



**SLOVENSKI STANDARD**  
**SIST EN 12255-5:2000**  
**01-november-2000**

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**Čistilne naprave za odpadno vodo - 5. del: Lagunski postopki**

Wastewater treatment plants - Part 5: Lagooning processes

Kläranlagen - Teil 5: Abwasserbehandlung in Teichen

Stations d'épuration - Partie 5: Lagunage

**Ta slovenski standard je istoveten z: EN 12255-5:1999**

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**ICS:**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

EN 12255-5

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ICS 13.060.30

English version

## Wastewater treatment plants - Part 5: Lagooning processes

Stations d'épuration - Partie 5: Lagunage

Kläranlagen - Teil 5: Abwasserbehandlung in Teichen

This European Standard was approved by CEN on 13 August 1999.

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.

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 Central Secretariat 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.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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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of an identical text or by endorsement, at the latest by March 2000, and conflicting national standards shall be withdrawn at the latest by December 2001.

It is the fifth part prepared by these Working Groups relating to the general requirements and processes for treatment plants for over 50 PT. The standard 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 process
- Part 7: Biological fixed-film reactors
- Part 8: Sludge treatment and storage
- Part 9: Odour control and ventilation
- Part 10: Safety principles for the construction of wastewater treatment plants
- Part 11: General data
- Part 12: Control and automation
- Part 13: Chemical treatment of wastewater by coagulation/precipitation
- Part 14: Disinfection
- Part 15: Measurement of the oxygen transfer in clean water in activated sludge aeration tanks
- Part 16: Wastewater filtration

NOTE : For requirements on pumping installations at wastewater treatment plants and in their water feed field, 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“.

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.

## 1 Scope

This European Standard specifies the performance requirements for the installation of lagooning processes.

This part applies to wastewater lagooning processes treating municipal wastewater from combined or separate sewerage systems and when used as a tertiary treatment.

NOTE : Lagooning processes are especially suitable for treatment of wastewater where large variations in flow are experienced (e.g. resulting from stormwater).

## 2 Normative references

This European Standard incorporates by dated or undated references provision 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.

EN 1085 : 1997	Wastewater treatment - Vocabulary
prEN 12255-1:1996	Wastewater treatment plants - Part 1: General construction principles
prEN 12255-3:1995	Wastewater treatment plants - Part 3: Preliminary treatment
prEN 12255-6:1997	Wastewater treatment plants - Part 6: Activated sludge process
prEN 12255-10:1996	Wastewater treatment plants - Part 10: Safety principles for the construction of wastewater treatment plants
prEN 12255-11:1998	Wastewater treatment plants - Part 11: General data

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### 3 Definitions

The definitions given in EN 1085:1997 apply. In addition, for the purposes of this standard, the following definition also applies:

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**3.1 maturation pond** : Wastewater lagoon used as tertiary treatment, typically for the removal of pathogenic micro-organisms by exposure to solar radiation by competition and predation mechanisms.

## 4 Process description

### 4.1 Natural lagoons

Natural lagooning for wastewater treatment is designed as a cascade of singular ponds operated consecutively. The first pond may be either a settlement or anaerobic pond. The following pond is partly aerobic (facultative pond) and serves for the degradation of carbon and nitrogen. Subsequent ponds serve for advanced treatment including the reduction of pathogens and/or organisms by exposure to solar radiation.

### 4.2 Aerated lagoons

Aerated lagoons consist of at least two singular ponds, one with artificial air supply by technical devices and the second for sedimentation.

### 4.3 Polishing ponds

Polishing ponds are mainly used for the further reduction of suspended solids in wastewater received from treatment plants.

### 4.4 Combinations with other systems

A combination of ponds and small technical systems (e.g. trickling filter, rotating disc) may be installed in cases of overloaded lagoons or where there is a need for advanced treatment. Where odour is likely to occur Imhoff tanks may be installed instead of anaerobic lagoons. Screening should be carried out before the wastewater enters aerated lagoons. Additional preliminary treatment may be required (see prEN 12255-3:1995).

