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Čistilne naprave za odpadno vodo - 12. del: Krmiljenje in avtomatizacija

Wastewater treatment plants - Part 12: Control and automation

Kläranlagen - Teil 12: Steuerung und Automatisierung

Stations d'épuration - Partie 12: Régulation et automatisation

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ICS:

13.060.30 Odpadna voda Sewage water

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Wastewater treatment plants - Part 12: Control and automation

Stations d'épuration - Partie 12 : Régulation et automatisation

Kläranlagen - Teil 12: Steuerung und Automatisierung

This European Standard was approved by CEN on 29 January 2024.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 12255-12:2024) 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of an identical text or by endorsement, at the latest by September 2024, and conflicting national standards shall be withdrawn at the latest by September 2024.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 12255-12:2003.

EN 12255-12:2024 includes the following significant technical changes with respect to EN 12255-12:2003:

a) comprehensive revision and addition in all sections;

b) adaption to the state of the art;

c) updating of the normative references.

This is the twelfth 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 with the generic title “*Wastewater treatment plants*” consists of the following parts:

- *Part 1: General construction principles*
- *Part 2: Storm water management systems*
- *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*

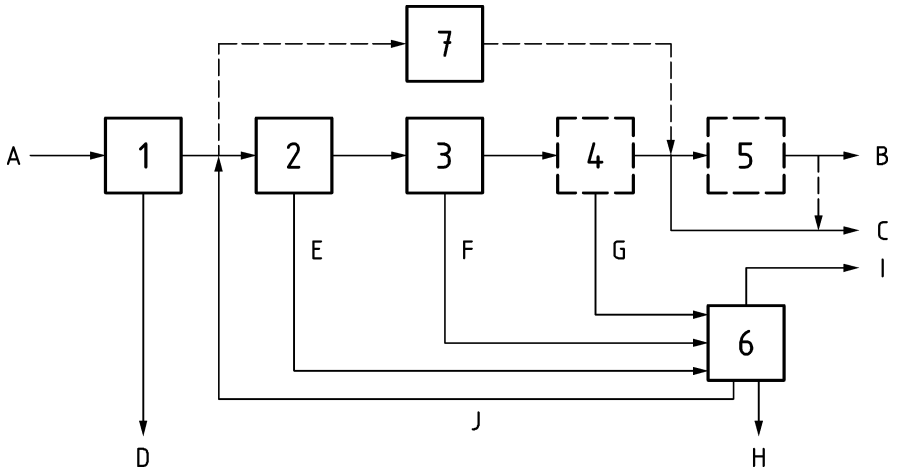
NOTE Part 2 is under preparation.

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.

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 in Figure 1:



Key

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

Figure 1 — Schematic diagram of wastewater treatment plants

Detailed information additional to that contained in this document 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.

NOTE For requirements on pumping installations at wastewater treatment plants, see EN 752, *Drain and sewer systems outside buildings — Sewer system management*, and EN 16932, *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 specifies general requirements for instrumentation and specific requirements for process control and automation systems on wastewater treatment plants for more than 50 PT.

NOTE 1 Because of the rapid rate of development of sensor and control equipment, this document is intended as an overview and uses examples and general requirements, not detailed equipment specifications. Detailed information additional to that contained in this document can be obtained by referring to the Bibliography.

NOTE 2 Although EC directives become matters of law in member states of the EU and some other situations, this standard is intended for wider use and hence those directives with clear technical guidance of a type that would generally be appropriate in a standard are referenced in the text and listed in the Bibliography. The alternative of listing requirements copied from directives would potentially create unacceptable conflict when directives are revised.

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 16323:2014, *Glossary of wastewater engineering terms*

EN 62305-3, *Protection against lightning — Part 3: Physical damage to structures and life hazard (IEC 62305-3)*

IEC 60364, *Low voltage electrical installations*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16323:2014 and the following apply.

ISO and IEC maintain terminology 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
instrumentation
electronic or mechanical devices that are used to either sense or monitor process variables

Note 1 to entry: These can be split into sensors and monitors.

3.1.1
sensor
electrical or mechanical device that communicates the qualitative state of a process variable

Note 1 to entry: Examples of this include a contact probe or switch that outputs a 0 or 1 as an off/on state and devices which transmit an electrical signal (usually a voltage) that is scalable to a process variable.

3.1.2
monitor
electrical or mechanical device that communicates the quantitative state of a process variable

Note 1 to entry: Examples of this include a contact probe and devices which transmit an electrical signal (usually a current) that is scalable to a process variable.

3.1.3
measurement system
combination of a sensor and a monitor that together communicates the quantitative state of a process variable

3.2
process control and automation
control device (such as a PLC, controller or relay) that takes inputs from the instrumentation system to automatically change the state of the system to a specified set of control variables

Note 1 to entry: This can be a one-way system or if the control is a circular control this would be called closed-loop control.

3.2.1
process variable
PV
quantity, quality, or condition of a process media or process object which value may be subject to change and can usually be measured

[SOURCE: ISO 15519-2:2015, 3.1.8]

3.2.2
set point
SP
setting within the control system that is the target setting for the control system to change the process variable

3.2.3
controller
device for regulation or management of a system or component

[SOURCE: ISO 16484-5:2022, 3.2.21]

3.2.4
telemetry system
communications system that receives data from instrumentation and control systems and transmits the readings to a remote data visualisation and storage system

3.2.5
SCADA system
supervisory control and data acquisition system
combination of hardware and software used to send commands and acquire data for the purpose of monitoring and control

Note 1 to entry: This is normally physically located on site.

4 Symbols and abbreviations

ASM	activated sludge models
ATEX	atmospheres explosible and regulation concerning potentially explosive atmospheres
HART	highway addressable remote transducer (protocol)
PT	total population
PLC	programmable logic controller

PV	process variable
RAS	return activated sludge
SAS	surplus activated sludge (also known as WAS or waste activated sludge)
SCADA	supervisory control and data acquisition
SP	set point
UV	ultraviolet light (UV treatment system)
WWTP	wastewater treatment plant

5 Instrumentation and control requirements

5.1 General requirements

The control system shall be considered at an early planning stage when designing for the overall process. The costs, including the investment and operating expenses for the control system with respect to various treatment alternatives should be estimated. Account shall be taken of the fact, that a sophisticated control system requires skilled and trained personnel for maintenance. The decision, of whether a sophisticated control system or simple controls are required, is dependent on the plant size and process complexity.

NOTE The relevant authority or national or local regulations can have requirements covering the nature of the control system.

Guidance for the selection of instrumentation, control and automation systems is given in Annex A.

5.2 Instruments

All instruments shall:

a) comply with electrical guidelines as outlined in IEC 60364 (national or local regulations or the relevant authority can specify more detailed requirements);

b) limit risks due to cyber-security as outlined in Network and Information Security (NIS) Directive [6] (national or local regulations or the relevant authority can specify more detailed requirements);

c) ensure all risks due to health and safety, especially around instrumentation operation and maintenance, are minimized;

d) have appropriate certifications for use in hazardous areas (see ATEX Directive 2014/34/EU [7] for additional information) where the instrumentation and control systems are within a zoned area;

e) be suitably protected from energy surges and lightning strikes in line with EN 62305-3.

5.3 Instrumentation systems

5.3.1 Instrumentation systems

All instrumentation systems shall:

- ensure the results of any monitoring are representative of the media being monitored taking into account differences in homogeneity;
- be currently capable of communicating with telemetry systems of the operator of the wastewater treatment system.