SLOVENSKI STANDARD
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Ļistilne naprave za odpadno vodo ï 16. del: Fiziļna (mehanska) filtracija

Wastewater treatment plants - Part 16: Physical (mechanical) filtration

Kläranlagen - Teil 16: Abwasserfiltration

Stations d'épuration - Partie 16: Filtration physique (mécanique)

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Wastewater treatment plants - Part 16: Physical (mechanical) filtration

Stations d'épuration - Partie 16: Filtration physique (mécanique)

Kläranlagen - Teil 16: Abwasserfiltration

This European Standard was approved by CEN on 28 July 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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Foreword

This European Standard (EN 12255-16:2005) has been prepared by Technical Committee CEN/TC 165 “waste water engineering”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2006, and conflicting national standards shall be withdrawn at the latest by March 2006.

It is the sixteenth part prepared by the Working Groups CEN/TC 165/WG 42 and 43 relating to the general requirements and processes for treatment plants for a total number of inhabitants and population equivalents (PT) over 50. EN 12255 with the generic title "Wastewater treatment plants" consists of the following Parts:

— Part 1: General construction principles

— Part 3: Preliminary treatment

— Part 4: Primary settlement

— Part 5: Lagooning processes

— Part 6: Activated sludge process

— Part 7: Biological fixed-film reactors

— Part 8: Sludge treatment and storage

— Part 9: Odour control and ventilation

— Part 10: Safety principles

— Part 11: General data required

— Part 12: Control and automation

— Part 13: Chemical treatment — Treatment of wastewater by precipitation/flocculation

— Part 14: Disinfection

— Part 15: Measurement of the oxygen transfer in clean water in aeration tanks of activated sludge plants

— Part 16: Physical (mechanical) filtration

NOTE For requirements on pumping installations at wastewater treatment plants, provided initially as Part 2 "Pumping installations for wastewater treatment plants", see EN 752-6 "Drain and sewer systems outside buildings — Part 6: Pumping installations.

The parts EN 12255-1, EN 12255-3 to EN 12255-8 and EN 12255-10 and EN 12255-11 were implemented together as a European package (Resolution BT 152/1998).

Differences in wastewater treatment throughout Europe have led to a variety of systems being developed. This European Standard gives fundamental information about the systems; this European Standard has not attempted to specify all available systems.

Detailed information additional to that contained in this European Standard may be obtained by referring to the bibliography.

The primary application is for wastewater treatment plants designed for the treatment of domestic and municipal wastewater.

Physical filtration plant include gravity filters (static-bed or moving-bed types) and sieves (microstrainers and drum filters).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard specifies design principles and performance requirements for tertiary clarification (receiving effluent from secondary treatment) by physical filtration plant at wastewater treatment plants serving more than 50 PT.

2 Normative references

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

EN 1085:1997, *Wastewater treatment — Vocabulary*

EN 12255–1, *Wastewater treatment plants — Part 1: General construction principles*

EN 12255–10, *Wastewater treatment plants — Part 10: Safety principles*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 1085:1997 and the following apply.

3.1
granular media filter
bed of filter media which is submerged in either an upflow or downflow of effluent to remove solids within the bed

3.2
drum filter or microstrainer
cylindrical sieve or cloth filter which rotates about a horizontal axis and is partially-immersed in a horizontal flow of effluent to remove solids

4 Requirements

4.1 General

Physical filtration processes can include the following:

— granular media filters;

— sieves such as microstrainers and drum filters.

Filter processes are used to remove fine suspended solids from treated wastewater by mechanical filtration. Where aeration is involved, it is normally limited to air scouring to remove solids accumulation trapped by filtration. Physical filters may also be designed to remove phosphate.

4.2 Process types

4.2.1 Granular media filters

4.2.1.1 Static bed filter

An upflow or downflow of effluent percolates rapidly through a bed of filter media trapping solids within the bed. For shallow bed and downflow filters, solids are predominantly captured at the surface. The rate of filtration is high causing a rapid accumulation of solids in the bed and a high rate of increase in headloss. At regular intervals a bed shall be taken out of service and washed using filtered effluent with or without air scour to remove accumulated solids. Washing can be affected by either a pumped or siphonic upflow of filtered effluent across the entire bed or by a travelling bridge washing individual compartments.

4.2.1.2 Moving-bed filter (continuous operation)

In this style of filter, an upflow or downflow of effluent passes continuously through a bed of mineral media to remove solids. An air lift raises mineral media from the bottom of the bed for washing and returns cleaned media to the top of the bed, enabling continuous filtration.

4.2.2 Microstrainers and drum filters

Microstrainers and drum filters are based on a sieve or cloth covered cylinder rotating horizontally about the longitudinal axis. The cylinder is suspended in a tank to which the effluent to be filtered is supplied. Drum filters are partially or completely submerged in the effluent to be filtered, whilst a microstrainer cylinder is only immersed to about two thirds of its diameter. In microstrainers the liquid flow is from inside to outside the cylinder. In drum filters the liquid flow is from the outside to inside the cylinder.

For a microstrainer, backwash nozzles situated vertically above the rotating cylinder, direct effluent onto the upper cylinder surface and dislodge trapped solids into a trough within the rotating cylinder. For a drum filter a backwash pump with nozzles situated laterally and close to the filter cloth surface induces flow of filtered effluent back through the cloth against the main flow of the wastewater. The flow of filtered effluent dislodges trapped solids which are then pumped away from the equipment. Drum filters generally do not rotate except when backwashing takes place.

5 Planning

The choice of physical filtration process depends on the size of the treatment plant, space available, the type, quality, quantity and variability of effluent to be treated, the final quality of effluent required, and the frequency of maintenance that is required for the process.

Physical filtration may be used to supplement efficient secondary solids separation.

The following factors shall be considered in design:

— type and efficiency of secondary treatment and clarification processes;

— capacity and dimensions of the filtration plant;

— quality required for treated effluent;

— range and variation in hydraulic or suspended solids loads;

— prevention of dead zones and detrimental deposition in tanks or channels;

— establishment of multiple units or other technical means to ensure maintenance of required final effluent quality if one or more units are out of operation;

— final destination of the liquors generated from washing;

— head loss to be minimised;

— measurement and control;

— media specification;

— tests to determine the required dimensions of filter media or cloths.

6 Process design

6.1 Design parameters

The following operational parameters shall be considered and values shall be selected which are appropriate for the required level of treatment:

— surface loading rate required (m^3/m^2 x h);

— suspended solids load (kg/h);

— pore or media size;

— maximum wash water requirement as a percentage of the treated flow rate;

— frequency of backwashing to maintain filtration rate;

— disposal route for backwash liquors;

— control of influent flows to the treatment process during washing;

— control of excessive instantaneous wash water flow rates.

6.2 Selection of filter media

6.2.1 General

Filter media should have an extensive surface area with narrow pores or channels designed to flocculate and trap suspended solids, and to allow effluent flow with minimum head loss. The filter media shall be capable of cleansing through some form of backwashing or scouring.

Influents to the filters include varying proportions of colloidal to non-colloidal suspended solids. Microstrainers can be less suited to removal of colloidal material than other processes.

Filterability tests should be carried out and the required effluent quality shall be considered before making a choice of process for physical filtration.

The following factors shall also be considered in choice of media:

— design life;

— quality of influent;

— requirements for replacement;

— ease of replacement;