SLOVENSKI STANDARD
SIST EN 1671:1998

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Tlačni kanalizacijski sistemi

Pressure sewerage systems outside buildings

Druckentwässerungssysteme außerhalb von Gebäuden

Réseaux d'assainissement sous pression a l'extérieur des bâtiments

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Réseaux d'assainissement sous pression à l'extérieur des bâtiments

Druckentwässerungssysteme außerhalb von Gebäuden

This European Standard was approved by CEN on 1997-04-11. 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.

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CEN

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" through WG 23 "Positive and negative pressure Systems" and Tg 2 "Pressure Sewerage Systems", 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of an identical text or by endorsement, at the latest by December 1997, and conflicting national standards shall be withdrawn at the latest by December 1997.

There are four 'informative' annexes; annex A gives some useful information additional to this standard, annex B has the figures, annex C contains the Bibliography and national regulations, and annex D contains A-deviations.

In drafting this European Standard account has been taken of other available draft Standards.

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.

INTRODUCTION

This European Standard covers positive Pressure Sewerage Systems (PSS) and has been prepared for use by the designer, manufacturers, consultants, customers and operators.

A PSS is designed to transport domestic wastewater arising from dwellings and commercial properties and shall not be used for the disposal of stormwater or rainwater. The PSS comprises a single pressure pipe or a branched network of pressure pipes. The pressure generating equipment is always located at the upstream end of the pressure pipe(s). The downstream boundary of the system is defined as the point at which the total flow from the system discharges from a single pipe at atmospheric pressure into a recipient e.g. manhole, gravity sewer or sump.

The use of compressed air as the only means of generating pressure is not covered in this standard.

This standard covers the control of flow to the pumping main by random operation of pumps using i.e. level control and use of logic real-time control to manage pump output. However the annex A is mainly concerned with random operations.

The use of small bore pressure pipes in conjunction with PSS may result in reduced environmental impact and consequential reduction in site construction leading to lower installation costs.

1 SCOPE

1.1 General

This European Standard specifies the performance, design, operation, maintenance and installation with related verification and test method for positive pressure driven sewerage systems outside buildings carrying wastewater.

It does not provide for the evaluation of conformity of systems to this European Standard. It does not specify the detail design or materials of construction of individual components within the system.

This European Standard covers positive pressure sewerage systems designed for transporting wastewater, defined as: Domestic sewage arising from dwellings and commercial properties but excluding stormwater and rainwater.

This European Standards covers the design of a PSS and some requirements of products used together with the PSS in order to ensure the performance of a PSS.

The components of the system and in conjunction with the system should be evaluated by reference to the appropriate product standard. In the absence of a product standard, this standard may be used as a reference for drawing up a specification for that product.

1.2 Limit of Design

Intermediate pressure booster equipment is not covered in this standard.

The use of compressed air as the only means of generating pressure is not covered in this standard.

The design requirements of this standard are minimum requirements and do not constitute in themselves a comprehensive design sufficient to ensure a correctly functioning system. Every system must be individually designed. Where proprietary components are employed, account should be taken of the advice of the component supplier.

1.3 Application of Pressure Sewerage Systems (PSS)

Information on the use of Pressure Sewerage Systems is given in A.1.

1.4 Sources of Additional Information

Documents which, whilst relating to specific systems, contain details which can be used within the framework of this standard are listed in informative annex C.

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.

prEN 476	General requirements for components used in discharge pipes, drains and sewers for gravity systems.
prEN 805	Water supply - Requirements for external systems and components.
EN 60204-1	Safety of machinery - electrical equipment of machines; Part 1: General requirements.

3 DEFINITIONS

For the purposes of this standard, the following definitions apply:

3.1 Collecting Chamber

Chamber into which the wastewater flows by gravity. This chamber may take the form of either a collecting tank or a collecting sump.

3.2 Pressure Generating Equipment

Pump(s) installed at the collecting chamber which provides the pressure for transporting the wastewater within the pipe system. Compressed air system may be connected at strategic points for the purpose of airflushing the pipe system.

3.3 Pressure Sewerage System (PSS)

The PSS is a system for transporting domestic wastewater comprising a single pressure pipe or a branched network of pressure pipes where the pressure generating equipment is always located at the upstream end of the pressure pipe(s). The disposal point is the point the total flow from a pressure system discharges at atmospheric pressure, e.g. a manhole, gravity sewer or sump.

4 SYSTEM DESCRIPTION

4.1 General

A PSS consists of collecting chambers, pressure generating equipment and pipes forming a branched network.

4.2 Main components

The Pressure Sewerage System consists of the following main components:

the collecting chamber (4.3),
the pressure generating equipment (4.4):
pump unit (4.4.1);
compressed air unit, if required (4.4.2);
pipework (4.5);
pipe-joints (4.5.2);
valves (4.5.3).

Fig. B.1 shows an example of a pressure sewerage system.

4.3 Collecting Chamber

The collecting chamber may serve one or more buildings. The maximum number of buildings will be dictated by the capacity of the pressure generating equipment.

