



SWEDISH
STANDARDS
INSTITUTE

SVENSK STANDARD SS-EN 12255-10

Fastställt
2001-03-16

Utgåva
1

Sida
1 (1+15)

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Wastewater treatment plants – Part 10: Safety principles

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Avlopp – Reningsanläggning – Del 10: Säkerhetskrav

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ICS 13.060.30

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Postadress: SIS, Box 6455, 113 82 STOCKHOLM
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Upplysningar om **sakinnehållet** i standarden lämnas av SIS (BST).
Telefon: 08 - 617 74 00. Telefax: 08 - 617 74 30

Tryckt i maj 2001

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12255-10

December 2000

ICS 13.060.30

English version

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 27 October 2000.

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 Management Centre 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by June 2001, and conflicting national standards shall be withdrawn at the latest by December 2001.

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

It is the tenth part prepared by the working groups CEN/TC 165/WG 42 und WG 43 relating to general requirements and processes for wastewater treatment plants for more than 50 PT. The parts of these series are as follows:

- 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 automatization ¹⁾
- Part 13: Chemical treatment
- Part 14: Disinfection ¹⁾
- Part 15: Measurement of the oxygen transfer in clean water in activated sludge aeration tanks
- Part 16: Physical (mechanical) filtration ¹⁾

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".

This European Standard sets rules for general minimum requirements only. Special safety requirements are defined in the national standards concerned.

The parts EN 12255-1, EN 12255-3 to EN 12255-8 and EN 12255-10 and EN 12255-11 became implemented together as a european package (Resolution BT 152/1998). The date of withdrawl (dow) of all conflicting national standards is 2001-12-31. Until the date of withdrawl is reached the National and the already published European standards both coexist.

1 Scope

This European Standard is for the protection of employees and defines safety requirements for wastewater treatment plants to be constructed or reconstructed as follows:

- for structures and parts of structures where safety factors have to be taken into account;
- all components of the technical equipment, as far as safety requirements have to be observed in the planning and construction of these parts of the plant.

It may be possible that national regulations exceed the requirements laid down in this standard. In this case these requirements shall be precisely described.

Special safety requirements, e.g. in the fields of electrical and mechanical engineering which are dealt with in other regulations shall be observed although they are not mentioned specifically in this standard.

This standard is of relevance only to new wastewater treatment plants and new parts for existing plants designed and constructed after the effective date. This standard is not to be applied retrospectively to existing plants.

Detailed informations additional to that contained in this standard may be obtained by referring to the bibliography.

¹⁾ in preparation

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 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 124, *Gully tops and manhole tops for vehicular and pedestrian areas – Design requirements, type testing, marking, quality control.*

EN 476, *General requirements for components used in discharge pipes, drains and sewers for gravity systems.*

EN 752-6, *Drain and sewer systems outside buildings – Part 6: Pumping installations.*

EN 1085, *Wastewater treatment – Vocabulary.*

prEN 12255-1:1996, *Waste water treatment plants – Part 1: General construction principles.*

3 Terms and definitions

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

3.1

Sewerage within a wastewater treatment plant

All structures used for collecting, draining or storing of wastewater within a wastewater treatment plant.

NOTE Sewerage within a wastewater treatment plant includes

- open and closed channels;
- pumping stations;
- storm water drainage and treatment systems.

3.2

Wastewater treatment plant

Facility for the physical, biological and chemical treatment of wastewater inclusive of all facilities for the treatment of solid wastes (screenings, grit, sludge).

3.3

Confined spaces

All structures of sewerage and wastewater treatment plants which are in contact with the wastewater, sludge, hazardous chemicals, etc., as far as they are covered or sunken.

NOTE Confined spaces also include inspection manholes and other shafts even if they are not in open contact with the wastewater.

4 General requirements

Compliance with safety regulations has to be an integral part of the design and construction of the facilities.

4.1 Confined spaces hazards and warning systems

4.1.1 Confined spaces

Special consideration is required for confined spaces in wastewater treatment plants which include e.g.:

- 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;
- digestion tanks;
- gasholders (gasometers);
- completely covered plants.

4.1.2 Hazards

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.

4.1.3 Warning systems for the safety of persons

Provision shall be made to enable monitoring the atmosphere in confined spaces before entering to make sure that no health risk for persons exists.

Fixed or portable monitoring equipment may be employed, portable monitoring shall be operable from places of safety.

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 means of communication, e.g. telephone or radio.

4.2 Vehicular and pedestrian traffic routes

4.2.1 Vehicular and pedestrian traffic routes shall be laid out in accordance with the operational requirements to provide safe access to and regress from work places and maintenance positions. They shall be free of obstacles over which persons might trip 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.

4.2.2 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.

4.2.3 Passageways shall be a minimum of 2,0 m high and 0,6 m wide. If they are used for transporting loads they should be a minimum of 1,2 m wide.

4.2.4 Steps or ramps shall be provided for height differences of more than 0,2 m. Ramps shall not be steeper than 1 : 10 and shall be constructed without steps. Where steps and ramps are not possible see 4.3.1.

4.3 Fixed ladders, manhole steps and staircases

4.3.1 If steps or ramps are not possible for structural reasons, fixed ladders, step irons, staircases or other access facilities shall be provided.

4.3.2 Fixed ladders, manhole steps and staircases shall be of non-slip design and shall offer adequate foot room. Where water, oil or grease may be present, additional means of slip prevention such as profilings or coatings shall be used.

Ladders shall have a minimum distance to the wall of 150 mm.

4.3.3 Where there is the danger of falling more than 3 m in height there shall be installed permanent equipment to prevent falling (e.g. safety rails for sledge and safety belt).

4.3.4 Safety cages are not allowed in confined spaces, where they may hinder the rescue of injured persons.

4.3.5 Suitable access aids shall be provided above access points for climbing on and off safely.

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

- sleeves are built into the manhole cover frames into which projecting positively fixed gripping bars can be inserted which extend a minimum of 1,1 m above the cover frame;
- existing railings provide a handhold;
- a man riding winch can be used.

4.3.6 Rest platforms shall be provided in maximum interval of 6 m on all steps or fixed ladders with a length of more than 10 m in such a way, that the rescue of injured persons and the transport of tools and materials will not be hindered.

4.3.7 The clearance on the users side of fixed ladders shall be not less than 0,65 m for vertical ladders and not less than 1,1 m for sloping ladders.

4.4 Manholes

4.4.1 Manhole shafts shall have a minimum width of DN/ID 1 000 according to EN 476.

4.4.2 The clear width of manhole covers in vehicular traffic areas shall be not less than DN/ID 600. In non traffic areas manhole covers should have a minimum clear width of DN/ID 800 according to EN 124.

4.5 Falling preventions and covers

4.5.1 Work places and traffic routes adjacent to a vertical drop or other dangerous areas shall have permanent guardrails to prevent persons falling or entering these dangerous areas. For the maximum allowable vertical drop height not prevented by those guardrails etc., see national regulations.

When there is no special risk of falling into open channels or basis tensioned chains, ropes or nets may be used.