



SLOVENSKI STANDARD

SIST EN 12666-1:2006

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Cevni sistemi iz polimernih materialov za odpadno vodo in kanalizacijo, ki delujejo po težnostnem principu in so položeni v zemljo - Polietilen (PE) – 1. del: Specifikacije za cevi, fitinge in sistem

Plastics piping systems for non-pressure underground drainage and sewerage - Polyethylene (PE) - Part 1: Specifications for pipes, fittings and the system

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Kunststoff-Rohrleitungssysteme (für erdverlegte Abwasserkanäle und -leitungen - Polyethylen (PE) - Teil 1: Anforderungen an Rohre, Formstücke und das Rohrleitungssystem

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Systemes de canalisations en plastique pour les branchements et collecteurs d'assainissement enterrés sans pression - Polyéthylène (PE) - Partie 1: Spécifications pour les tubes, les raccords et le système

Ta slovenski standard je istoveten z: EN 12666-1:2005

ICS:

23.040.01	Deli cevovodov in cevovodi na splošno	Pipeline components and pipelines in general
91.140.80	Drenažni sistemi	Drainage systems
93.030	Zunanji sistemi za odpadno vodo	External sewage systems

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12666-1

December 2005

ICS 23.040.01; 91.140.80; 93.030

English Version

**Plastics piping systems for non-pressure underground drainage
and sewerage - Polyethylene (PE) - Part 1: Specifications for
pipes, fittings and the system**

Systèmes de canalisations en plastique pour les
branchements et collecteurs d'assainissement enterrés
sans pression - Polyéthylène (PE) - Partie 1: Spécifications
pour les tubes, les raccords et le système

Kunststoff-Rohrleitungssysteme für erdverlegte
Abwasserkanäle und -leitungen - Polyethylen (PE) - Teil 1:
Anforderungen an Rohre, Formstücke und das
Rohrleitungssystem

This European Standard was approved by CEN on 24 November 2005.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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Foreword

This European Standard (EN 12666-1:2005) has been prepared by Technical Committee CEN/TC 155 "Plastics piping systems and ducting systems", the secretariat of which is held by NEN.

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 June 2006, and conflicting national standards shall be withdrawn at the latest by December 2007.

This European Standard is a part of a system standard for plastics piping systems of a particular material for a specified application. There are a number of such system standards.

System standards are based on the results of the work undertaken in ISO/TC 138 "Plastics pipes, fittings and valves for the transport of fluids", which is a Technical Committee of the International Organization for Standardization (ISO).

They are supported by separate standards on test methods to which references are made throughout the system standard.

The system standards are consistent with general standards on functional requirements and on recommended practice for installation.

EN 12666 consists of the following parts, under the general title *Plastics piping systems for non-pressure underground drainage and sewerage - Polyethylene (PE)*

- *Part 1: Specifications for pipes, fittings and the system (this European Standard)*
- *Part 2: Guidance for the assessment of conformity (intended to be published as CEN/Technical Specification)*
- *Part 3: Guidance for installation (intended to be published as CEN/Technical Specification)*

For pipes and fittings which have conformed to the relevant national standard before June 2006, as shown by the manufacturer or by a certification body, the national standard may continue to be applied until June 2008.

NOTE The actual dates will be given in the final text of the standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EN 12666-1:2005 (E)**1 Scope**

This Part of EN 12666 specifies the requirements for pipes, fittings and the system of polyethylene (PE) piping systems intended to be used for

- non-pressure underground drainage and sewerage outside the building structure (application area code "U"), and
- non-pressure underground drainage and sewerage for both buried in the ground within the building structure (application area code "D") and outside the building structure.

This is reflected in the marking of products by "U" and "UD".

It also specifies the test parameters for the test methods referred to in this European Standard.

This European Standard covers a range of nominal sizes, a range of pipe series/stiffness classes and gives recommendations concerning colours.

NOTE 1 It is the responsibility of the purchaser or specifier to make the appropriate selection from these aspects, taking into account their particular requirements and any relevant national regulations and installation practices or codes.

In conjunction with CEN/TS 12666-2 ^[1] it is applicable to PE pipes and fittings, their joints and to joints with components of other plastics and non-plastics materials intended to be used for buried piping systems for non-pressure drainage and sewerage.

This European Standard is applicable to PE pipes with or without an integral socket.

The fittings can be manufactured by injection-moulding or be fabricated from pipes and/or mouldings.

This European Standard is applicable to PE pipes and fittings for the following types of joints:

- elastomeric ring seal joints;
- butt fused joints;
- electrofusion joints;
- mechanical joints.

NOTE 2 Requirements and limiting values for application area code "D" are given in Tables 3, 6 and Table 12.

