



SLOVENSKI STANDARD

SIST EN 752-6:1998

01-december-1998

Sistemi za odvod odpadne vode in kanalizacijo zunaj zgradb - 6. del: Črpalne postaje

Drain and sewer systems outside buildings - Part 6: Pumping installations

Entwässerungssysteme außerhalb von Gebäuden - Teil 6: Pumpanlagen

Réseaux d'évacuation et d'assainissement à l'extérieur des bâtiments - Partie 6:
Installations de pompage

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93.030 Zunanji sistemi za odpadno vodo External sewage systems

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Descriptors: sanitation, water removal, sewage, water pipelines, buildings, exterior, installation, pumping, structural design, organization, equipments, safety

English version

Drain and sewer systems outside buildings - Part 6: Pumping installations

Réseaux d'évacuation et d'assainissement à l'extérieur des bâtiments - Partie 6: Installations de pompage

Entwässerungssysteme außerhalb von Gebäuden - Teil 6: Pumptanlagen

This European Standard was approved by CEN on 5 March 1998.

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

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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 October 1998, and conflicting national standards shall be withdrawn at the latest by October 1998.

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.

This part is the sixth 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 Generalities 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.

In drafting this part of this European Standard account has been taken of other available standards, in particular EN 476 "General requirements for components used in discharge pipes, drains and sewers for gravity systems" and prEN 773 "General requirements for components used in hydraulically pressurised discharge pipes, drains and sewers".

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 European Standard sets out principles for planning and design of pumping installations for drain and sewer systems which otherwise operate essentially under gravity.

For pumping installations for pressurised drainage systems EN 1671 applies.

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: Generalities and definitions.
EN 752-2:1996	Drain and sewer systems outside buildings - Part 2: Performance requirements.
EN 752-3	Drain and sewer systems outside buildings - Part 3: Planning
EN 752-4:1997	Drain and sewer systems outside buildings - Part 4: Hydraulic design and environmental considerations
EN 752-7	Drain and sewer systems outside buildings - Part 7: Maintenance and operation
EN 1671	Pressure sewerage systems

3 Definitions

For the purposes of this European Standard, the following definitions, together with those given in EN 752-1 apply:

3.1 air valve: Valve used to allow air to escape from or enter into a rising main

3.2 dry well: Dry chamber forming part of a pumping station and containing pumping equipment, normally used in conjunction with a wet well.

3.3 duty point: Rate of flow and the corresponding total head for which a pump is designed or selected.

3.4 explosion proof: Protected from causing ignition of flammable gases.

3.5 pumping installation: Pumping station together with any associated rising main(s).

3.6 pumping station: Building, structures and equipment used to transfer sewage through a rising main or otherwise to raise the sewage.

3.7 retention time: Time during which sewage is held within the pumping installation.

3.8 wet well: Chamber forming a part of a sewage pumping station into which sewage discharges prior to pumping. It can include submersible pumping equipment and pipework.

4 Sources of additional information

This European 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.

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5 General

Pumping installations are occasionally required in gravity drain and sewer systems in order to avoid excessive depths, or to drain low lying areas. They may also be required at combined sewer overflows or outfalls to discharge flows into treatment works or receiving waters.

Installations shall be planned and designed taking into account:

- a) total cost;
- b) energy usage;
- c) operations and maintenance requirements;
- d) risk and consequences of failure;
- e) health and safety of public and operating staff;
- f) environmental impact;
- g) the nature of sewage which can:
 - be aggressive, corrosive and/or erosive;
 - have a high solid content increasing the potential for blockage;
 - be toxic;
 - lead to potentially explosive conditions.

Clauses 7, 8 and 9 deal separately with the design of pumping stations, rising mains and components. However these shall not be considered in isolation as there is interaction between them.

6 Planning of pumping installations

6.1 Preliminary Considerations

Where part of a system cannot be effectively drained using a gravity system then consideration should be given to the use of one or more pumping installations. The optimum number of installations shall first be determined having regard to the total cost (see also EN 752-3). The preliminary considerations for each pumping installation shall include:

- the general location in relation to such features as flood plains, rivers, railways, major roads and over all topography;
- the relation to existing sewer systems;
- environmental considerations including the potential impact on any environmentally sensitive areas and the siting of combined sewer overflows
- access requirements;
- land ownership;
- availability of power supply, water supply and telecommunications;
- risk of explosion;
- risk of flooding;
- risk of flotation;
- risk of saline infiltration;
- the suitability of geotechnical conditions.

