SLOVENSKI STANDARD
SIST EN 12255-8:2024

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Čistilne naprave za odpadno vodo - 8. del: Obdelava in skladiščenje blata

Wastewater treatment plants - Part 8: Sludge treatment and storage

Kläranlagen - Teil 8: Schlammbehandlung und -lagerung

Stations d'épuration - Partie 8: Stockage et traitement des boues

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ICS:

13.060.30 Odpadna voda Sewage water

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Wastewater treatment plants - Part 8: Sludge treatment and storage

Stations d'épuration - Partie 8 : Stockage et traitement des boues

Kläranlagen - Teil 8: Schlammbehandlung und -lagerung

This European Standard was approved by CEN on 27 February 2024.

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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 12255-8:2024) 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of an identical text or by endorsement, at the latest by November 2024, and conflicting national standards shall be withdrawn at the latest by November 2024.

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 12255-8:2001.

The main changes compared to the previous edition EN 12255-8:2001 are listed below:

a) comprehensive revision and additions in all sections;

b) addition of design recommendations;

c) addition of sludge drying systems;

d) adaptation to the current state of the art;

d) updating of the Normative references;

e) editorial revision.

It is the eighth 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. EN 12255 with the generic title “*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 1 Part 2 is under preparation.

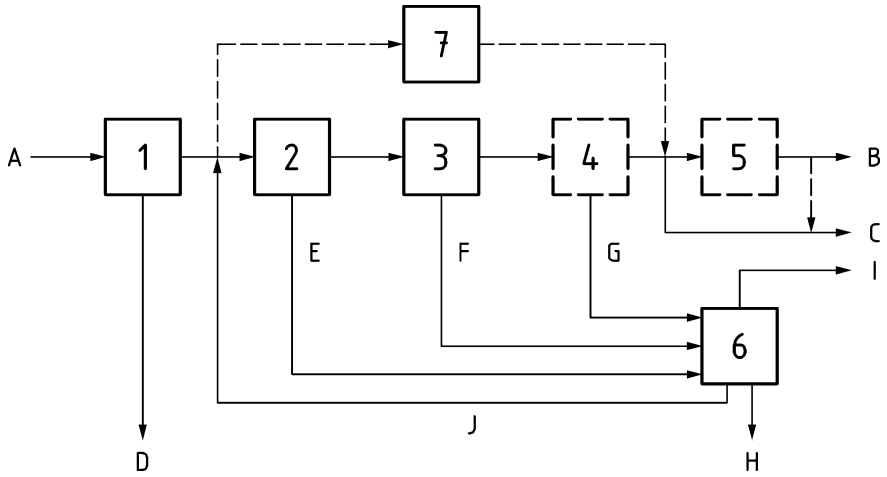
NOTE 2 For requirements on pumping installations at wastewater treatment plants see EN 752 and EN 16932 (all parts).

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.

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

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

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

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

1 Scope

This document specifies design principles and performance requirements for sludge treatment and storage facilities at wastewater treatment plants serving more than 50 PT.

Guidance on operation is provided where it is necessary in order to facilitate the design of control and automation and design access to points of operation.

NOTE Other sludges and organic wastes can be treated together with municipal sewage sludge where national and local regulations permit.

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 12255-9, *Wastewater treatment plants — Part 9: Odour control and ventilation*

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

3 Terms and definitions

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

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

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

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

3.1
psychrophilic
process conditions for microorganisms which are active below 30 °C

Note 1 to entry: In the context of wastewater applications the effective temperature range for this is higher than given in some other disciplines.

3.2
mesophilic
process conditions for microorganisms which are active at temperatures between 30 °C and 45 °C

Note to entry: In the context of wastewater applications the minimum temperature for this is higher than given in some other disciplines.

3.3
thermophilic
process conditions for microorganisms which are active at temperatures above 45 °C

3.4
pseudo stabilisation
process preventing organic degradation so long as particular conditions (such as pH value or dryness) are maintained, but for which degradation recommences when the conditions are no longer met

3.5
stock solution
partially prepared mixture of chemical and water in a condition to facilitate handling or distribution

3.6
normal litre
litre of gas, usually dry, referenced to 1 atmosphere (101,325 kPa) and 0 °C

[SOURCE: Adapted from ISO 20675:2018, 3.41 by conversion to litres]

Note 1 to entry: The unit is expressed $l_{n.}$. In other documents the unit Nl is sometimes used.

4 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply.