Liability arising from the operation and maintenance of the collecting chamber or local regulations may dictate the use of separate collecting chambers for each dwelling or building.

The essential elements of a collecting chamber are:

- ventilation
- a suitably rated electrical supply
- controls and alarm equipment
- level control sensors within the chamber for automatic control of the pumps
- non-return valves and isolation valves to prevent back flow from the down-stream system.

Construction materials shall be suitable for operation with sewage.

The working volume in the sump and the residual volume remaining at the end of the pumping sequence shall be designed to be as small as possible without adversely effecting the operation of the pump. (See also 4.2.)

When designing and installing the chambers, due account should be taken of the risk of fracture of the pipework passing through the chamber wall, that may result from differential movement, vibrations etc.

The bottom of the chamber shall be designed to be self cleansing to minimise the risk of sedimentation and operate with small working volume to minimise the retention time, an example of which is given in fig. B.2 and B.4.

All collecting chambers shall be designed to resist external forces. The collecting chamber shall be watertight and shall not leak. Access frames and covers shall prevent the ingress of surface water.

National or local regulations may allow use of collecting chambers inside buildings.

Where indoor collecting tanks are used, an example of which is given in Annex B, Fig. B.3, they shall incorporate gas tight cover and be installed and insulated to prevent the transmission of noise and vibration to the property.

Consideration shall be given to the prevention of backflow when designing a system incorporating collection tanks.

The cover of a collecting sump is not necessarily gas tight. Within the collecting sump the pump(s) are installed together with associated level control sensors, pipework and valves. Fig. B.2 illustrates an example of a typical collecting sump.

See also A.2.1.

4.4 Pressure Generating Equipment

4.4.1 Pump Units

Examples of pumps used in pressure sewerage systems are:

- Multivane open impeller pumps with grinding device.
- Semi-positive displacement pumps with grinding device.
- Single vane non-clogging centrifugal pumps.
- Vortex pumps.

The most commonly used pumps in a PSS are submersible pumps, with or without grinding devices.

The pumps are mounted inside the collecting sump (see collecting chamber, 4.3), with one or two pumps per sump.

NOTE: Pump(s) is/are generally mounted externally to collecting tanks (see fig. B.3).

For the effective function of a PSS "standard execution motors" are normally used. However, national or local regulations can demand explosion-proof certified motors and level control equipment. For further information see EN 60204-1.

Air locks in the pumps shall be avoided.

See also A.2.2.

4.4.2 Air Compressor Units

Compressed air may be used to support the flow of wastewater.

Where compressed air is required the compressed air station (static or mobile) should be located (or connected) upstream of the branch that needs support.

The compressed air stations can be equipped with air compressors, compressed air reservoirs and compressed air release controls or compressors which work directly on the pressure pipe without pressure reservoir.

See also A.2.3.

4.5 Pipework

4.5.1 General

The pipes form a branched network or pipeline tract.

The pipelines, in general, are laid to follow ground contour. High and low points can be arranged as desired.

Air bleeding devices (air release and/or air inlet valves or vent stack pipes), suitable for sewage applications, might be necessary at high points. All high points shall be clearly identified. Note though that odours and waterhammer might occur, which shall be checked in the planning stage.

The whole pressure pipeline shall be constructed from corrosion resistant materials unaffected by permanent contact with wastewater, wastewater gases and surrounding ground conditions. The pipes shall have a smooth interior and be resistant to cyclic stresses.

The pressure pipelines in a collecting chamber and in the pipe-system shall be constructed to a minimum pressure rating of 600 kPa (6 bar). Account should be taken of any long term loss of

strength of the pipe material, e.g. where pipelines are installed above ground or are likely to be subject to hot effluent. See also prEN 476.

Unused connections are to be sealed against the internal pressure and to prevent the ingress of ground water.

Joints and their components shall comply with the relevant European Product Standard and be installed in accordance with the manufacturer's instructions. Until the European standard and unified regulations are available, standards and regulations at the place where the system is being constructed shall apply.

4.5.2 Pipe-joints

The pipe jointing system shall present a smooth unobstructed interior surface in order to avoid sedimentation and blockages.

4.5.3 Valves

Isolation valves shall be provided to help facilitate maintenance, locate leakage and permit repairs, i.e. on each branch.

5 REQUIREMENTS

5.1 General

The PSS shall transport the sewage from the collecting chamber(s) to the outlet under all normal operating conditions.

All PSS's shall be designed to comply with national and local regulations. In addition, the PSS shall satisfy the following requirements.

5.2 Essential Requirements

The essential requirements of a PSS are that:

- there shall be no danger to public health;
- there shall be no danger to operating personnel;
- the required design life and structural integrity shall be ensured.

5.3 Performance Requirements

The performance requirements of a PSS are that:

- the system shall operate without blockages;
- flooding shall be eliminated or limited to identifiable circumstances and frequencies prescribed by national or local authorities;
- surcharge of incoming gravity sewers should be eliminated or limited to identifiable circumstances and frequencies;
- they shall not endanger existing adjacent structures and services;
- pipes shall be pressure-tested in accordance with performance specifications;