## 5 Requirements

### 5.1 General

The requirements specified in prEN 12255-1:1996 and prEN 12255-10:1996 apply to this part. Where technical aeration is a requirement reference should be made to prEN 12255-6:1997 and where additional preliminary treatment is required e.g. screening, reference should be made to prEN 12255-3:1995.

### 5.2 Siting

Where odour is likely to occur (e.g. natural lagooning) plants shall be located a minimum of 200 m from any habitation. The main wind direction, topography, ground water table, geotechnical conditions, risk of flooding and landscape should be taken into account.

### 5.3 Accessibility

It shall be possible to bring machinery to any point around a lagoon for the maintenance of banks, control of vegetation and de-sludging. Unauthorized access to the lagoon installation shall be prevented e.g. fences.

### 5.4 Design

#### 5.4.1 Process considerations

The design of the lagooning system shall ensure it operates with all the earth basins full to the top water level. If not otherwise agreed, the conditions of operation which prevent damage to the structures shall be specified.

In addition to the requirements specified in prEN 12255-1:1996 and prEN 12255-11:1998, the following parameters shall be considered for the design of a lagooning system :

- a) the climatic conditions for the lagoons treating wastewater under mainly naturally established conditions e.g. anaerobic lagoons, facultative ponds, oxidation ponds, maturation ponds. Information on the climatic conditions shall be specified;

- b) a minimum depth of 1 m taking account of the volume to be occupied by the sludge before withdrawal and free sedimentation of solids; especially for settlement and anaerobic lagoons;
- c) inlet and outlet configuration with respect to sludge blanket level and accessibility for cleaning;
- d) the frequency for sludge removal;
- e) the type, number and unit size of aeration equipment for the water depth and the protection of the bottom from erosion in aerated lagoons;
- f) the minimisation of short circuiting by suitable shape, design and location of the lagoon inlet and outlet;
- g) the exposure to solar radiation in maturation ponds should not be reduced and the intensified growth of algae and their effect on the receiving waters shall be considered;
- h) the way of sludge disposal;
- i) the effect of storm water.

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#### 5.4.2 Watertightness

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Earth basins shall be watertight to a permeability factor of less than  $10^{-8}$  m/s to 0.3 m soil. Other basins with short detention time of no more than 10 days and treating secondary effluent e.g. polishing ponds shall be watertight to a permeability factor of at least  $10^{-7}$  to 0.3 m soil. Validation of watertightness should be carried out in accordance with national procedures.

Where watertightness is to be ensured by soil compaction, the optimum compacting conditions e.g. load and moisture content, shall be assessed by preliminary tests. Watertightness shall be tested by laboratory test before filling with water by at least three permeability measurements per basin.

Where watertightness is ensured by a synthetic lining system, the lining shall be, opaque, abrasion resistant and UV resistant. Special precautions shall be provided to prevent gas accumulation under the lining.

Synthetic linings should be a minimum of 3 mm in thickness.

Where watertightness is ensured by clay, the layer should be a minimum of 0.3 m thickness.

When emptying lagoons or where there is a rise in the level of ground water, measures shall be established to protect the watertight construction.



### 5.4.3 Banks

In natural soil and subsoil the banks above and under water of lagoons should not be steeper than 1:2. The banks of lagoons should be protected against erosion. Aerated lagoons should be especially protected 0.3 m below and above the water level where wave action is likely.

Where banks are covered with a clay layer they shall not be steeper than 1:3 and measures shall be taken to prevent this layer from cracking (e.g. cracking by desiccation).

### 5.4.4 Structures and pipeworks

The inlet to the first lagoon within a system shall be fitted with a device for retention and easy removal of floating matter. There should be a bypass facility for each lagoon. The interconnecting channel or pipework system between lagoons shall be designed to permit cleaning from the bank and shall prevent deposits and floating matter from being conveyed downstream. The outlet of the final basin shall be designed to permit measurement of flow and sampling.

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