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Čistilne naprave za odpadno vodo - 10. del: Varnostna načela

Wastewater treatment plants - Part 10: Safety principles

Kläranlagen - Teil 10: Sicherheitstechnische Baugrundsätze

Stations d'épuration - Partie 10 : Principes de sécurité

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Wastewater treatment plants - Part 10: Safety principles

Stations d'épuration - Partie 10 : Principes de sécurité

Kläranlagen - Teil 10: Sicherheitstechnische Baugrundsätze

This European Standard was approved by CEN on 6 February 2023.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 12255-10:2023) 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of an identical text or by endorsement, at the latest by September 2023, and conflicting national standards shall be withdrawn at the latest by September 2023.

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

This document supersedes EN 12255-10:2000.

This is the tenth part prepared by Working Group CEN/TC 165/WG 40 relating to the general requirements and processes for treatment plants for a total number of inhabitants and population equivalents (PT) over 50.

The EN 12255 series, Wastewater treatment plants, consists of the following parts:

— *Part 1: General construction principles*

— *Part 2: Storm management systems*

— *Part 3: Preliminary treatment*

— *Part 4: Primary treatment*

— *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 Part 2 is under preparation.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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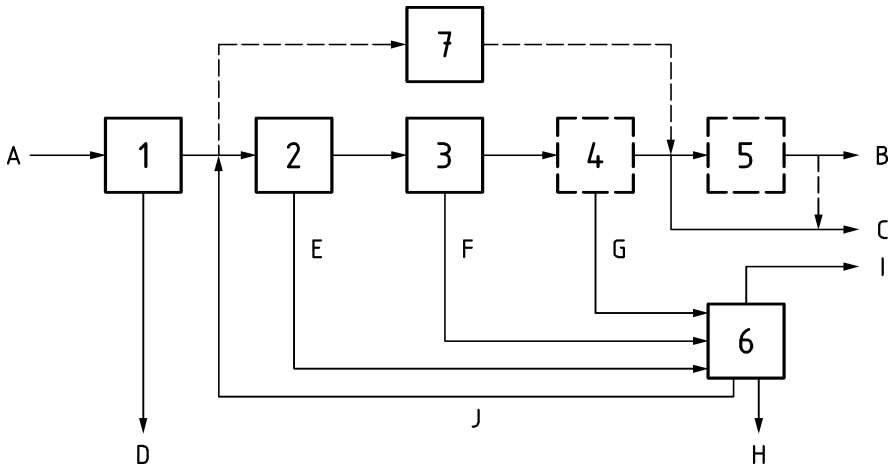
Introduction

Differences in wastewater treatment throughout Europe have led to a variety of systems being developed. This document gives fundamental information about the systems; this document has not attempted to specify all available systems. A generic arrangement of wastewater treatment plants is illustrated below in Figure 1:



Key

1 preliminary treatment
2 primary treatment
3 secondary treatment
4 tertiary treatment
5 additional treatment (e.g. disinfection or removal of micropollutants)
6 sludge treatment
7 lagoons (as an alternative)
A raw wastewater
B effluent for re-use (e.g. irrigation)
C discharged effluent
D screenings and grit
E primary sludge
F secondary sludge
G tertiary sludge
H stabilized sludge
I digester gas
J returned water from dewatering

Figure 1 — Schematic diagram of wastewater treatment plants

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

NOTE For requirements on pumping installations at wastewater treatment plants see EN 752, *Drain and sewer systems outside buildings* and the EN 16932 series, *Drain and sewer systems outside buildings — Pumping systems*:

— *Part 1: General requirements;*

— *Part 2: Positive pressure systems;*

— *Part 3: Vacuum systems.*

1 Scope

This document defines minimum safety requirements to be observed in the planning, construction or reconstruction of wastewater treatment plants.

The purpose of this document is to ensure the protection of people.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 476, *General requirements for components used in drains and sewers*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
confined space
space in which the ventilation is restricted to the extent that special safety precautions need to be taken

[SOURCE: EN 16323:2014, term number 2.1.3.4]

3.2
manway
tightly lockable access opening in containers, tanks, vessels, boilers, bunkers etc. through which a person can enter to perform inspection or repair work

4 Symbols and abbreviations

ATEX Explosive Atmospheres (ATEX) Directives (2014/34/EU and 1999/92/EC)

LEL lower explosive limit

5 Requirements

5.1 General

Compliance with safety regulations is an integral part of the design and construction of the facilities. National or local regulations can exceed the requirements laid down in this document. In those jurisdictions that are bound by European Commission Directives, many aspects of safety have been enshrined in law so are not repeated in this document. For places not covered by such laws these Directives can be a useful guide for good practice. Accordingly, a list of the key Directives is given in Annex B in addition to a list of standards that contain detailed requirements (e.g. for machinery installations).

The primary consideration should be the avoidance of accidents and harmful incidents where foreseeable. Consideration of mitigation measures should be an additional layer of protection not an alternative.

