SLOVENSKI STANDARD
SIST EN 14636-2:2010

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Cevni sistemi iz polimernih materialov za odvodnjavanje in kanalizacijo, ki delujejo po težnostnem principu - Poliestrska smola (PRC) - 2. del: Vstopni in revizijski jaški

Plastics piping systems for non-pressure drainage and sewerage - Polyester resin concrete (PRC) - Part 2: Manholes and inspection chambers

Kunststoff-Rohrleitungssysteme für drucklos betriebene Abwasserkanäle und -leitungen - Polymerbeton (PRC) - Teil 2: Einsteigschächte und Kontrollschächte

Systèmes de canalisations en plastique pour les branchements et les collecteurs d'assainissement sans pression - Béton résines polyester (PRC) - Partie 2: Regards et boîtes d'inspection et de branchement

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23.040.20	Cevi iz polimernih materialov	Plastics pipes
93.030	Zunanji sistemi za odpadno vodo	External sewage systems

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Plastics piping systems for non-pressure drainage and sewerage - Polyester resin concrete (PRC) - Part 2: Manholes and inspection chambers

Systèmes de canalisations en plastique pour les branchements et les collecteurs d'assainissement sans pression - Béton de résine polyester (PRC) - Partie 2: Regards et boîtes d'inspection et de branchement

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Contents

Page

Foreword

This document (EN 14636-2:2009) 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of an identical text or by endorsement, at the latest by June 2010, and conflicting national standards shall be withdrawn at the latest by June 2010.

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.

EN 14636, *Plastics piping systems for non-pressure drainage and sewerage — Polyester resin concrete (PRC)*, consists of the following parts:

— *Part 1: Pipes and fittings with flexible joints*

— *Part 2: Manholes and inspection chambers*

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 European Standard specifies units made from polyester resin concrete (PRC, see 3.1.18), and their joints, for the construction of inspection chambers with inverts not exceeding 2 m deep and for manholes, intended to be used within a drain or sewer system operating without pressure. It applies to products for use outside buildings in buried installations to be installed by open-trench techniques.

This document applies to nominal sizes from DN 600 to DN 3000 for chamber rings and shaft rings having a circular shape.

The intended use of these products is to provide access to buried drain or sewer systems for the conveyance of wastewater, i.e. sewage and surface water, at temperatures up to 50 °C, without pressure or occasionally at a head of pressure up to 0,5 bar[1)], and installed in areas subjected to vehicle and/or pedestrian traffic and outside buildings.

NOTE 1 The attention of readers is drawn to applicable requirements contained in EN 476.

This standard specifies definitions, requirements and characteristics of units and their joints for the construction of manholes and inspection chambers, of materials, test methods, marking and evaluation of conformity.

The units are classified on the basis of its type and the type of structure they are intended to be used.

NOTE 2 It is the responsibility of the purchaser or specifier to make the appropriate selections, taking into account their particular requirements and any relevant national regulations and installation practices or codes.

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 637, *Plastics piping systems — Glass-reinforced plastics components — Determination of the amounts of constituents using the gravimetric method*

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

EN 705:1994, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Methods for regression analysis and their use*

EN 13101, *Steps for underground man entry chambers — Requirements, marking, testing and evaluation of conformity*

EN 13121-1, *GRP tanks and vessels for use above ground — Part 1: Raw materials — Specification conditions and acceptance conditions*

EN 14636-1, *Plastics piping systems for non-pressure drainage and sewerage — Polyester resin concrete (PRC) — Part 1: Pipes and fittings with flexible joints*

EN ISO 75-2:2004, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics, ebonite and long-fibre-reinforced composites (ISO 75-2:2004)*

1) 1 bar = 10^5 N/m^2 = 0,1 MPa.

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

EN ISO 9001:2008, *Quality management systems — Requirements (ISO 9001:2008)*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document the following terms and definitions apply.

