SIST

SLOVENSKI STANDARD
SIST EN 295-3:2012

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Nadomešča:
SIST EN 295-3:1996
SIST EN 295-3:1996/A1:2000

Keramični cevni sistemi za odvod odpadne vode in kanalizacijo - 3. del: Preskusne metode

Vitrified clay pipe systems for drains and sewers - Part 3: Test methods

Steinzeugrohrsysteme für Abwasserleitungen und -kanäle - Teil 3: Prüfverfahren

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Systèmes de tuyaux et accessoires en grès pour les réseaux de branchement et d'assainissement - Partie 3: Méthodes d'essai

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Ta slovenski standard je istoveten z: **EN 295-3:2012**

ICS:

23.040.50	Cevi in fitingi iz drugih materialov	Pipes and fittings of other materials
91.140.80	Drenažni sistemi	Drainage systems
93.030	Zunanji sistemi za odpadno vodo	External sewage systems

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2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 295-3

January 2012

ICS 93.030

Supersedes EN 295-3:1991

English Version

Vitrified clay pipe systems for drains and sewers - Part 3: Test methods

Systèmes de tuyaux et accessoires en grès vitrifié pour les collecteurs et branchements - Partie 3: Méthodes d'essai

Steinzeugrohrsysteme für Abwasserleitungen und -kanäle - Teil 3: Prüfverfahren

This European Standard was approved by CEN on 19 November 2011.

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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-CENELEC Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 295-3:2012) has been prepared by Technical Committee CEN/TC "Wastewater engineering", the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by July 2012, and conflicting national standards shall be withdrawn at the latest by January 2013.

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 295-3:1991.

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

a) test method for resistance to high pressure water jetting added;

b) test method for water absorption added;

c) test methods from the previous parts 4, 5, 6 and 7 have been included in this European Standard;

d) editorially revised.

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The standard series EN 295 "Vitrified clay pipe systems for drains and sewers" consists of the following parts:

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— *Part 1: Requirements for pipes, fittings and joints;*

— *Part 2: Evaluation of conformity and sampling;*

— *Part 3: Test methods;*

— *Part 4: Requirements for adaptors, connectors and flexible couplings;*

— *Part 5: Requirements for perforated pipes and fittings;*

— *Part 6: Requirements for components of manholes and inspection chambers;*

— *Part 7: Requirements for pipes and joints for pipe jacking.*

This European Standard takes into account the requirements of EN 476.

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, Croatia, 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, Turkey and the United Kingdom.

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1 Scope

This European Standard specifies requirements for testing of products manufactured from vitrified clay and other materials specified in the following standards:

— pipes, fittings and joints according to EN 295-1;

— adaptors, connectors and flexible couplings according to EN 295-4;

— perforated pipes and fittings according to EN 295-5;

— components of manholes and inspection chambers according to EN 295-6;

— pipes and joints for pipe jacking according to EN 295-7.

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 295-1:2012, *Vitrified clay pipe systems for drains and sewers — Part 1: Requirements for pipes, fittings and joints*

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EN 295-4:2012, *Vitrified clay pipe systems for drains and sewers — Part 4: Requirements for adaptors, connectors and flexible couplings*

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EN 295-5:2012, *Vitrified clay pipe systems for drains and sewers — Part 5: Requirements for perforated pipes and fittings*

EN 295-6:2012, *Vitrified clay pipe systems for drains and sewers — Part 6: Requirements for components of manholes and inspection chambers*

EN 295-7:2012, *Vitrified clay pipe systems for drains and sewers — Part 7: Requirements for pipes and joints for pipe jacking*

EN ISO 527-2:1996, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2:1993 including Corr 1:1994)*

EN ISO 868, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868)*

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)*

CEN/TR 14920:2005, *Jetting resistance of drain and sewer pipes — Moving jet test method*

3 Terms and definitions

For the purposes of this European Standard, the relevant terms and definitions specified in EN 295-1:2012, EN 295-4:2012, EN 295-5:2012, EN 295-6:2012 and EN 295-7:2012 apply.