5.2 Confined spaces

Toxic, explosive or oxygen deficient atmospheres can easily arise in confined spaces either enclosed or sunken where gasses can collect. They can also lead to high temperatures arising (e.g. inside protective clothing) which can make them unsuitable environments to carry out work. Typically, confined spaces in wastewater treatment plants include:

— conduits;

— shafts, inspection manholes, seepage water shafts;

— basins (covered or sunken);

— drop structures;

— valve structures;

— inlet and outlet structures;

— sunken or enclosed screening plants;

— pumping stations (dry or wet wells);

— sludge silos and covered thickeners;

— aerobic or anaerobic digestion tanks;

— gasholders (gasometers);

— completely covered plants.

The need to enter such spaces in order to carry out maintenance or inspections shall be minimized by design. Examples of how to achieve this include:

— ensuring equipment can be removed from the confined space in order for it to be maintained in an area that is a safe environment;

— installation of sensors rather than inspection points.

To prevent unauthorised access (e.g. by people who might not understand the associated risks), entry points to such confined spaces shall be adequately secured.

However, it is likely that all spaces will ultimately require access even if those occasions are rare. Therefore, suitably secured access should be provided and provision made for any temporary or permanent equipment that might be needed to undertake the work safely and for the potential need to rescue personnel.

Fixed or portable gas monitoring equipment shall be employed; portable gas monitoring shall be operable from safe places (see 5.4).

5.3 Hazardous substances

Hazards from substances in wastewater treatment plants can arise from solid substances, liquids, vapours, gases and bio-aerosols, microorganisms and dust particles in a dangerous quantity or concentration and through the presence of oxygen-displacing media.

Hazards can also arise from substances being introduced from an external source or can be produced *in situ* by biological processes (e.g. fermentation, putrefaction) or by chemical reactions (e.g. when different wastewaters are mixed).

Hazards can arise from the following sources:

— gases or vapours which can cause fires or explosions;

— oxygen deficiency which can result in suffocation;

— toxic, corrosive, irritant, flammable or hot substances, which can cause harm to health by contact, absorption through the skin or by ingestion, inhalation, or penetration through puncture wounds;

— increase of flow or level of water, e.g. following heavy rain or flooding;

— microorganisms and their metabolic products which can result in infections;

— radioactive substances.

Where possible, designs should seek to avoid creating the circumstances leading to the formation of the hazard. Where this is not possible designs should seek to keep the hazard separated from people.

5.4 Warning systems for the safety of persons

Fixed provision shall be made to enable monitoring the atmosphere in frequently entered confined spaces and other areas where hazardous atmospheres are foreseeable to ensure that health risks for persons can be avoided. Where personnel will only need to enter areas under exceptional circumstances it may be assumed that portable monitoring systems will be used.

Fixed monitoring equipment may also be used to actuate emergency systems (e.g. switching on ventilation). The activation of these means shall be indicated by appropriate signals.

The monitoring equipment shall be tested to ensure reliability and shall be explosion protected.

There shall be an adequate means of communication between authorized personnel on the wastewater treatment site, e.g. telephone or radio.

5.5 Open water

Open tanks, lagoons and channels present risks of drowning.

Prevention of unauthorized or accidental access by personnel and animals should be the primary method of avoiding dangerous incidents (e.g. people rescuing pets, livestock or other animals that have strayed or fallen into the water). This is typically achieved by fencing or raising of tank sides to be above ground level.

Signage warning of deep or fast flowing water is also required.

The installation of a floating device or float-and-retrieval ring near lagoons or other expanses of water, should be considered where it is impractical to provide complete security by other means.

5.6 Vehicular and pedestrian traffic routes

5.6.1 Access considerations

Vehicular and pedestrian traffic routes shall be laid out to provide safe access to and egress from operational work places and maintenance positions. They shall be free of obstacles over which persons might trip, well-lit and shall be constructed in such a way that they can be kept safe to walk along when wet or icy.

This requirement is adequately satisfied, if e.g.:

— work places can be reached as directly and conveniently as possible;

— paths are even and not obstructed by parts of the plant and there are no obstacles on the paths such as pipeline crossings and they are not obstructed by the operation of valves;

— obstacles such as open channels or conveyor belts are bridged over;

— floors are easy to clean;

— floor coverings, gratings, roads and paths have non-slip surfaces, and collection of water on the surfaces is prevented;

— paths are constructed of materials which are resistant against wear and tear;

— slabs and pavings are laid even and with narrow joints;

— non-slip surfaces allow safe walking in every direction under adverse conditions;

— doors of emergency exits open to the outside.

5.6.2 Operational considerations

Traffic routes and thoroughfares shall be laid out in such a way as to prevent risks from vehicles during operation.

This requirement is adequately satisfied, if e.g.:

— traffic routes are kept free from installations so that they can be used at any time;

— traffic routes for vehicles where passing doors, gates, passageways, thoroughfares, or stair-exits shall have a minimum 1,0 m clearance between the exit and the traffic way. Blind exits shall be protected, e.g. by use of diversion barriers or mirrors;

— traffic routes are present in adequate numbers and their layout and dimensions are such that they can be used safely by pedestrians or vehicles according to their function, e.g. adequate turning areas for vehicles;

— traffic routes for motorized or rail-mounted means of transport are wide enough to maintain a minimum safety distance of 0,5 m on both sides of traffic routes between the outer edge of the means of transport and the boundary of the traffic route;

— lighting equipment on traffic routes is located and designed such that the lighting itself cannot cause any accident hazard; and the intensity of general lighting is at least 5 lux;

— speed limits have been considered.