NOTE For the purposes of this document a manhole or inspection chamber consists of units and components defined in this clause and as shown in Figure 1.

3.1.1
adjusting unit
component of a manhole or inspection chamber used above the cover slab to adjust the height of the structure and accommodate a cover and frame

3.1.2
angular deflection
δ
angle between the axes of two adjacent units

NOTE It is expressed in degrees (°).

3.1.3
base unit
vertical component of a manhole or inspection chamber, consisting of a chamber ring and a base, with or without benching, incorporating appropriate flexible joints to provide watertight connections to pipelines with or without integral connecting pipe(s) or adaptor(s)

NOTE It is classified by the nominal size of the integrated chamber ring.

3.1.4
chamber ring
vertical hollow component of a manhole or inspection chamber of uniform cross-section

NOTE It is classified by its nominal size. Appropriate flexible joints to provide watertight connections to pipelines with or without integral connecting pipe(s) or adaptor(s) may be incorporated.

3.1.5
connecting pipe
short pipe having plain, socket or spigot ends which provides a connection between a pipeline and a manhole

3.1.6
cover slab
horizontal unit forming the roof of a manhole or inspection chamber, which incorporates an opening for access and above which adjusting unit(s) and/or a cover and frame are intended to fit

3.1.7
crushing load
crushing strength
q_{cr}
maximum short-term load that a component is able to withstand during a crushing strength test

NOTE It is expressed in kilonewtons per metre length (kN/m) or newtons per millimetre length (N/mm).

3.1.8
design service temperature
maximum sustained temperature at which the system is expected to operate

NOTE The design service temperature is expressed in degrees Celsius (°C).

3.1.9
flexible joint
joint that allows relative movement between the components being joined

3.1.10
inspection chamber
structure similar to a manhole that is intended to provide access for inspection equipment, such as TV cameras, but does not provide access for personnel

3.1.11
manhole
vertical watertight structure used to connect pipelines, change directions or levels of pipelines, permit access to pipelines of personnel and equipment for inspection and maintenance and provide aeration and ventilation

3.1.12
maximum draw
D_{max}
maximum allowable longitudinal movement of a joint

NOTE It is expressed in millimetres (mm).

3.1.13
minimum crushing load
$q_{cr,min}$
short-term load that a chamber ring or shaft ring is required to withstand during a crushing strength test, without failure

NOTE It is determined using Equation (1) as follows:

$$q_{cr,min} = \text{strength class} \times [DN] \times 0{,}001 \quad (1)$$

and it is expressed in kilonewtons per metre length (kN/m) or newtons per millimetre length (N/mm).

3.1.14
minimum vertical crushing load
F_v
short-term load that a component is required to withstand during a vertical crushing strength test, without failure

NOTE It is expressed in kilonewtons (kN).

3.1.15
nominal size DN
alphanumerical designation of size for a component with a circular bore, which is a convenient round number for reference purposes and related to the internal diameter when expressed in millimetres

NOTE 1 For reference or marking purposes the designation for chamber rings, shaft rings or base units consists of the letters DN plus a number, e.g. DN 2000.

NOTE 2 For reference or marking purposes the designation for slabs such as reducing slabs or cover slabs or for tapers consists of the letters DN plus a number for the nominal size of the chamber ring below plus a number for the nominal size of the access opening, whereby the numbers are separated by a slash, e.g. DN 2000/1000.

3.1.16
normal service conditions
conveyance of wastewater in the temperature range from 2 °C to 50 °C, without pressure, for 50 years

3.1.17
polyester resin concrete
PRC
material formed from mineral aggregates and fillers which are bound together using a polyester resin

3.1.18
reducing slab
horizontal transition unit forming the roof of a chamber ring, which incorporates an opening for access and above which a shaft ring is intended to fit

3.1.19
rerating factor
multiplication factor that quantifies the relation between a mechanical, physical or chemical property at the service condition compared to the respective value at 23 °C and 50 % relative humidity (R.H.)