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4 Symbols and abbreviations

Symbol	Description
A	Outside diameter of the spigot moulding
a_M	Measurement from inside of pipe barrel to mid point of inside of socket fairing, in millimetres (continuity of invert test).
a_p	Width of top bearer, in millimetres (crushing strength test and bending tensile strength test).
B	Nominal length of external barrel of pipe unobstructed by socket shape and/or jointing configuration, in millimetres (crushing strength test).
B_t	Distance from the outside surface of the spigot moulding to the internal surface of the pipe at one point at which the outside diameter of the spigot moulding (A) was measured, in millimetres (continuity of invert test).
b	Specimen width, in millimetres (fatigue strength test).
C_t	Distance from the outside surface of the spigot moulding to the internal surface of the pipe at the opposite end to B_t of the diameter measured as the outside diameter of the spigot (A), in millimetres (continuity of invert test).
c	Concentration of solution, in moles per litre (chemical resistance tests).
c_i	Factor for the upper (0,4) or lower (0,1) limit of the load (fatigue strength test).
D	Inside diameter of the socket moulding
DN	Nominal size - a numerical designation of size which is a convenient round number equal to or approximately equal to the internal diameter, in millimetres (bending moment resistance test).
D_S	Deviation from straightness
d_1	Barrel internal diameter, in millimetres (bending tensile strength test).
E_t	Distance from the internal surface of the socket moulding to the internal surface of the pipe at one point at which the inside diameter of the socket moulding (D) was measured, in millimetres (continuity of invert test).
F_i	Force for upper and lower limit, in kilonewtons (fatigue strength test).
F_N	Crushing strength, in kilonewtons per metre.
F_t	Distance from the internal surface of the socket moulding to the internal surface of the pipe at the opposite end to E_t, of the diameter measured as the inside of the socket moulding (D), in millimetres (continuity of invert test)
G_m	Mean annular gap, in millimetres (continuity of invert test).
IRHD	International Rubber Hardness Degrees of bearing strips/facings, in degrees IRHD (crushing strength test).
k_s	Hydraulic roughness in millimetres
l_4	Centre line distance between supports, in millimetres (fatigue strength test).
L_N	Nominal length of the pipe
L_T	Test length
M	Bending moment resistance, in kilonewton metres (bending moment resistance test).
M_b	Bending moment, in Newton millimetres (bending tensile strength test).
M_p	Mean particle size, in millimetres (abrasion resistance test).

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M_1	Test piece mass before treatment, in grammes (chemical resistance test).
M_2	Test piece mass after treatment, in grammes (chemical resistance test).
S	Support span in metres
s_1	Specimen wall thickness, in millimetres (bending tensile test).
S_{min}, S_{max}	Extreme values of difference in invert, in millimetres (continuity of invert test).
S_t	Standard deviation, in millimetres (continuity of invert test).
s_f	Specimen wall thickness, in millimetres (fatigue strength test).
t	Time.
U	Degree of non-uniformity of particles (abrasion resistance test).
W_{15}	Water addition in 15 minutes, in litres per square metre (watertightness test).
β	Half the depth of a socket fairing, in millimetres (continuity of invert test).
Δa	Measurement of difference in invert levels, in millimetres (continuity of invert test).
Δs	Deviation from squareness in millimetres.
ε	Deformation of rigid fairing materials (creep resistance of rigid fairing materials test).
σ_i, σ_j	Restoring stress at $t = 10^i$ and $t = 10^j$, in N/mm^2 (polyurethane relaxation tests).
σ_{bz}	Bending tensile strength, in Newtons per square millimetre (bending tensile strength test).

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5 Test for squareness of ends

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5.1 Test of squareness of ends for pipes according to EN 295-1:2012

A whole pipe shall be placed horizontally on two supports which have a distance of 75 mm from each end of the barrel for up to and including DN 500 and 100 mm for pipes greater than DN 500.