Abbreviations

AS	active substance of polymers
BOD_5	biochemical oxygen demand in 5 days
CHP	combined heat and power generating system
CO	carbon monoxide
COD	chemical oxygen demand
d	day
DAF	dissolved air flotation
DD	degree of disintegration (%)
DS	dry solids
EPS	exopolymeric substances
FOG	fat oil and grease
VS	volatile solids
kWh_{el}	kilowatt hours of electrical power
kWh_{th}	kilowatt hours of thermal power
MAP	magnesium ammonium phosphate (struvite)
MSRT	mean solids residence time
N	nitrogen
NaOH	sodium hydroxide
NPSH	nett positive suction head
SVI	sludge volume index
UV –	ultraviolet (light)
WAS	waste activated sludge (surplus sludge)
WWTP	waste water treatment plant

Symbols

$C_{Ac,equ}$	volatile organic acids concentration calculated as acetate in mg/l
$C_{COD,0}$	COD concentrations in the sludge water of the untreated sludge in mg/l

$C_{COD,1}$	COD concentrations in the sludge water of the treated sludge
$C_{COD,R}$	reference COD concentration [mg/l]
DD	degree of disintegration (%)
k_H	hydrolysis rate in d^{-1}
t_R	retention time in d
T	temperature in °C
η_{VS}	ratio of degraded volatile solids to initial volatile solids
$\eta_{Dis.COD}$	degree of COD disintegration

5 Planning

The planned utilization or disposal of sludge influences subsequent utilization. It can be subject to a variety of regulations dependent upon the site of the treatment plant and the proposed routes for use or disposal.

The choice of the sludge treatment process depends on the size of the treatment plant, the type, origin and characteristics of the sludge to be treated and the final method of utilization or disposal routes and related quality requirements, e.g. nutrients, pollutants, pathogenic microorganisms and caloric value. Processes which allow for more than one sludge utilization or disposal option are preferable.

Consideration shall be given to the possibility of centralized sludge treatment facilities which allow a wider range of treatment techniques. Special care is needed in respect of extra loads e.g. of nitrogen generated from sludge liquors at centralized facilities. Sufficient storage capacity shall be available to prevent sludge overflow under all likely conditions.

The following factors shall be considered in planning sludge treatment:

— sludge characteristics;

— import of sludges and other organic waste;

— utilization or disposal routes and related quality requirements, e.g. nutrients, harmful substances and calorific value;

— minimum and maximum daily sludge production (volume and dry solids mass);

— future sludge production;

— range of solids concentrations (total and volatile solids);

— physical characteristics (e.g. viscosity and temperature);

— biological properties (degradability, inhibitors and toxicants);

— aggressive or corrosive conditions;

— likely emissions including greenhouse gases, pollutants, and odours (see also EN 12255-9);

— removal of gross solids which can cause blockage or malfunction by screening;

— effect of abrasive or deposit forming solids such as grit;

— effect of additives used in wastewater treatment, such as precipitants, coagulants and flocculants and their influence on utilization;

— impact of return liquors on the wastewater treatment process e.g. peak loads of ammonia and phosphorus from sludge processing;

— health and safety of operators and the general public (see also EN 12255-10) e.g. generation of toxic and /or explosive atmospheres;

— noise;

— visual appearance.

The planning stage should include determination of the extent to which the operation of the plants will be automated (see EN 12255-12) as there will be differences between systems designed primarily to operate automatically and those requiring manual intervention. However, all plants shall have provisions for manual intervention in order to safeguard operation in the event of control system failure.

6 Processes

6.1 General

Provision shall be made to allow the sampling of input and output for each unit process (see EN ISO 5667-13).

Flow measurement for each unit process should be considered.

The design shall take account of any requirements for control of odour, noise, vibration and explosive atmospheres in accordance with EN 12255-9 and EN 12255-10.

Annex A gives other guidance and information.

6.2 Sludge conditioning

6.2.1 Overview

Sludge needs to be conditioned before dewatering and in some cases before thickening. The most common conditioning is done with polymers (usually polyacrylamides), but natural polymers (e.g. based on chitin or potato starch) are also available though they are not as effective. Such natural polymers have the advantage that they are easily biodegradable.

Sludge conditioning can also be achieved with cations such as iron, aluminium and calcium, which achieve coagulation of micro-flocs by compensation of the negative surface charge on particles. Such salts also achieve phosphate precipitation during wastewater treatment. Agglomeration of micro-flocs occurs depending on shear forces, but the resulting flocs are weak. Formation of large and strong flocs requires addition of polymers which form polymer bridges between particles.

Both under- and overdosing of polymers lead to suboptimal thickening and dewatering results. There is a narrow optimum range.

6.2.2 Use of Polymers [14]

Polymers can be distinguished according to their following properties:

— consistency (granular, emulsion or dispersion);

— non-ionic, cationic or anionic (cationic or non-ionic are usually used for sludge conditioning);