3.1.20
rigid joint
joint that does not allow relative movement between the components being joined

3.1.21
shaft ring
vertical hollow component of a manhole or inspection chamber of uniform cross-section, classified by its nominal size.

NOTE When incorporated in a structure together with chamber rings it has a smaller nominal size than the chamber rings.

3.1.22
strength class
S_c
constant equal to the minimum short term crushing load of a chamber ring or shaft ring, $q_{cr,min}$ (see 3.1.14), divided by one thousandth of its nominal size (DN)

3.1.23
taper
vertical transition unit forming a sloping roof of a chamber ring or a shaft ring, thereby reducing the ring to the size of the access opening

NOTE Either a shaft ring or adjusting unit(s) and/or a cover and frame are intended to fit above.

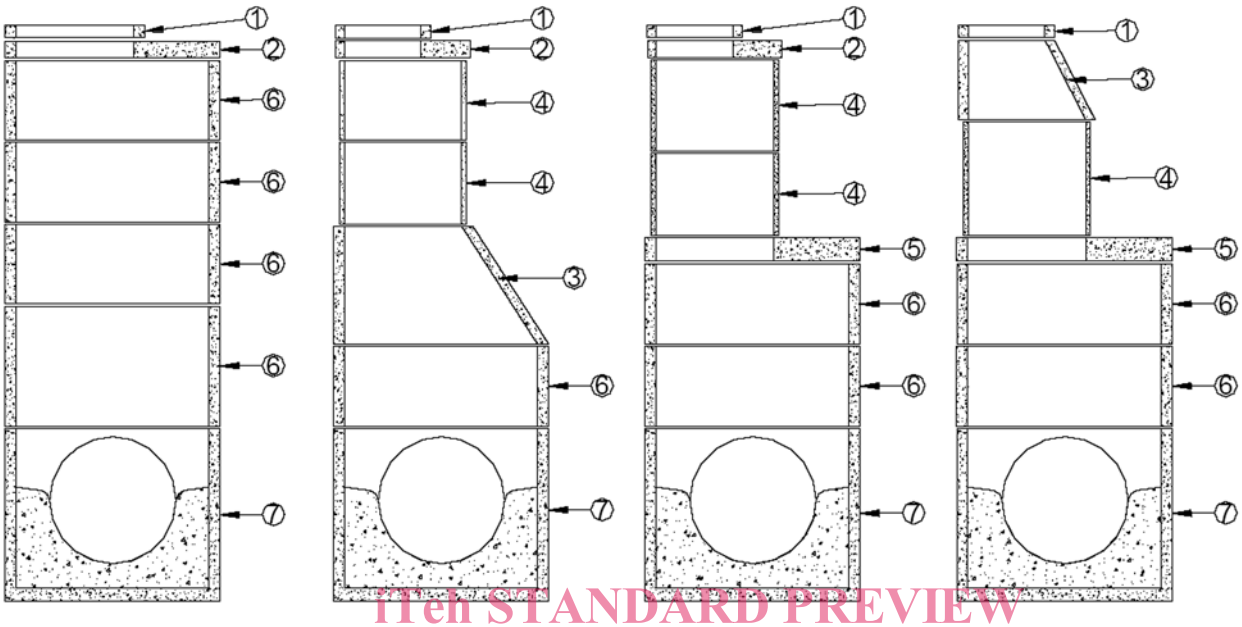
3.1.24
type test
test carried out in order to assess the fitness for purpose of a product or assembly of components to fulfil its or their function(s) in accordance with the product specification

3.1.25
ultimate vertical crushing load
vertical crushing strength
F_u
ultimate short-term load that a component is able to withstand during a vertical crushing strength test

NOTE It is expressed in kilonewtons (kN).

