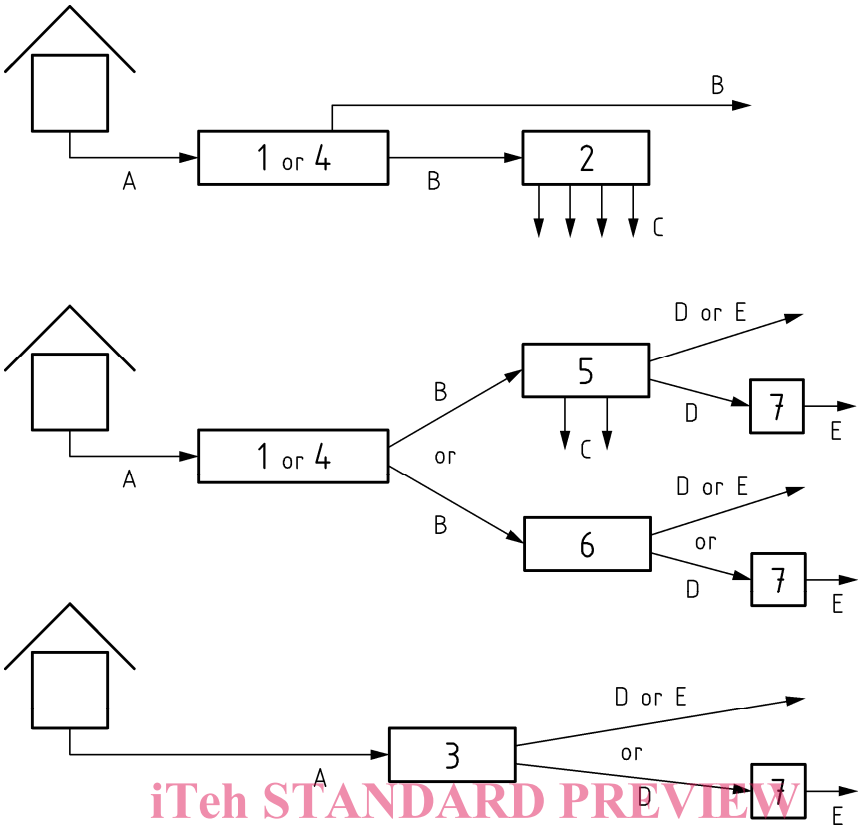

Key

A: Raw domestic wastewater

B: Septic tank effluent

C: Treated infiltrated effluent

D: Treated wastewater

E: Tertiary treated wastewater

1: Prefabricated septic tank

2: Soil infiltration system

3: Packaged and/or site assembled domestic wastewater treatment plant

4: Septic tank assembled in situ from prefabricated kit

5: Pre-treated effluent filtration system

6: Prefabricated treatment unit used for septic tank effluent

7: Prefabricated tertiary treatment unit

Figure 1 – Scheme related to the arrangement of the parts of EN 12566

Introduction

Filtration systems have effluent collection systems and the effluent quality can be measured. The systems described are intended to illustrate the main principles of construction and are subject to variation. The regulatory authorities shall be consulted for suitability. All filtration systems shall be designed to accept the total daily flow from at least one house.

No treatment efficiencies are indicated in this document for any particular system.

The dimensional values and ranges given in the document were agreed as sufficient to provide acceptable treatment for basic parameters in the majority of simple situations.

Some specific dimensional values and ranges can be found in country's codes of practice and regulations given in the bibliography.

1 Scope

This Technical Report provides details of filtration systems used for applications ranging from a single house up to and included 50 PT. The filtration systems receive domestic wastewater from septic tanks manufactured according to the requirements given in EN 12566-1 and EN 12566-4.

This document is a code of practice and gives design parameters, construction details, installation and component requirements for constructed sand filters and subsurface flow sand or gravel reed beds.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1085:2007, *Wastewater treatment – Vocabulary*

EN 12050-2, *Wastewater lifting plants for buildings and sites - Principles of construction and testing - Part 2: Lifting plants for faecal-free wastewater*

EN 13252, *Geotextiles and geotextile-related products — Required characteristics for use in drainage systems*

3 Terms and definitions

For the purposes of this Technical Report, the terms and definitions given in EN 1085:2007 and the following apply.

3.1
biological layer
biological film which grows on the top of the filter material when pre-treated effluent from the septic tank infiltrates the filter material

3.2
buried filter
filter covered with a layer of soil

3.3
collection layer
layer in which collection pipes collect treated waste water that has passed through the filter

3.4
collection pipe
perforated pipe placed at the bottom within the collection layer connected to the collection chamber

3.5
collection chamber
chamber receiving treated waste water from the collection layer and discharging through the pipe to the outfall

NOTE It is designed to enable effluent sampling.

3.6
collection trench
mound of granular fill material on the base of the excavation at the outlet side, in which a collection pipe collects water which has passed through the filter

3.7
covered filter
filter usually covered with pebbles or gravel

3.8
connection pipe
non-perforated pipe used to connect the septic tank to the distribution chamber or the collection pipe(s) to an external collection chamber

3.9
distribution chamber
chamber allowing even gravity distribution of septic tank effluent via the distribution pipes

3.10
distribution layer
layer of the system composed of granular fill material in which pre-treated effluent from the septic tank is discharged through infiltration pipes

3.11
distribution pipe
non-perforated pipe used to connect the distribution chamber to a single infiltration pipe

3.12
dosing chamber
small tank receiving pre-treated effluent from the septic tank and containing a dosing device (e.g. a pump, a hydraulic siphon or a tipping trough) which automatically discharges the desired volume

3.13
end connections
perforated and non-perforated pipes and fittings that connect the lower ends of infiltration pipes, and can enable airflow between infiltration pipes

NOTE The connecting fittings may incorporate ventilation and access provision.

