SLOVENSKI STANDARD
SIST EN 1401-1:2009

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Nadomeģ a:
SIST EN 1401-1:1999

Cevni sistemi iz polimernih materialov za odpadno vodo in kanalizacijo, ki delujejo po teģnostnem principu in so pologeni v zemljo - Nemehļ an polivinilklorid (PVC-U) - 1. del: Specifikacije za cevi, fitinge in sistem

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

Kunststoff-Rohrleitungssysteme für erdverlegte drucklose Abwasserkanäle und -leitungen - Weichmacherfreies Polyvinylchlorid (PVC-U) - Teil 1: Anforderungen an Rohre, Formstücke und das Rohrleitungssystem

Systemes de canalisations en plastique pour les branchements et les collecteurs d'assainissement enterrés sans pression - Poly(chlorure de vinyle) non plastifié (PVC-U) - Partie 1 : Spécifications pour tubes, raccords et le systeme

Ta slovenski standard je istoveten z: **EN 1401-1:2009**

ICS:

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

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EUROPEAN STANDARD

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English Version

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

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This European Standard was approved by CEN on 10 January 2009.

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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 CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 1401-1:2009) 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of an identical text or by endorsement, at the latest by September 2009, and conflicting national standards shall be withdrawn at the latest by September 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1401-1:1998.

The main changes with respect to the previous edition are listed below:

a) addition of a definition for solid wall pipes and fittings (3.1.13);

b) updating of the references in Clause 2, Annex C and Bibliography;

c) raw material (4.1);

d) C_{max} of sockets (Table 5);

e) the SN series is extended with the sizes DN 710 (non-preferred) and DN 800 (Table 4);

f) O-ring type sockets (6.4);

g) solvent cement sockets (6.4.2.1);

h) additional mechanical requirements of pipes (7.1.2);

i) physical characteristics of pipes (Table 12 and note);

j) performance requirements (Table 15 – first row);

k) deletion of Long Term Performance of TPE seals (Table 15 and 10.3);

l) reformulated material (A.1.5 and A.3.3);

m) reprocessable and recyclable material from PVC-U products other than pipes and fittings (A.3.2 and Table A.2);

n) summary of use of non-virgin material (A.5, Table A.3);

o) compound characteristics (B.2).

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 1401 consists of the following Parts, under the general title *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* (the present standard)

— *Part 2: Guidance for assessment of conformity* (under revision)

— *Part 3: Guidance for installation* (ENV)

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

1 Scope

This Part of EN 1401 specifies the requirements for solid wall pipes, fittings and the system of unplasticized poly(vinyl chloride) (PVC-U) piping systems in the field of non-pressure underground drainage and sewerage:

a) outside the building structure (application area code "U") and

b) both buried in ground within the building structure (application area code "D") and outside the building.

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 pipes and fittings series and a range of 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 prCEN/TS 1401-2 [1] and ENV 1401-3 [2] it is applicable to PVC-U 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 underground drainage and sewerage.

This European Standard is applicable to non foamed PVC-U pipes without a socket as well as pipes with an integral socket.

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

Requirements and limiting values for application area code "D" are given in Table 4, Table 6, Table 13 and Table 15.

NOTE 2 Pipes, fittings and other components conforming to any of the plastics product standards listed in Annex C can 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 15.

2 Normative references

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

EN 580, *Plastics piping systems — Unplasticized poly(vinyl chloride)(PVC-U) pipes — Test method for the resistance to dichloromethane at a specified temperature (DCMT)*

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 727, *Plastics piping and ducting systems — Thermoplastics pipes and fittings — Determination of Vicat softening temperature (VST)*

EN 744:1995, Plastics *piping and ducting systems — Thermoplastics pipes — Test method for resistance to external blows by the round-the-clock method*

EN 922, *Plastics piping and ducting systems — Pipes and fittings of unplasticized poly(vinyl chloride) (PVC-U) — Specimen preparation for determination of the viscosity number and calculation of the K-value*