3.1.26
vertical unit
base unit, taper, chamber ring or shaft ring

3.1.27
wastewater
water composed of any combination of water discharged from domestic, industrial or commercial premises, surface run-off and accidentally any sewer infiltration water, i.e. sewage, rainwater or surface water



Key
① adjusting unit
② cover slab
③ taper
④ shaft ring
⑤ reducing slab
⑥ chamber ring
⑦ base unit

Figure 1 — Typical assemblies of units within manholes or inspection chambers made of polyester resin concrete (PRC)

3.2 Symbols and abbreviations

For the purposes of this document the symbols given in Table 1 and abbreviations given in Table 2 apply.

Table 1 — Symbols

Symbol	Description	Unit	Where used
a_b	width of a bearing strip	millimetres	Annexes A and B
b	width of a sawn test piece	millimetres	5.4.1.2, Annex B
D_{max}	maximum draw	millimetres	3.1.13, 4.4.2
d_a	external diameter of a chamber ring or a shaft ring	millimetres	5.3.1.1, Fig. 2
d_i	internal diameter of a chamber ring or a shaft ring	millimetres	5.3.1.1, Fig. 2, Table 4, Annexes A and B
e	wall thickness of a chamber ring, shaft ring or taper or wall thickness of a test piece taken from a chamber ring or a shaft ring	millimetres	5.3.1.1, 5.3.2, Fig. 2 and 4, Annexes A and B
F_d	vertical (deflection) load applied to steps	kilonewtons	5.4.6.1, Annex E
F_u	ultimate vertical crushing load (vertical crushing strength)	kilonewtons	3.1.26, Annex C
F_v	minimum vertical crushing load	kilonewtons	3.1.15, 5.4.2.1, Annex C
F_1	horizontal pull-out force applied to steps	kilonewtons	5.4.6, Annex E
f_{corr}	correction factor for stress distribution	–	Annex B
h	height of a taper	millimetres	5.3.2, Fig. 4, 5.5
L	length of a chamber ring or a shaft ring	metres	5.3.1.1, Fig. 2, 5.3.1.2, 5.5
l_a	lever arm length	metres	Annex G
l_b	distance between the centres of the bearers	millimetres	Annex B
l_f	distance between the centres of the fulcrums	metres	Annex G
l_p	length of a test piece	millimetres	5.4.1.2, Table 6, Annexes A and B
P	test load applied by loading frame	newtons	Annexes A and B
P_{calc}	calculated minimum test load	newtons	Annexes A and B
P_{cr}	load applied by loading frame at failure	newtons	Annex A
P_{eff}	effective test load applied to a test piece	newtons	Annex A
P_{min}	minimum load to be applied by loading frame	newtons	Annexes A and B
q_{cr}	crushing load (or crushing strength) of a chamber ring or a shaft ring calculated from the load applied to test piece at the moment of failure (collapse)	kilonewtons per metre or newtons per millimetre	3.1.7, Annexes A and B
$q_{cr,min}$	minimum crushing load	kilonewtons per metre or newtons per millimetre	3.1.14, 3.1.23, 5.4.1.1, Table 5, Annexes A and B
t_{sq}	tolerance on diametrical squareness	millimetres per metre	5.3.1.1, Fig. 2, Table 4
T_{cube}	height, length and width of a cube sawn from a unit	millimetres	5.4.3.2, Annex D
W^*	load due to own weight of the compression beam	newtons	Annexes A and B

Table 1 *(continued)*

Symbol	Description	Unit	Where used
W_p	load due to own weight of a test piece	newtons	Annex A
W_{ring}	load due to own weight of a chamber ring or a shaft ring	newtons per millimetre of length	Annex B
δ	angular deflection of a joint	degrees	3.1.2, 4.4.2
Δ_{str}	deviation from straightness	millimetres per metre	5.3.1.1, Fig. 2, Table 4
σ_c	calculated compressive strength	newtons per square millimetre	5.4.3, Annex D
σ_{rb}	calculated ring bending tensile stress or strength	newtons per square millimetre	Annexes A and B
$\sigma_{rb,min}$	minimum ring bending tensile stress	newtons per square millimetre	Annex B

