SLOVENSKI STANDARD
SIST EN 752-3:1996

01-december-1996

Sistemi za odvod odpadne vode in kanalizacijo zunaj zgradb - 3. del: Projektiranje

Drain and sewer systems outside buildings - Part 3: Planning

Entwässerungssysteme außerhalb von Gebäuden - Teil 3: Planung

Réseaux d'évacuation et d'assainissement a l'extérieur des bâtiments - Partie 3: Etablissement de l'avant-projet

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Ta slovenski standard je istoveten z: EN 752-3:1996

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ICS:

93.030	Zunanji sistemi za odpadno vodo	External sewage systems

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EUROPEAN STANDARD

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Descriptors: sanitation, water removal, buildings, exterior, structural design, design, generalities

English version

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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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of an identical text or by endorsement, at the latest by January 1997, and conflicting national standards shall be withdrawn at the latest by January 1997.

This part is the third in a series relating to the functional requirements of drain and sewer systems outside buildings that operate essentially under gravity. There will be seven parts, as follows: Drain and sewer systems outside buildings -

Part 1: General and definitions

Part 2: Performance requirements

Part 3: Planning

Part 4: Hydraulic design and environmental considerations

Part 5: Rehabilitation

Part 6: Pumping installations

Part 7: Maintenance and operations.

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In drafting this part of this European Standard account has been taken of other available draft standards, in particular prEN 476 "General requirements for components used in discharge pipes, drains and sewers for gravity systems".

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According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

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1 Scope

This European Standard is applicable to drain and sewer systems, which operate essentially under gravity, from the point where the sewage leaves a building or roof drainage system, or enters a road gully, to the point where it is discharged into a treatment works or receiving water.

Drains and sewers below buildings are included provided that they do not form part of the drainage system of the building.

This part sets out the principles to follow when planning drain and sewer systems that operate essentially under gravity.

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 European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 752-1 Drain and sewer systems outside buildings - Part 1: General and definitions.

3 Definitions

For the purposes of this standard, the definitions given in EN 752-1 apply.

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4 Sources of additional information

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This Standard sets out the essential requirements for good practice in various engineering activities relating to the planning, design and operation of drain and sewer systems. For supplementary detail and guidance reference should be made to national documents until such time as fully comprehensive European Standards are available.

The documents listed in annex A contain details which may be used in the framework of this part, given approval by the relevant authority.

5 General

System planning within a catchment area shall consider the sewer system, combined sewer overflows, detention tanks, pumping installations, the receiving sewage treatment works, and the effects of discharges on receiving waters. Attention should be paid to enhancing the natural recharge of aquifers. Hydraulic performance of the whole system shall be considered to ensure that additions or modifications to the system do not result in previous design criteria being exceeded. Where the sewage is pumped consideration shall be given to the effects of the pump discharge rates on the downstream parts of the system.

Drain and sewer systems shall be designed, installed and maintained so as to convey and discharge their contents without causing an unacceptable environmental nuisance, risk to public health, or risk to personnel working therein.

The design shall take into account the conveyance of sewage, including trade effluents, which will neither damage the system and/or the treatment works, nor impair their operation.

A sewer system design will be influenced by topography, the character of developments served, existing

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and future flows from the catchment, the suitability of receiving waters or receiving sewage treatment works and the adequacy of any existing system to accept the design flow.

6 Sewer systems

There are three different systems as follows:

- the separate system;
- the combined system;
- the partially separate system.

The selection of a system will mainly depend upon:

- type of system which presently exists;
- capacity and quality of receiving waters;
- nature of discharges to the system;
- need for prior treatment;
- topography;
- treatment works;
- other local conditions.

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7 Permissible utilisation

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Permissible discharges to the system are:

- Domestic wastewater.
- Authorised trade effluents. Pre-treatment of such effluents may be required before discharge to the system is permitted.
- Surface water and, where exceptionally permitted, groundwater.

8 Layout

8.1 Design objectives

The design objectives shall be:

a) protection of public health;

b) protection of the receiving water and sewage treatment works from hydraulic overloading and adverse environmental effects;

c) protection of groundwater;

d) provision for local recharge of aquifers;

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e) provision of the necessary capacity;

f) provision of safe working conditions;

g) provision for durability;

h) prevention of nuisance through odour emission;

i) satisfactory operation and maintenance.

The above objectives shall be considered in terms of their total cost implications.

8.2 Factors affecting layout

The layout will be influenced by factors such as:

a) site conditions, environmental considerations, retained features and existing utility services;

b) protection of water abstraction areas;

c) availability of suitable sewers or outfalls;

d) layout of buildings, disposition of drainage systems inside buildings, appliances located on levels necessitating direct connections to drains;

e) use of buildings served;

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f) planning and coordination of utility services;

g) social disruption during construction and its cost implications;

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h) practical aspects of construction methods, working space, adequate protection and support;

i) stability of building during and following construction of the drains and sewers;

j) existing, planned and future development;

k) connections to or from existing drains and sewers which are to be retained;

l) provision for phased construction and occupation;

m) available gradients;

n) possibility of real-time control;

o) levels of receiving waters;

p) effects of tides, waves and currents;

q) groundwater levels;

r) access for inspection and maintenance;

s) overland flood flowpaths.

