SLOVENSKI STANDARD
SIST EN 14636-1:2010

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Cevni sistemi iz polimernih materialov za odvodnjavanje in kanalizacijo, ki delujejo po težnostnem principu - Poliestrska smola (PRC) - 1. del: Cevi in fitingi z gibljivimi spoji

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

Kunststoff-Rohrleitungssysteme für drucklos betriebene Abwasserkanäle und -leitungen - Polymerbeton (PRC) - Teil 1: Rohre und Formstücke mit biegsamen Verbindungen

Systèmes de canalisations en plastique pour les branchements et les collecteurs d'assainissement sans pression - Béton de résine polyester (PRC) - Partie 1: Tubes et raccords avec assemblages flexibles

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Systèmes de canalisations en plastique pour les branchements et les collecteurs d'assainissement sans pression - Béton de résine polyester (PRC) - Partie 1: Tubes et raccords avec assemblages flexibles

Kunststoff-Rohrleitungssysteme für drucklos betriebene Abwasserkanäle und -leitungen - Gefüllte Polyesterharzformstoffe (PRC) - Teil 1: Rohre und Formstücke mit flexiblen Verbindungen

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (EN 14636-1:2009) 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of an identical text or by endorsement, at the latest by May 2010, and conflicting national standards shall be withdrawn at the latest by August 2011.

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 European Standard consists of the following Parts:

Plastics piping systems for non-pressure drainage and sewerage — Polyester resin concrete (PRC):

— *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 United Kingdom.

1 Scope

This European Standard applies to pipes and fittings made from polyester resin concrete (PRC, see 3.1.23), intended to be used within a drain or sewer system operating without pressure. It applies to products for use in buried installations to be installed by open-trench techniques or pipe jacking.

It applies to pipes, fittings and their joints of nominal sizes from DN 150 to DN 3000 for circular cross-sections, from WN/HN 300/450 to WN/HN 1400/2100 for egg-shaped cross-sections and from DN 800 to DN 1800 for kite-shaped cross-sections.

The intended use of these products is for the conveyance of sewage, rainwater 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.

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

It specifies definitions, requirements and characteristics of pipes, fittings, joints, materials, test methods and marking.

The pipes are classified on the basis of the intended method of installation and cross-sectional shape.

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 document. 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 — Material requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber*

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

EN 1119, *Plastics piping systems — Joints for glass-reinforced thermosetting plastics (GRP) pipes and fittings — Test methods for leaktightness and resistance to damage of non-thrust resistant flexible joints with elastomeric sealing elements*

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

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

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

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

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.

3.1.1
adaptor
fitting that provides for connections to structures, pipes of other materials, or valves

3.1.2
angular deflection
δ
angle in degrees (°) between the axes of two adjacent pipes (see Figure 1 b) and c))

3.1.3
bend
fitting that provides for a change of alignment within a pipeline

3.1.4
branch
fitting comprising a pipe with one additional connecting pipe of equal or smaller nominal size, DN or WN/HN (see 3.1.13 or 3.1.14), to connect two pipelines

3.1.5
design service temperature
maximum sustained temperature in degrees Celsius (°C) at which the system is expected to operate

3.1.6
draw
D
longitudinal movement in millimetres (mm) of a joint (see Figure 1 a))

3.1.7
laying length of a bend
L
distance in metres (m) from one end of the bend, excluding the spigot insertion depth, L_i, of a socket end, where applicable, projected along the axis of that end of the bend to the point of intersection with the axis of the other end of the bend (see Figure 8)

3.1.8
laying length of a pipe
L
total length in metres (m) of a pipe, L_{tot} (see 3.1.20), minus, where applicable, the manufacturer's recommended spigot(s) insertion depth, L_i, in the socket. It is also known as the internal barrel length

3.1.9
fitting
component comprising an adaptor, bend or branch

3.1.10
flexible joint
joint that allows relative movement between the components being joined

3.1.11
minimum crushing load
$q_{cr,min}$
short-term load that a component is required to withstand during a crushing strength test, without failure (see 5.4.1.1, Equations (1) and (2)). It is expressed in kilonewtons per metre length (kN/m) or newtons per millimetre length (N/mm)

3.1.12
misalignment
M
amount by which the centrelines of adjacent pipes fail to coincide (see Figure 1 d))

3.1.13
nominal size DN
alphanumerical designation of size for a component with a circular or kite-shaped bore

NOTE 1 It is a convenient round number for reference purposes and is related to the internal diameter when expressed in millimetres.

NOTE 2 The designation for reference or marking purposes consists of the letters DN plus a number e.g. DN 600.

