



SLOVENSKI STANDARD

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Splošne zahteve za elemente težnostnih cevnih sistemov za odvod odpadne vode

General requirements for components used in discharge pipes, drains and sewers for gravity systems

Allgemeine Anforderungen an Bauteile für Abwasserkanäle und -leitungen für Schwerkraftentwässerungssysteme

Prescriptions générales pour les composants utilisés dans les réseaux d'évacuation, de branchement et d'assainissement à écoulement libre

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ICS:

13.060.30 Odpadna voda Sewage water

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EUROPEAN STANDARD

EN 476

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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", the secretariat of which is held by DIN.

This European Standard provides the basis for the preparation or revision of product standards for discharge pipes, drains and sewers operating as gravity systems (see clause 1 "Scope").

Components meeting the requirements of this European standard and in permanent or in temporary contact with water intended for human consumption, will not adversely affect the quality of that water. Therefore this standard does not contravene the EC-Council Directives 75/440, 79/869 and 80/778.

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of an identical text or by endorsement, at the latest by January 1998, and conflicting national standards shall be withdrawn at the latest by January 1998.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 and the United Kingdom.

1 Scope

This European standard specifies general requirements for components such as pipes, fittings and manholes with their respective joints intended for use in discharge pipes, drains and sewers which operate as gravity systems where any pressure likely to occur is a maximum of 40 kPa.

This European standard provides the general basis for the preparation or revision of product standards. It is not applicable for the evaluation of products.

It is applicable as a reference for drawing up a product specification, if there is no product standard available.

This European standard includes marking, quality control and certification requirements.

This European standard comprises:

- Common requirements for all components;
- Specific requirements for discharge components for use inside buildings or attached to the external surfaces of buildings;
- Specific requirements for components for use in drain and sewer systems.

In product standards combinations of these requirements may be applied where appropriate, eg: for the components buried in ground inside the building structure.

This European standard covers components to be used in conveying in a satisfactory manner:

- domestic waste water;
- rainwater and surface water; and,
- other waste waters (e.g. industrial waste water) that will not damage the components.

This European standard applies to components of circular and other cross sections.

This European standard applies equally to components which are factory-made and to those constructed on site, where applicable.

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

EN ISO 9001

Quality systems – Model for quality assurance in design, development, production, installation and servicing (ISO 9001 : 1994).

EN ISO 9002

Quality systems – Model for quality assurance in production, installation and servicing (ISO 9002 : 1994)

EN 45011
General criteria for certification bodies operating product certification

EN 45012
General criteria for certification bodies operating quality system certification

ISO 48
Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD)

3 Definitions, symbols and abbreviations

For the purposes of this standard the following definitions apply:

3.1 external diameter OD: Mean external diameter of the pipe barrel at any cross section. For pipes with external profiles on the barrels, the external diameter is the maximum diameter when viewed in cross section.

3.2 factory production control: Surveillance mode in which a manufacturer performs its own surveillance on the result of its production according to a set of rules formally specified in quality assurance or quality management provision.

3.3 flexible pipe: Pipe, the load carrying capacity of which is limited by diametral deformation under load to the ultimate design criteria without breaking or overstressing.

3.4 gravity system: System where flow is caused by the force of gravity and where the pipe normally operates partially full.

3.5 invert: Lowest point of the internal surface of the barrel of a pipe or channel at any cross section.

3.6 internal diameter ID: Mean internal diameter of the pipe barrel at any cross section.

3.7 joint: Connection between the adjacent ends of two components including the means of sealing.

3.8 nominal size DN: Numerical designation of size of component, which is a convenient integer approximately equal to a manufacturing dimension in mm. This can apply to either the internal diameter (DN/ID) or the external diameter (DN/OD).

3.9 pipe barrel: Cylindrical part of the pipe with a uniform cross section excluding socket and spigot.

3.10 proof load: Specified test load which a component withstands where the related requirements of the product standard are met.

3.11 quality control system: Organizational structure, responsibilities, procedures, processes and resources for implementing quality management.

3.12 rigid pipe: Pipe, the load carrying capacity of which is limited by breaking or overstressing, without significant deformation of its cross section.

3.13 ring stiffness: Resistance of a pipe to diametral deflection in response to external loading applied along one diametric plane given as follows:

$$S = \frac{EI}{D_m^3}$$

where :

- S is the ring stiffness of the pipe in kilonewtons per square metre;
- E is the modulus of elasticity in flexure in the circumferential direction in kilonewtons per square metre;
- I is second moment of area of the pipe wall in the longitudinal direction, per unit length, in metres to the fourth power per metre;
- D_m is the diameter of the neutral axis of the pipe wall, in metres.

3.14 semi-rigid pipe: Pipe, the load carrying capacity of which is limited by diametral deformation or by breaking or overstressing.

3.15 surface water: Water drained from the surface of buildings, structures or the ground.

3.16 ultimate load: Load which causes failure as defined in product standards.

4 General functional and dimensional requirements

Product standards may include specifications which are more stringent, but not less stringent than those in this standard.

4.1 Dimensions of pipes and fittings

4.1.1 Nominal sizes

Nominal sizes DN shall be given in product standards as DN/ID or DN/OD.

Nominal sizes specified in product standards shall preferably be selected from table 1 or table 2.

Other nominal sizes may be specified in product standards.

Table 1: Nominal sizes: DN/ID

30, 40, 50, 60, 70, 80, 90, 100, 125, 150, 200, 225, 250, 300, 400, 500, 600, 800, 1000, 1200, 1400, 1600, 1800, 2000, 2200, 2500, 2800, 3000, 3500, 4000

Table 2: Nominal sizes: DN/OD

32, 40, 50, 63, 75, 90, 100, 110, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1200, 1400, 1600, 1800, 2000

NOTE: For each material, it is intended to limit the number of nominal sizes.