Table 2 — Abbreviations

Symbol	Meaning	Where used
DN	nominal size	1, 3.1.14, 3.1.16, 3.1.23, 5.2 to 5.5, Annexes A, B
BU	classification for base unit	5.1.3, 5.2, Table 3
CS	classification for cover slab	5.1.3, 5.2, Table 3
IC	classification for inspection chamber	5.1.2, 5.2, Table 3, 5.5
M	classification for manhole	5.1.2, 5.2, Table 3, 5.5
PRC	polyester resin concrete	1, 3.1.18, 4.1.3, 4.1.6, 4.3.4, 4.4.1, 5.2 to 5.5, 8, Annexes A, B, D, E
R	classification for chamber ring or shaft ring	5.1.3, 5.2, Table 3, 5.5
RS	classification for reducing slab	5.1.3, 5.2, Table 3, 5.5
T	classification for taper	5.1.3, 5.2, Table 3

4 General requirements

4.1 Materials

4.1.1 General

The manhole or inspection chamber units shall be constructed using mineral aggregates, polyester resin, with or without fillers and if applicable, additives necessary to impart specific properties to the resin.

4.1.2 Resin

The resin used in the manhole or inspection chamber units shall have a temperature of deflection of at least 70 °C, when tested in accordance with EN ISO 75-2:2004, Method A with the test specimen in the edgewise position. It shall also conform to the applicable requirements of EN 13121-1.

4.1.3 Aggregates and fillers

Aggregates and fillers shall be mineral and shall not contain constituents in such quantities as can be detrimental to the curing, strength, leak-tightness or durability of the polyester resin concrete (PRC) (see 3.1.18). The size of particles in aggregates and fillers shall not exceed 1/3 of the smallest thickness of the unit.

4.1.4 Elastomers

Each elastomeric material(s) of a sealing component shall conform to EN 681-1. The sealing component shall be supplied by the manufacturer of the manhole or inspection chamber unit either attached to the unit or separately.

4.1.5 Metals

When exposed metal components are used, there shall not be evidence of corrosion of the components after the metallic item has been immersed for seven days at (23 ± 2) °C in an aqueous sodium chloride solution, 30 g/l, and then removed from the solution and visually examined for evidence of corrosion.

4.1.6 Minimum resin content

When tested in accordance with EN 637 the content of resin in the polyester resin concrete (PRC) (see 3.1.18) shall be not less than 7 % by mass of the sample.

4.2 Appearance

Both internal and external surfaces of units shall be free from irregularities that would impair the ability of the unit to conform to the requirements of this European Standard. The edges of the units shall be free from cracks or burrs and the joint surfaces shall be free from irregularities that would preclude the formation of a leak-tight seal. The ends of a chamber ring or shaft ring shall be square to its longitudinal axis within the tolerance specified in 5.3.1.

4.3 Reference conditions for testing

4.3.1 Temperature

The mechanical, physical and chemical properties specified in this European Standard shall be determined at (23 ± 5) °C. For service temperatures over 35 °C and up to and including 50 °C, type tests shall be carried out at least at the purchaser's declared design service temperature (see 3.1.8) to establish rerating factors (see 3.1.20) for all long-term properties to be used in design.

4.3.2 Properties of water for testing

The water used for the tests referred to in this European Standard shall be tap water having a pH of (7 ± 2).

4.3.3 Loading conditions

The mechanical, physical and chemical properties specified in this European Standard shall be determined using circumferential, perpendicular and/or longitudinal loading conditions, as applicable.

4.3.4 Measurement of dimensions

The dimensions of the polyester resin concrete (PRC) units and their joints shall be determined at (23 ± 5) °C. Measurements shall be made in accordance with either EN ISO 3126 or using any method of sufficient accuracy to determine conformity or otherwise to the applicable limits. Routine measurements shall be determined at the prevailing temperature or if the manufacturer prefers at (23 ± 5) °C.