3.1.14
nominal size WN/HN
alphanumerical designation of size for a component with an egg-shaped bore

NOTE 1 It is a convenient round number for reference purposes and is related to the internal width and height (w_i and h_i, see Figures 3 and 6) when expressed in millimetres.

NOTE 2 The designation for reference or marking purposes consists of the letters WN/HN plus two numbers e.g. WH/HN 300/450.

3.1.15
non-pressure pipe or fitting
pipe or fitting not subject to an internal pressure greater than 0,5 bar

3.1.16
normal service conditions
conveyance of surface water, rainwater or sewage, in the temperature range from 2 °C to 50 °C, without pressure, for 50 years

3.1.17
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.)

3.1.18
strength class
constant equal to the minimum short term crushing load of a component, $q_{cr,min}$, (see 3.1.11), divided by one thousandth of either its nominal size (DN) or nominal width (WN)

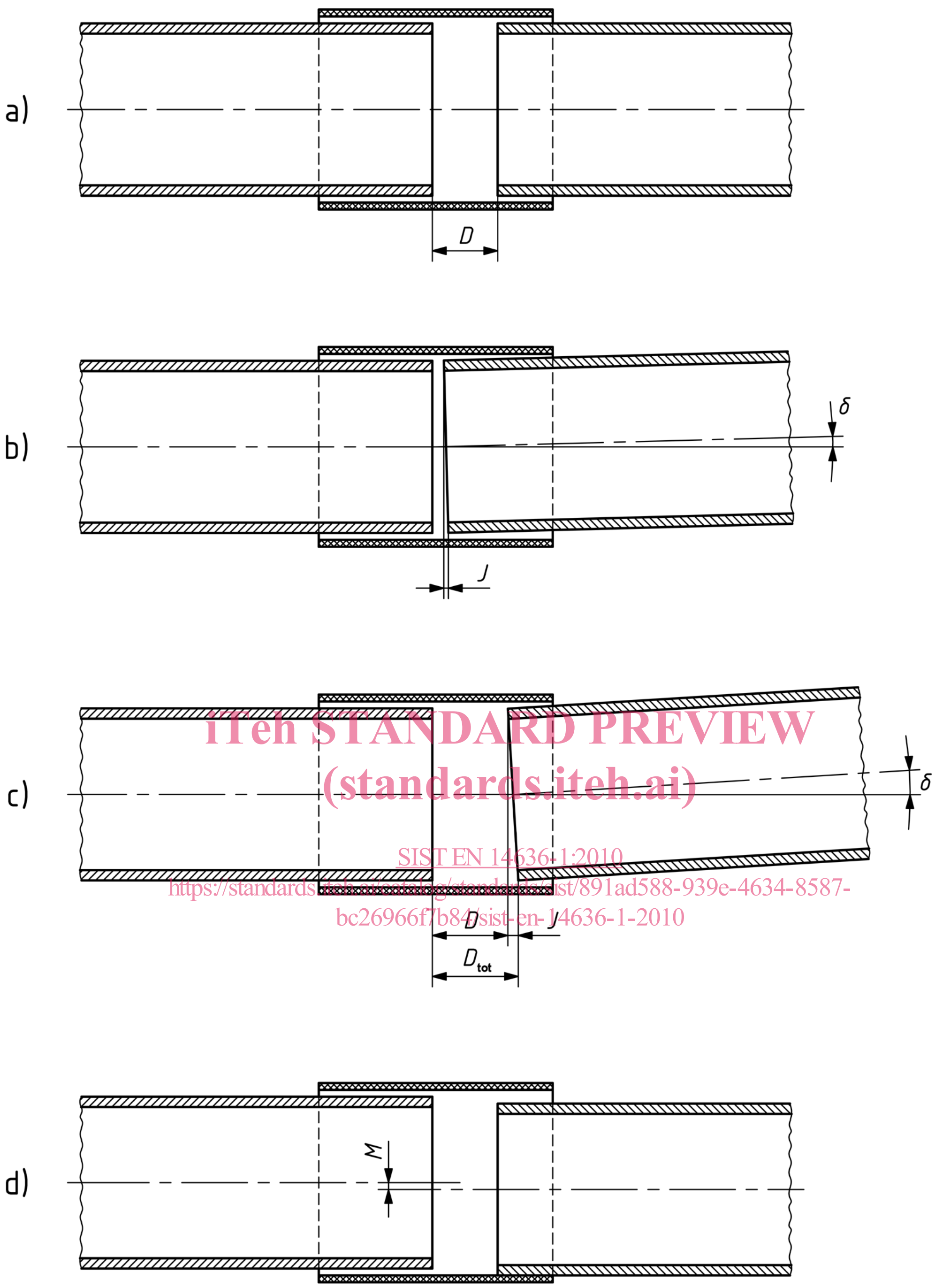
3.1.19
total draw
D_{tot}
sum of the draw, D, expressed in millimetres (mm), plus the additional longitudinal movement of joint components, J (see Figure 1 b) and c)), due to angular deflection, δ, (see 3.1.2 and Figure 1 b) and c))