Once these have been established consideration can be given to more detailed planning.

6.2 Planning

The requirements for the pumping installation shall be determined in accordance with clause 6 of EN 752-2:1996, with particular reference to:

- the nature and quantity of flows including the range of flow rates (diurnal, dry/wet weather, etc.) and the range of heads to be pumped;
- the effect of the flows on the downstream sewer system and treatment works;

- measures to limit the impact of failure, which may include the use of standby pumps, generators, duplicate rising mains, emergency overflows, screens, overpumping arrangements, detention tanks, all including the requirements of the relevant authority;
- the requirements of the relevant authority with regard to combined sewer overflows;
- limiting noise and odour;
- limiting retention time in order to avoid septicity and/or sedimentation;
- provision of facilities and equipment for operation and maintenance;
- requirements for future expansion;
- consideration of special conditions (e.g. aquifer protection zones).

Once the requirements for the pumping installation have been determined, consideration can be given to the requirements for the site and the location taking into account:

- the estimated size of the pumping station, relating to the number, size and type of duty and stand-by pumps, whether there is to be a wet well/dry well, wet well only arrangement, or duplicated wet wells;
- space for detention tanks, screens or grit chambers if required;
- space for future expansion of the pumping station;
- access to the site in all weather conditions;
- space for maintenance vehicles and ancillary equipment;
- the route and levels of the incoming and outgoing sewers;
- environmental impact including odour, noise, visual impact, impact of discharge to receiving waters;
- location of receiving waters for overflows if required;
- the risk of vandalism, site security and the need for fencing.

7 Design of pumping stations

7.1 Internal design

Design requirements shall be determined for:

- pumps;
- drive units;

- controls and electrical equipment;
- instrumentation and telemetry;
- alarms;
- pipework and valves.

These shall take account of the basic requirements (see Clause 6). Consideration shall be given to:

- maximum and minimum predicted flow rates to determine the duty points of the pumps and the size of mechanical and electrical equipment;
- type and number of pumps being used (in general at least two pumps are required);
- fixed speed, multi-speed or variable speed drive units;
- provision of screens, grit chambers or, where permitted, macerators at the inlet to minimise the risk of clogging of, or damage to the pump impellers and downstream components;
- removal of screenings and grit;
- odour control;
- physical size of the various items of plant such as pumps;
- provision of access to, and sufficient working space around, all components which may require maintenance or replacement;
- means of lifting for removal or dismantling of equipment;
- size of the wet well(s) and, where applicable, the dry well;
- inlet configuration;
- welfare facilities for staff where required;
- power source for drive units (e.g. electricity or diesel) and if necessary, standby power source;
- fuel storage capacity, where appropriate;
- overpumping facilities;
- susceptibility to vandalism.

The layout shall also:

- allow pumps to be installed so they can be primed;

- keep the suction pipelines substantially horizontal, as short as possible and with no areas for air to become trapped;
- ensure that non-immersible electrical and mechanical equipment is protected from flooding;

Control equipment should be grouped together where possible.

The hydraulic design of the pumping station and rising main shall be considered together.

Buildings and chambers shall be adequately ventilated to avoid build-up of toxic or explosive gases. Wet wells shall be provided with forced ventilation where necessary. Gas testing facilities shall be made available (either portable or permanently installed).

7.2 Wet well design

The design of the wet well shall take into account the need:

- for the sump to extend below the level of incoming sewers;
- to be able to isolate, empty and clean the wet well (e.g. by partitioning or duplicating the wet well);
- to avoid "dead zones" where sedimentation can build up (in some cases model testing may be useful);
- to design the intake configuration to ensure stable flow conditions to the pump, particularly avoiding air entrainment (in some cases model testing may be useful);
- to allow adequate clearance between the base and sides of the wet well and the pump inlet;
- to protect against septicity (see clause 7 of EN 752-4:1997);
- to take any necessary measures to guard against explosion.

The size of the wet well and its detailed design shall be determined from the maximum and minimum flow rates. The capacity between start and cut out shall be set to limit the frequency of switching to within the drive unit manufacturer's recommendations. Start levels shall take into account the need to prime pumps.

7.3 External layout and access

Access and appropriate parking shall be provided at all times for emergency vehicles, maintenance vehicles and ancillary equipment. Adverse weather conditions shall be considered. The site shall be designed to deter unauthorised access.

Adequate protection against lightning shall be provided.