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**Avlopp – Reningsanläggning –
Del 14: Desinfektion**

**Wastewater treatment plants –
Part 14: Disinfection**

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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.

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EN 12255-14:2003 (E)

Contents

	page
Foreword	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 Design	6
5 Requirements	13
Bibliography	15

Foreword

This document (EN 12255-14:2003) has been prepared by Technical Committee CEN/TC 165 “Wastewater 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of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

This is the fourteenth Part prepared by the Working Groups CEN/TC 165/WG 42 and WG 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 processes*
- *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*.

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).

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

EN 12255-14:2003 (E)

1 Scope

This European Standard specifies performance requirements for the disinfection of effluents from wastewater treatment plants.

The primary application is for wastewater treatment plants designed for the treatment of domestic and municipal wastewater for over 50 PT.

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

Detailed information additional to that contained in this standard can be obtained by referring to the bibliography.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1085:1997, *Wastewater treatment — Vocabulary*.

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

EN 12255-5, *Wastewater treatment plants — Part 5: Lagooning processes*.

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

EN 12255-12, *Wastewater treatment plants — Part 12: Control and automation*.

3 Terms and definitions

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

3.1

residual concentration

concentration of a disinfectant in the final effluent of the wastewater treatment plant

3.2

UV radiation (UV dose)

the received UV-dose over the duration of the UV irradiation along the pathway of an infinitesimal small water volume expressed in J/m²

3.3

UV intensity

quotient of the energy flux of the UV radiation received on the surface of an infinitesimal small area divided by the size of the area. The unit of UV intensity is W/m²

3.4

UV-reactor

a closed vessel reactor or an open channel section with an assembly of UV-lamps irradiating the water passing through the UV-reactor

3.5

bioassay

method to determine the effective UV radiation of an UV system using a calibrated test organism. Calibration of test organisms is done in a laboratory device with an UV radiation of a homogeneous and measured intensity (see [15], [20])

3.6

ozone demand

amount of ozone required to attain a certain residual ozone concentration in the effluent of a treatment stage. The ozone demand includes the ozone consumption due to the decay of the ozone and due to reactions of ozone with any of the pollutants in the water

3.7

chlorinator

equipment for dosing chlorine gas into water

3.8

contact basin

tank for providing the required detention time for certain reactions to take place

3.9

membrane

semipermeable material used as filter media in membrane filtration processes. Membranes normally are flat sheets, tubes or hollow fibres composed of a thin semipermeable layer on a structural material

3.10

module

unit containing an assembly of membranes and systems for distributing the raw water inflow, and systems for collecting permeate and the concentrate

3.11

permeate

fluids passing through the membrane in membrane filtration processes

3.12

concentrate

fluids enriched with substances not passing the membranes in membrane filtration processes

3.13

flux

membrane surface area specific rate of fluids passing through the membrane in membrane filtration processes normally indicated in $l/(m^2 \cdot h)$. The flux is mainly determined by the wastewater quality, the type of membrane used, the mode of filtration and the transmembrane pressure

3.14

transmembrane pressure

pressure difference between concentrate and permeate side of the membrane

3.15

cross flow filtration

filtration with a significant flow parallel to the membrane surface, which is intended to prevent substances from accumulating on the surface of the membrane

3.16

dead end filtration

filtration without a significant flow parallel to the membrane surface

3.17

perpendicular mixing

mixing vertical to floating direction

EN 12255-14:2003 (E)

4 Design

4.1 General

Disinfection processes are used to improve the microbiological quality of effluents, if required, e.g. because of sensitive uses of the receiving waters downstream. A disinfection of effluents from wastewater treatment plants can be required to contribute to public health to prevent a contamination by human pathogens of:

- waters used for bathing and other recreational activities involving immersion;
- shellfisheries;
- treated wastewater to be reused for unrestricted irrigation or as process water or grey water;
- sources used for potable water supply.

A disinfection of effluents from wastewater treatment can be attained by two possible mechanisms:

- inactivation of micro-organisms rendering micro-organisms incapable of reproduction;
- removing the micro-organisms from an effluent (e.g. by filtration) but not necessarily inactivating them.

Processes most commonly used for disinfecting wastewater by removing inactivating micro-organisms are:

- Ultraviolet (UV)-radiation;
- Chlorination;
- Ozonation.

Processes most commonly used for disinfecting wastewater by removing respectively reducing micro-organisms are:

- membrane filtration;
- effluent maturation ponds;
- soil filtration.

4.2 Planning

4.2.1 General

Disinfection, if required, should be the last stage in the wastewater treatment process. Poor performance by upstream processes will affect the performance of the disinfection process. If an effluent has to be stored prior to discharge – e.g. in case of discharge to tidal water or irrigation – it should be preferably disinfected after storage directly prior to discharge in order to limit regrowth hazards.

When planning disinfection systems consideration shall be given to:

- a) level of disinfection required;
- b) stability and efficiency of disinfection process;
- c) technological level of disinfection process;
- d) operational requirements;
- e) safety hazards;