3.1.20
total pipe length
L_{tot}
distance in millimetres (mm) between two planes normal to the pipe axis and passing through the extreme end points of the pipe (see Figures 2 to 7)

3.1.21
type tests
tests 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

3.1.22
crushing load (crushing strength)
q_{cr}
maximum short-term load that a component is able to withstand during a crushing strength test, expressed in kilonewtons per metre length (kN/m) or newtons per millimetre length (N/mm)

3.1.23
polyester resin concrete
PRC
material formed from mineral aggregates and fillers which are bound together using a polyester resin



Key

D draw
D_{tot} total draw
J longitudinal movement of the joint due to angular deflection
M misalignment
δ angular deflection

Figure 1 — Joint movements

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, B and E
b	width of a sawn test piece	millimetres	5.4.1.2, Annexes B and E
B	laying length of a branch pipe	millimetres	6.3, Figure 9
B_B	nominal offset (body) length of a branch pipe	millimetres	6.3, Figure 9
B_i	spigot insertion depth of a branch pipe	millimetres	6.3, Figure 9
D	draw	millimetres	3.1.6, 3.1.19, Figure 1, 7.2.2
D_{max}	maximum draw	millimetres	4.4.2.2, 7.2.2, 7.2.4
D_{tot}	total draw	millimetres	3.1.19, Figure 1, 7.2.4
d_a	external diameter of a pipe	millimetres	5.3.1, Figure 2, 5.3.3 to 5.3.6, Figures 4 to 7, 6.2.1.1, 6.3.1.1
d_e	external diameter of a spigot	millimetres	5.3.4 to 5.3.6, Figures 5 to 7
d_i	internal diameter of a pipe with a circular or kite-shaped cross-section	millimetres	5.3.1, Figure 2, 5.3.3, Figure 4, 5.3.4, Figure 5, 5.3.6, Figure 7, Annexes A, B and E
e	wall thickness of a pipe with a circular or kite-shaped cross-section or wall thickness of a test piece taken from a pipe	millimetres	4.1.3, 5.3.1, Figure 2, 5.3.3, Figure 4, 5.3.4, Figure 5, 5.3.6, Figure 7, 6.2.1.1, 6.3.1.1, Annexes A, B and E
e_1	wall thickness at the springline of a pipe with egg-shaped cross-section	millimetres	5.3.2, Figure 3, 5.3.5, Figure 6, Annex A
e_2	wall thickness at top of pipe of a pipe with egg-shaped cross-section	millimetres	5.3.2, Figure 3, 5.3.5, Figure 6, Annexes A and B
e_3	pedestal height of a pipe with egg-shaped cross-section	millimetres	5.3.2, Figure 3
f_{corr}	correction factor for stress distribution	–	Annexes B and E
f_{low}	factor for lower load	–	Annex E
f_{up}	factor for upper load	–	Annex E
h_i	internal height of a pipe with egg-shaped cross-section	millimetres	3.1.14, 5.3.2, Figure 3, 5.3.5, Figure 6
J	longitudinal movement within a joint due to angular deflection, δ (see 3.1.2)	millimetres	3.1.19, Figure 1, 7.2.4
L	laying length of a pipe or a bend or laying length of the main pipe of a branch fitting	metres	3.1.7, 3.1.8, 4.4.2.2, 5.3.1 to 5.3.6, Figures 2 to 7, 5.3.7.1, 5.4.2.2, 5.5, Figure 8, 6.2.1.5, Figure 9, 6.3.1.4
l_a	lever arm length	metres	Annexes C and G
l_b	distance between the centres of the bearers	millimetres	Annexes B, C and E
L_B	nominal body length of the main pipe of a fitting	millimetres	6.2, Figure 8, 6.3, Figure 9
L_i	insertion depth of the spigot of a pipe or main pipe of a fitting	millimetres	3.1.7, 3.1.8, 5.3.1 to 5.3.6, Figures 2 to Figure 7, 6.2, Figure 8, 6.3, Figure 9
l_f	distance between the centres of the fulcrums	metres	Annex G
l_p	length of a test piece	millimetres	5.4.1.2, 7.2.4.6, Annexes A, B and E
l_s	support span	metres	Annex C
L_{tot}	total length of a pipe	millimetres	3.1.8, 3.1.20, Figures 2 to Figure 7, 5.3.1 to 5.3.6