NOTE 3 Pipes, fittings and other components conforming to any of the plastics product standards listed in the bibliography may be used with pipes and fittings conforming to this European Standard, provided they conform to the requirements for joint dimensions given in Clause 6 and to the requirements of Table 8 and Table 12.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 681-1, *Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber*

EN 681-2, *Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 2: Thermoplastic elastomers*

EN 728, *Plastics piping and ducting systems — Polyolefin pipes and fittings — Determination of oxidation induction time*

EN 921:1994, *Plastics piping systems — Thermoplastics pipes — Determination of resistance to internal pressure at constant temperature*

EN 1055:1996, *Plastics piping systems — Thermoplastics piping systems for soil and waste discharge inside buildings — Test method for resistance to elevated temperature cycling*

EN 1277:2003, *Plastics piping systems — Thermoplastics piping systems for buried non-pressure applications — Test method for leaktightness of elastomeric sealing ring type joints*

EN 1401-1, *Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U) — Part 1: Specifications for pipes, fittings and the system*

EN 1519-1:1999, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Polyethylene (PE) — Part 1: Specifications for pipes, fittings and the system*

EN 1989, *Thermoplastics piping systems — Joints for buried non-pressure sewerage applications — Test method for long-term sealing performance of joints with thermoplastic elastomer (TPE) seals by estimating the sealing pressure*

EN 12061, *Plastics piping systems — Thermoplastics fittings — Test method for impact resistance*

EN 12256, *Plastics piping systems — Thermoplastics fittings — Test method for mechanical strength or flexibility of fabricated fittings*

EN ISO 472:2001, *Plastics — Vocabulary (ISO 472:1999)*

EN ISO 580:2005, *Plastics piping and ducting systems - Injection-moulded thermoplastics fittings - Methods for visually assessing the effects of heating (ISO 580:2005)*

EN ISO 1043-1:2005, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics (ISO 1043-1:2005)*

EN ISO 1133:2005, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics (ISO 1133:2005)*

EN ISO 2505:2005, *Thermoplastics pipes - Longitudinal reversion - Test method and parameters (ISO 2505:2005)*

EN ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions (ISO 3126:2005)*

EN ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pycnometer method and titration method (ISO 1183-1:2004)*

EN ISO 9969, *Thermoplastics pipes — Determination of ring stiffness (ISO 9969:1994)*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN ISO 472:2001, EN ISO 1043-1:2001 and the following apply.

EN 12666-1:2005 (E)**3.1.1****application area code**

code used in the marking of pipes and fittings to indicate the application area for which they are intended, as follows:

- U: code for the area more than one meter from the building to which the buried piping system is connected;
- D: code for the area under and within one metre from the building where the pipes and the fittings are buried in the ground and are connected to the soil and waste discharge system of the building

NOTE In code D application areas, the existence of hot water discharge in addition to the external forces from surroundings is usual.

3.1.2 Geometrical definitions**3.1.2.1****nominal size DN**

numerical designation of the size of a component, which is a convenient round number approximately equal to the manufacturing dimension, in millimetres

3.1.2.2**nominal size DN/OD**

nominal size, related to the outside diameter

3.1.2.3**nominal outside diameter**

d_n

specified outside diameter, in millimetres, assigned to a nominal size DN/OD

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3.1.2.4**outside diameter**

d_e

value of the measurement of the outside diameter through its cross-section at any point of a pipe or spigot end of a fitting, rounded up to the next greater 0,1 mm

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3.1.2.5**mean outside diameter**

d_{em}

value of the measurement of the outer circumference of a pipe or spigot end of a fitting in any cross-section, divided by π ($\approx 3,142$), rounded up to the next greater 0,1 mm

3.1.2.6**mean inside diameter of a socket**

d_{sm}

arithmetical mean of a number of measurements of the inside diameter of a socket in the same cross-section

3.1.2.7**wall thickness**

e

value of the measurement of the wall thickness at any point around the circumference of a component

3.1.2.8**mean wall thickness**

e_m

arithmetical mean of a number of measurements of the wall thickness, regularly spaced around the circumference and in the same cross-section of a component, including the measured minimum and the measured maximum values of the wall thickness in that cross-section

3.1.2.9**pipe series S**

number for pipe designation (conforming to ISO 4065:1996 [2])

3.1.2.10**standard dimension ratio (SDR)**

numerical designation of a pipe series, which is a convenient round number approximately equal to the dimension ratio of the nominal outside diameter, d_n and the nominal wall thickness, e_n

3.1.3 Mechanical definitions**3.1.3.1****nominal ring stiffness (SN)**

numerical designation of the ring stiffness of a pipe or fitting, which is a convenient round number, relative to the determined stiffness in kiloNewtons per square metre (kN/m^2), indicating the minimum ring stiffness of a pipe or fitting

3.1.4 Material definitions**3.1.4.1****virgin material**

material in a form such as granules or powder that has not been subjected to use or processing other than that required for its manufacture and to which no reprocessable or recyclable material has been added