4.1.2 Internal diameters and limit deviations

Product standards shall specify:

- internal diameters and limit deviations; or
- external diameters, wall thicknesses and limit deviations; or
- minimum bores. (see 7.1)

Maximum limit deviations on the internal diameter ID are in table 3.

Table 3: Maximum limit deviations on internal diameters

Nominal size	Limit deviations on mean internal diameter mm	Limit deviations on individual internal diameter mm
DN ≤ 100	± 0,05 DN	± 0,1 DN
100 < DN ≤ 250	± 5	± 10
250 < DN ≤ 600	± 0,02 DN	± 0,04 DN
DN > 600	± 15	± 30

NOTE: DN in table 3 can be applied to either DN/ID or DN/OD.

4.2 Geometry of pipes

Pipe straightness shall be within tolerances specified in product standards (see 7.2).

The angle between the planes of the end face of the pipe and the longitudinal axis of the pipe shall be 90 ° with a tolerance such that the function of the pipe joint shall be not impaired (see 7.3).

A range of pipe lengths may be specified in product standards.

Product standards shall specify tolerances on pipe lengths, even if the lengths themselves are not specified.

4.3 Geometry of fittings

4.3.1 General

Angles for fittings shall be stated in product standards.

Preferred angles for fittings are $11^{\circ}15'$, 15° , 20° to $22^{\circ}30'$, 30° , 45° , 67° to 70° and 87° to 90° . Other angles may be allowed in product standards.

4.3.2 Bends

The minimum radii "r" of bends, defined at their axes, having angles " α " greater than 70° and internal diameters greater than 200 mm, shall be 0,7 times the internal diameter (see figure 1).

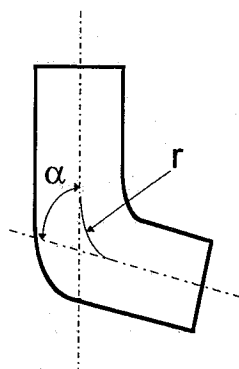


Figure 1: Illustration of radius "r" and angle " α " of bend

4.4 Smoothness of bore

Interior surfaces of pipes and fittings shall be free from visible defects that may adversely affect their hydraulic performance. Product standards shall specify the acceptable imperfections or a hydraulic performance test.

4.5 Appearance and soundness

Pipes, fittings and joints shall be free from defects which could impair their performance in service.

4.6 Longitudinal bending moment resistance

Product standards shall state for long rigid or semi-rigid pipes of small diameters longitudinal bending moment resistance in kilonewton per metre or bending load for a specified span and loading condition in kilonewton. Alternatively, maximum values of length to diameter ratios shall be given in product standards (see 7.4).

NOTE: This is to help avoid problems when transporting, lifting, handling and installing pipes.

4.7 Interconnection

Product standards shall state whether or not components within dimensional series (or tolerances) are capable of interconnection.

Where such interconnection is not confirmed, product standards shall specify the means (e.g. adaptors) required to effect interconnection.

4.8 Corrosion resistance

Pipes, fittings, joints, inspection chambers and manholes shall be resistant to corrosion by domestic waste water, surface water and the effects of soil and ground water. Corrosion resistance tests may be specified in product standards.

4.9 Abrasion resistance

Pipes and fittings shall be resistant to abrasive effects of hard particles in domestic waste and surface water. Abrasion resistance tests may be specified in product standards.

4.10 Modification

Any modification on site shall be carried out in accordance with appropriate product standards and/or manufacturer's instructions, without adversely affecting functional requirements.

4.11 Coatings and linings

Coatings, linings or other protective measures may be specified in product standards. It may be necessary to specify additional protection for joints.

4.12 Long-term behaviour

Where appropriate, long term behaviour of components shall be specified in product standards.

4.13 Durability

Product standards shall give details of durability characteristics of the finished product.

4.14 Sealing elements

Sealing elements as specified by the component manufacturer shall normally be supplied together with the components.

5 Functional requirements for discharge components inside buildings

5.1 General

Where the term: "inside buildings" is used in the context of components fixed inside buildings, it also includes discharge pipes and fittings fixed on external surfaces of buildings.

5.2 Strength of pipes

Appropriate strength requirements for pipes shall be given in product standards.

5.3 Watertightness

Pipes, fittings and joints for use in discharge pipes inside buildings shall withstand an internal hydrostatic pressure, without leakage.

Components, including joint assemblies, shall satisfy a pressure test from 0 kPa rising to 50 kPa, without leakage (see 8.1).

Moisture adhering to the external surfaces shall not constitute leakage.

The above requirement does not apply to rainwater systems fixed externally to the building.

5.4 Airtightness

Joint assemblies intended for use as discharge pipes inside buildings, excluding rainwater systems fixed externally to the building, shall satisfy an internal air pressure test from 0 kPa rising to 1 kPa (see 8.3).

5.5 Temperature

Pipes, fittings and joints excluding rainwater systems shall be suitable for a maximum intermittent wastewater temperature of 95 °C, at the point of entry to the pipe system (see 8.2).

5.6 Thermal expansion

Product standards shall state the coefficient of thermal expansion, where appropriate.

6 Functional and dimensional requirements for drains and sewers that are generally buried

6.1 Dimensions of manholes and inspection chambers

Dimensions of manholes with access for personnel shall comply with the safety requirements in force at the place of installation.