Table 1 — *(continued)*

Symbol	Description	Unit	Where used
M	misalignment	millimetres	3.1.12, Figure 1
M_{BMR}	minimum longitudinal bending moment resistance	kilonewton metre	5.4.2, Annex C
M_3	calculated longitudinal bending moment resisted by the pipe when tested using three-point loading method	kilonewton metre	5.4.2.1, Annex C
M_4	calculated longitudinal bending moment resisted by the pipe when tested using four-point loading method	kilonewton metre	5.4.2.1, Annex C
N_d	specified shear load for joint misalignment test	newtons per millimetre of nominal size	7.2.4.2
P	test load applied by loading frame	newtons	Annexes A, B and E
P_b	total bending load applied	kilonewtons	Annex C
P_{calc}	calculated minimum test load	newtons	Annexes A and B
$P_{calc,low}$	calculated lower limit of cyclic load	newtons	5.4.4, Annex E
$P_{calc,up}$	calculated upper limit of cyclic load	newtons	5.4.4, Annex E
P_{cr}	load applied by loading frame at failure	newtons	Annex A
$P_{eff,CK}$	effective test load applied to a test piece with a circular or kite-shaped cross-section	newtons	Annex A
$P_{eff,E}$	effective test load applied to a test piece with an egg-shaped cross-section	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 pipe calculated from the load applied to test piece at the moment of failure (collapse)	kilonewtons per metre or newtons per millimetre	3.1.22, Annexes A and B
$q_{cr,min}$	minimum crushing load	kilonewtons per metre or newtons per millimetre	3.1.11, 3.1.18, 5.4.1, Annexes A and B
r	radius of curvature	millimetres	6.2, Figure 8
t_{sq}	tolerance on diametrical squareness	millimetres per metre	5.3.1 to 5.3.6, Figures 2 to 7
T_{cube}	height, length and width of a cube sawn from a pipe wall	millimetres	5.4.3, Annex D
W^*	load due to own weight of the compression beam	newtons	Annexes A and B
W_p	load due to own weight of a test piece	newtons	Annex A
W_{pipe}	load due to own weight of a pipe	newtons per millimetre of length	Annex B
w_i	internal width of a pipe with an egg-shaped bore	millimetres	3.1.14, 5.3.2, Figure 3, 5.3.5, Figure 6, Annexes A and B
w_p	width of the pedestal of a pipe with an egg-shaped bore	millimetres	5.3.2, Figure 3

Table 1 — *(concluded)*

Symbol	Description	Unit	Where used
α_n	fitting angle	degrees	6.2, Figure 8, 6.3, Figure 9
δ	angular deflection of a joint	degrees	3.1.2, 3.1.19, Figure 1, 4.4.2.1, 7.2.3
Δ_{str}	deviation from straightness	millimetres per metre	5.3.1 to 5.3.6, Figures 2 to 7
σ_c	calculated compressive strength	newtons per square millimetre	5.4.3
σ_{fat}	calculated fatigue strength	newtons per square millimetre	Annex E
σ_{low}	lower limit of bending tensile stress	newtons per square millimetre	Annex E
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	Annexes B and E
σ_{up}	upper limit of bending tensile stress	newtons per square millimetre	Annex E

Table 2 — Abbreviations

Symbol	Meaning	Where used
BMR	longitudinal bending moment resistance	5.4.2, 10.2.2, Annex C
DN	nominal size	1, 3.1.4, 3.1.13, 3.1.18, 5.2 to 5.5, Clause 6, 7.2.4, Annexes A to C
HN	nominal internal height of a pipe with egg-shaped cross-section	1, 3.1.4, 3.1.14, 5.2 to 5.5, 6.1, 6.4, Annex A
OC	classification for open-trench construction with circular bore	5.2 to 5.5 and 6.4, Annexes A and B
OE	classification for open-trench construction with egg-shaped bore.	5.2 to 5.5 and 6.4, Annexes A and B
OK	classification for open-trench construction with kite-shaped bore	5.2 to 5.5, and 6.4, Annexes A and B
PRC	polyester resin concrete	1, 3.1.23, 4.1.3, 4.1.6, 4.3.4, 5.2 to 5.5, 6.2.2, 6.3.2, 6.4, Clause 10, Annexes A to E
TC	classification for trenchless construction with circular bore	5.2 to 5.5, Annexes A and B
TE	classification for trenchless construction with egg-shaped bore	5.2 to 5.5, Annexes A and B
TK	classification for trenchless construction with kite-shaped bore	5.2 to 5.5, Annexes A and B
WN	nominal internal width of a pipe with egg-shaped cross-section	1, 3.1.4, 3.1.14, 3.1.18, 5.2 to 5.5, 6.1, 6.2, 6.4, 7.2.4, Annexes A to B