EN 1053, *Plastics piping systems — Thermoplastics piping systems for non-pressure applications — Test method for watertightness*

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

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

EN 1411:1996, *Plastics piping and ducting systems — Thermoplastics pipes — Determination of resistance to external blows by the staircase method*

EN 1905, *Plastics piping systems — Unplasticized poly(vinyl chloride) (PVC-U) pipes, fittings and material — Method for assessment of the PVC content based on total chlorine content*

EN 10204:2004, *Metallic products — Types of inspection documents*

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

EN ISO 1043-1:2001, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics (ISO 1043-1:2001)*

EN ISO 1167-1:2006, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method (ISO 1167:2006)*

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

EN ISO 2505, *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 9969, *Thermoplastics pipes — Determination of ring stiffness (ISO 9969:2007)*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

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

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: application area code for the area more than 1 m from the building to which the buried piping system is connected;

D: application area code for the area under and within 1 m from the building where the pipes and the fittings are buried in 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 the surroundings is usual.

3.1.2
nominal size
DN
numerical designation of the size of a component, other than a component designated by thread size, which is approximately equal to the manufacturing dimension, in millimetres (mm)

3.1.3
nominal size
DN/OD
nominal size, related to the outside diameter

3.1.4
nominal outside diameter
d_n
specified outside diameter, in millimetres, assigned to a nominal size DN/OD

3.1.5
outside diameter
d_e
value of the measurement of the outside diameter through its cross section at any point of a pipe or spigot, rounded to the next greater 0,1 mm

3.1.6
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 to the next greater 0,1 mm

3.1.7
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

3.1.8
out-of-roundness
ovality
difference between the measured maximum and the measured minimum outside diameter in the same cross section of a component

3.1.9
wall thickness
e
value of the measurement of the wall thickness at any point around the circumference of a component

3.1.10
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

3.1.11
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

3.1.12
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

3.1.13
solid wall pipe and fitting
pipe or fitting with smooth internal and external surface with the same compound / formulation through the wall

3.2 Symbols

A : length of engagement

a : circumferential side cover of a saddle branch

B : length of lead-in

C : depth of sealing zone

d_e : outside diameter

d_{em} : mean outside diameter

d_n : nominal outside diameter

d_{sm} : mean inside diameter of a socket

d_3 : internal diameter of the groove

e : wall thickness

e_m : mean wall thickness

e_2 : wall thickness of a socket

e_3 : wall thickness in the groove area

f : groove width

H : length of chamfer

K : K-value

L : axial cover of a saddle branch

l : effective length of a pipe

L_1 : length of spigot

L_2 : length of the solvent cement socket

M : length of spigot of a plug

R : radius of swept fittings

Z : design length of a fitting

α : nominal angle of a fitting

3.3 Abbreviations

DN : nominal size

DN/OD : nominal size, outside diameter related

PVC-U : unplasticized poly(vinyl chloride)

SDR : standard dimension ratio

SN : nominal ring stiffness

TIR : true impact rate

4 Material

4.1 Raw material

The raw material shall be PVC-U to which are added those additives that are needed to facilitate the manufacture of components conforming to the requirements of this European Standard.

When calculated on the basis of a known formulation, or in case of dispute or unknown formulation, determined in accordance with EN 1905, the PVC-content shall be at least 80 % by mass for pipes and 85 % by mass for injection-moulded fittings.

A further reduction of the PVC-U content to ≥ 75 % by mass for pipes only is permitted provided the PVC-U is substituted by coated or uncoated $CaCO_3$ conforming to the following.

a) The composition of the CaCO3, before coating if any, shall conform to the following:
   - content of $CaCO_3$ ≥ 96 % by mass;
   - content of $MgCO_3$ ≤ 4 % by mass;
   - content of $CaCO_3$ and $MgCO_3$ in total ≥ 98 % by mass.

b) The physical properties of the material shall conform to the following:
   - mean particle size D50 ≤ 2,5 µm;
   - top cut D98 ≤ 20 µm.