3.1.4.2**own reprocessable material**

material prepared from rejected unused pipes and fittings, including trimmings from the production of pipes and fittings, that will be reprocessed in a manufacturer's plant after having been previously processed by the same manufacturer by a process such as moulding or extrusion, and for which the complete formulation is known

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3.1.4.3**external reprocessable material**

material comprising either one of the following forms:

- a) material from rejected unused pipes or fittings or trimmings there from, that will be reprocessed and that were originally processed by another manufacturer;
- b) material from the production of unused PE products other than pipes and fittings regardless of where they were manufactured

3.1.4.4**recyclable material**

material comprising either one of the following forms:

- a) material from used pipes or fittings which have been cleaned and crushed or ground;
- b) material from used PE products other than pipes or fittings which have been cleaned and crushed or ground

3.2 Symbols

A : length of engagement

C : depth of sealing zone

d_e : outside diameter

d_{em} : mean outside diameter

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d_n : nominal outside diameter

d_{sm} : mean inside diameter of a socket

e_m : mean wall thickness

e_n : nominal wall thickness

e_2 : wall thickness of a socket

e_3 : wall thickness in the groove area

l : effective length of pipe

L_1 : length of spigot

M : length of spigot of a plug

R : radius of swept fittings

Z_d : design length (Z_d -length)

α_n : nominal angle of a fitting

3.3 Abbreviations

CT : close tolerance

DN : nominal size

DN/OD : nominal size, outside diameter related

MFR : melt mass-flow rate

OIT : oxidation induction time

PE : polyethylene

SDR : standard dimension ratio

SN : nominal ring stiffness

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4 Material**4.1 Base material**

The base material shall be polyethylene (PE) to which are added those additives that are needed to facilitate the manufacture of pipes and fittings conforming to this European Standard.

The reference density of the base material (resin) shall be at least 930 kg/m³ when determined according to EN ISO 1183-1.

4.2 Reprocessable and recyclable material

In addition to virgin material the use of the manufacturer's own reprocessable material obtained during the production and testing of products conforming to this European Standard is permitted.

External reprocessible material and recyclable material of pipes and fittings is permitted provided it originates from products in accordance with this European Standard or EN 1519, EN 12201^[3], EN 13244^[4] and EN 1555^[5] or national standards replaced by these European Standards.

4.3 Melt mass-flow rate

Pipes and fittings shall be made from PE materials with a MFR as follows:

$$0,2 \text{ g/10 min} \leq \text{MFR}_{(190/5)} \leq 1,4 \text{ g/10 min}$$

when tested in accordance with EN ISO 1133:2005, condition T (temperature: 190 °C; loading mass: 5 kg).

4.4 Resistance to internal pressure (long-term behaviour)

When tested in accordance with the test method as specified in Table 1, using the indicated parameters, the material shall have characteristics conforming to the requirements given in Table 1.

The material shall be tested in the form of a pipe.

Table 1 — Material characteristics (long-term behaviour)

Characteristic	Requirements	Test parameters		Test method
Resistance to internal pressure	No failure during the test period	End caps Test temperature Orientation Number of test pieces Circumferential (hoop) stress Conditioning period Type of test Test period	Type a) or b) 80 °C Free 3 4,0 MPa 1 h Water-in-water 165 h	EN 921:1994
Resistance to internal pressure	No failure during the test period	End caps Test temperature Orientation Number of test pieces Circumferential (hoop) stress Conditioning period Type of test Test period	Type a) or b) 80 °C Free 3 2,8 MPa 1 h Water-in-water 1 000 h	EN 921:1994

4.5 Thermal stability (OIT)

When tested in accordance with EN 728 using a test temperature of 200 °C, the oxidation induction time of the material used for pipes or fittings shall not be less than 20 min.

4.6 Fusion compatibility

Materials fulfilling the longterm behaviour requirements given in 4.4 and having an MFR (190/5) within the range given in 4.3 shall be considered to be compatible for fusion to each other.

4.7 Sealing ring retaining means

Sealing rings may be retained using means made from polymers other than PE.

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5 General requirements

5.1 Appearance

When viewed without magnification, the following requirements apply:

- internal and external surfaces of pipes and fittings shall be smooth, clean and free from grooving, blistering, impurities and pores and any other surface irregularity likely to prevent their conformance with this European Standard;
- pipe ends shall be cleanly cut and the ends of pipes and fittings shall be square to their axis.

Electrofusion fittings may feature exposed metallic components.

5.2 Colour

The pipes and fittings shall be coloured through the wall. The colour should preferably be black or as agreed between manufacturer and purchaser.

A deviating colour for a co-extruded inner layer is permitted provided the material of this layer conforms to Clause 4.

6 Geometrical characteristics

6.1 General

Dimensions shall be measured according to EN ISO 3126.

NOTE The figures are schematic sketches only, to indicate the relevant dimensions. They do not necessarily represent manufactured components.

6.2 Dimensions of pipes

6.2.1 Outside diameter

The mean outside diameter, d_{em} , shall conform to Table 2.

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