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8.3 Financial and engineering assessment

The financial and economic aspects of the various options open to the designer shall be considered alongside the technical, environmental, operational, manpower, social, energy conservation and other factors before reaching a decision as to the preferred solution.

8.4 Preliminary geotechnical and other investigations

8.4.1 General

Attention needs to be paid to both the topographical features present in the localities concerned and to the geological nature of the underlying strata.

8.4.2 Topography

Surface reconnaissance and examination of contour maps and aerial photographs will enable preliminary lines for sewers and rising mains to be established so that the general feasibility of the proposals can be determined before detailed layouts are prepared. It is important to use any available geological survey data in conjunction with contour maps when deep open and trenchless options have to be considered.

8.4.3 Geotechnical Survey

At the planning stage an understanding of the ground conditions to be encountered during the construction of the scheme is essential in order to be able to evaluate fully all the route and construction options.

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The aim in this initial soil survey will be to gain broad information in the most cost effective manner. As the project develops, more intensive investigations will be necessary.

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Geological maps are, even with their limitations, a source of general information. Where these are inadequate, a preliminary ground investigation should be undertaken.

The data gathered in a geotechnical survey should, as appropriate, be sufficient to be able to assess:

a) ground loadings on the pipes/structures;

b) landslide conditions;

c) subsidence conditions;

d) fine particle movement;

e) any likely swelling of clay strata;

f) groundwater levels and movement;

g) aquifer recharge potential;

h) loadings from adjacent structures and highways;

i) previous land use (including mining);

j) alternative construction methods;

k) options in pipe type choice;

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l) pipe bedding options;

m) aggressive soil or groundwater conditions.

Soil and rock samples should be retained especially where tunnelling or other trenchless methods are contemplated.

8.4.4 Existing drainage services

The lines, levels, hydraulic adequacy and structural condition of all relevant existing drains, sewers, ditches, land drains and watercourses shall be ascertained.

8.4.5 Other existing utility services

The positions of other existing relevant utility services shall be ascertained as accurately as possible.

8.4.6 Infiltration

If there is a risk of unplanned extraneous water entering drains and sewers, investigations shall be carried out to determine the extent of this risk.

8.4.7 Groundwater

Where appropriate, groundwater levels including seasonal variations shall be determined during representative periods of time. Investigations shall be carried out to identify conditions which can be detrimental.

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8.4.8 Nature of effluents

The nature of the expected effluent shall be assessed.

8.5 Depth

Depth will have a significant effect on the cost of construction and maintenance. In deciding the method of construction, the depth of drains and sewers shall be considered, in conjunction with other factors such as:

- protection against flooding;
- nature of the ground;
- presence of groundwater;
- proximity of foundations;
- proximity of utility services;
- proximity of trees or heavy root growth;
- protection against frost.

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8.6 Gradient

Economical design is usually achieved when drains and sewers follow the natural falls of the ground. They should, however, be laid at such gradients as will produce velocities sufficiently high to prevent deposition of solid matter in the invert. Special maintenance provisions can be required to ensure frequent sewer cleaning on sewers where it had not been possible to provide a self cleansing velocity gradient.

8.7 Minimum pipe sizes

Pipe sizes shall be selected not only on the basis of hydraulic requirements, but also to ensure that the risk of blockage is reduced and access for effective maintenance can be reasonably achieved.

8.8 Access to drains and non man-entry sewers

In the case of sewers, access shall be provided, where practicable, at every change of alignment or gradient, at the head of all sewers, at every junction of two or more sewers, wherever there is a change in the size of a sewer and in addition at reasonable intervals for inspection and maintenance. In general, access should be provided through manholes. Inspection chambers may be used within the system when adequate inspection and maintenance is assured.

In the case of drains, access shall be provided by means of manholes, inspection chambers and access fittings.

Manholes and inspection chambers should be sited so as to avoid the need for acute changes in direction of flow from branch drains.

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8.9 Access to man-entry sewers

In the case of man-entry sewers, access shall be provided at reasonable intervals to allow for inspection and maintenance.

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8.10 Common trenches

Where common trenches for sewers or drains and other utility services are used care shall be taken to ensure the stability of the pipes. Spacing of pipelines should be adequate for connections, including those which are planned for the future.

8.11 Pumping installations

Circumstances which may make the pumping of wastewater or surface water either necessary or advisable and which should be considered alongside the long term energy commitments and the total costs involved include the following:

a) avoidance of excessive depths of sewer;

b) the drainage of low lying or other parts of the catchment area susceptible to flooding;

c) the development of areas not capable of gravitational discharge to an adjoining drain or sewer system, a sewage treatment works or an outfall;

d) overcoming an obstacle, e.g. a ridge, a watercourse, a railway or for avoiding the use of an inverted siphon;