The deviation from squareness shall be measured as the maximum difference, at either end, between distances from any point on the end of the barrel to a plane rectangular to the line joining the points of support. Any suitable apparatus may be used. An example is given in Figure 1.

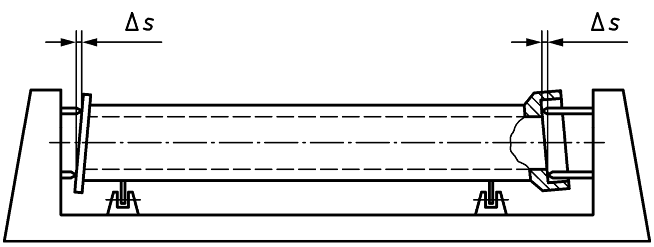

Figure 1 — Measurement of squareness of ends

5.2 Test of squareness of ends for pipes according to EN 295-7:2012

A whole pipe shall be placed on a horizontal support according to Figure 2. The gauge shall be clamped to the ground ends of the pipe. The pivot arm is located approximately 100 mm away from the cut end.

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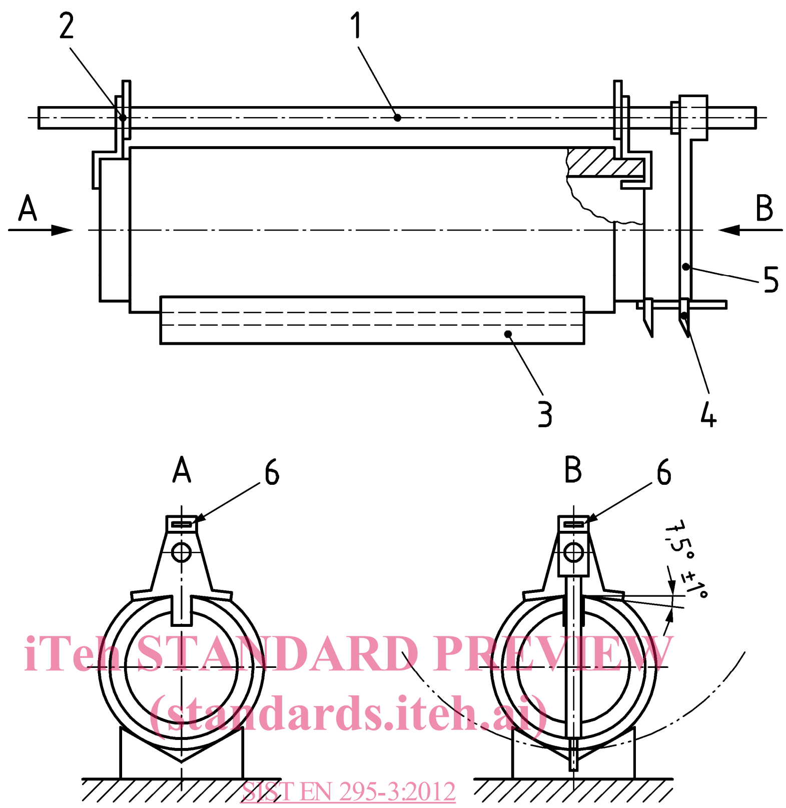
The distance between the pivot arm and the cut end is measured at 90° intervals. The deviation from squareness is the difference between the maximum and minimum measurements. This procedure shall be performed for both ends of the pipe. Any suitable apparatus may be used. An example is given in Figure 2.



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Key

1 gauge
2 clamp
3 support
4 calliper gauge
5 pivot arm
6 spirit level

Figure 2 — Gauge for squareness of ends

6 Straightness test

The deviation from straightness of a pipe barrel is the maximum distance from the centre of a straight line equal to the test length spanning any concave curve on the outside of a pipe barrel to the pipe surface, D_s, as shown in Figure 3. It is permissible to test for straightness using any suitable apparatus.