3.14
filter area
surface area of the filter material

3.15
filter material
inert material with various particle or pore sizes used for filtration

NOTE This material, often sand, placed beneath the distribution layer provides both an area for biological growth and a degree of filtration for the pre-treated effluent from the septic tank.

3.16
filtration system
construction of infiltration pipes, filter material and a collection system used for treating pre-treated effluent

NOTE The infiltration pipes may be located either in trenches or beds which can be singular or multiple.

3.17
granular fill material
inert material in which the infiltration pipes are placed in the distribution or collection layers

Note It may also be used to replace native soil when used as backfill.

3.18
gravel filter
constructed filter using gravel as the filter material

3.19
horizontal reed bed
open gravel filter planted with macrophytes where the effluent is treated by flowing horizontally from the distribution to the collection point

NOTE Local practice may dictate the use of specific macrophytes, reeds or plants.

3.20
horizontal filter
filter where the effluent is treated by flowing horizontally from the distribution to the collection point

3.21
impermeable film
inert membrane, which is impermeable to liquid

3.22
infiltration pipe
perforated pipe through which the pre-treated effluent from the septic tank is discharged into the treatment installation

3.23
installation area
area of septic tank and filtration system excluding the outfall

3.24
land drain
surface or subsurface channel for the transportation of rainwater

NOTE They are used to dewater ground and divert the natural flow of surface and subsurface water away from the filtration system.

3.25
lining
material used to form a container within an excavation

3.26
mesh
fabric, resistant to decomposition with hole diameters approximately 1 mm, which is permeable to liquid and air but prevents solid particles from passing through it

3.27
open filter
uncovered filter

3.28
prefilter
device used to protect the treatment system (to prevent clogging of the filtration system, particularly the infiltration pipes)

3.29
reed bed
open filter planted with macrophytes

NOTE Local practice may dictate the use of specific macrophytes, reeds or plants.

3.30
sand filter
constructed filter using sand as the filter material

3.31
vertical reed bed
open sand or gravel filter planted with macrophytes where the effluent is treated by flowing vertically

NOTE Local practice may dictate the use of specific macrophytes, reeds or plants.

3.32
vertical filter
filter where the effluent is treated by flowing vertically between the distribution and collection layer

3.33
water table
level below which the ground is saturated with water

4 Description of filters

The systems described in this document are:

— Buried vertical sand filter;

— Covered vertical sand filter;

— Open vertical sand filter with reeds;

NOTE 1 This system is also known as vertical reed bed.

— Open vertical gravel filter with reeds;

NOTE 2 Local practice may dictate the use of specific macrophytes, reeds or plants.

NOTE 3 In some countries, this system is also known as a vertical reed bed.

— Open horizontal gravel filter with reeds;

NOTE 4 Local practice may dictate the use of specific macrophytes, reeds or plants.

NOTE 5 In some countries, this system is also known as a horizontal reed bed.

Filters should be described according to Table 1:

Table 1 — Description of filters

Filter name	Buried vertical sand filter	Covered vertical sand filter	Open vertical sand filter with reeds	Open vertical gravel filter with reeds	Open horizontal gravel filter with reeds
Surface	Buried	Covered	Open with reeds		
Flow	Vertical	Vertical	Vertical	Vertical	Horizontal
Filtration media	Sand	Sand	Sand	Gravel	Gravel

5 Design Parameters

5.1 General

A filtration system may use watertight or non-watertight construction depending upon the circumstances and regulations. Depending on the local regulations, non watertight filtration systems may not be acceptable.

NOTE A system that is not watertight may allow a degree of infiltration into the soil. The soil can provide additional treatment. When the filter discharges a low volume, more of the discharge infiltrates. At higher volume discharges, more of the discharge flows to the outfall.

The biological layer may limit the infiltration into the filter material. The layer's properties depend on the filter material's permeability, the specific hydraulic loading rate, the organic and oxygen conditions.

The permeability of the filter material is determined by grain size distribution (sand type), compaction and discontinuities.

The correct design of the filter area is crucial in order to avoid blockage.

The design parameters given enable a system to be selected to meet the following pollutant concentration requirements:

— organic matter;

— suspended solids;

— phosphorus (see Annex D);

— nitrogen;

— pathogens.

Local regulations or guidance may determine acceptable levels for each parameter.

5.2 Site considerations

5.2.1 Climatic conditions

When designing, constructing and locating the filtration system, climatic conditions in the area such as extremes of temperature, dryness, rainfall and snow should be taken into consideration.

Factors influencing excavation depths include:

— frost cover;

— protection from disturbance;

— depth of the outlet pipe from the septic tank;

— depth to water table;

— depth to bedrock.

5.2.2 Water table or bed rock

Hydrogeological statistics and/or site investigations should be used to determine the seasonally highest groundwater table.

European countries regulations and practices require depths of unsaturated soil to be present between the base of a non watertight filtration system and the seasonally highest level of the water table or bed rock. Depending of the vulnerability of the ground water or bed rock the requirement for the depth of unsaturated soil can vary between 0,2 m to over 1,0 m.

Where the required dimensions can not be achieved, a watertight filtration system or alternative arrangements (raised filtration systems, etc.) shall be used.