The test length shall be 150 mm less than the nominal length of the pipe to allow for clearance at the shoulder of any socket and at any jointing material at the spigot end.

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Key

L_N is the nominal length of the pipe

L_T is the test length

D_s is the deviation from straightness

$L_T = L_N - 150$ mm at DN ≤ 500

$L_T = L_N - 200$ mm at DN > 500

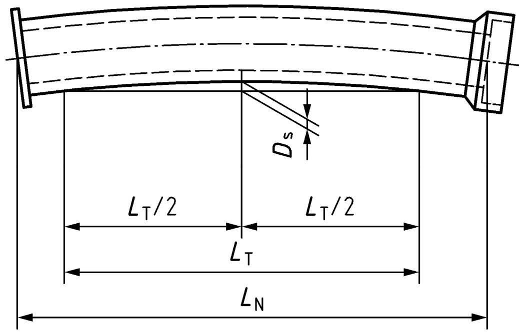

Figure 3 — Straightness test method

7 Crushing strength test

7.1 General

7.1.1 Preconditioning

Prior to crushing strength tests, sample pipes or pipe sections shall be preconditioned by either:

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a) complete immersion in water at ambient temperature for the minimum times given in Table 1, where the wall thickness is the mean wall thickness of the batch,

Table 1 — Preconditioning time for strength tests

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Wall thickness mm	**Minimum preconditioning time**	
	Unglazed, glazed only on interior or exterior surface, salt glazed h	Ceramic glazed h
up to 20	18	42
> 20 to ≤ 35	42	66
> 35	66	90

or

b) by complete immersion in a water pressure tank at ambient temperature for 24 h at a pressure of 250 kPa (2,5 bar).

An example of the pressure tank is given in Figure 4.

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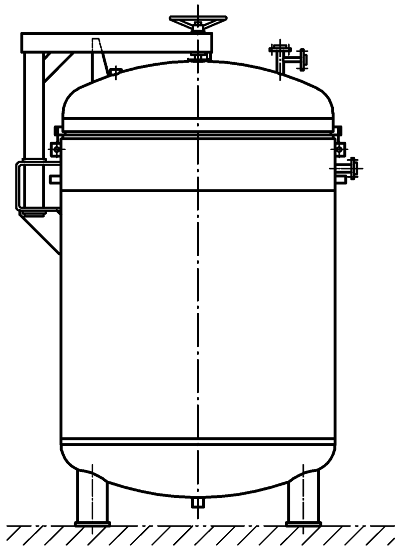

Figure 4 — Example of pressure tank for preconditioning

7.1.2 Testing machine

The testing machine for crushing shall be capable of applying compressive loads and shall be substantial and rigid throughout, so that the distribution of the load will not be affected by the deformation or yielding of any part. The machine and bearers shall be designed to transmit the load in a vertical plane through the longitudinal centre lines of the bearers and pipe.

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The load shall be applied to the top bearer in such a way that the combination of support, bearers and bearing strips is free to rotate in a vertical plane through the longitudinal centre lines of the top and custom bearers.

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The testing machine load shall be verified by calibration to an accuracy of 1 % by an approved agency at intervals of not more than 12 months.

7.1.3 Loading

The pipe or pipe section of no less than 300 mm long shall be placed between the bearer strips. When using the rigid system described in 7.3.3 the plane of any permitted longitudinal curvature shall be approximately horizontal.

The load shall be applied to the pipe or pipe section without vibration or sudden shock, at a uniform rate between 0,40 kN/m of pipe per second and 0,60 kN/m of pipe per second, or in increments of not more than 0,50 kN/m at the same rate, up to the point of failure or, in the case of acceptance (proof) testing, to the load corresponding to the required strength.

7.2 Bearers and bearing strips/facings

7.2.1 Bearers

The bearers shall consist of metal, teak or similar hard wood, be straight and free from knots, warping or twisting, and shall be centrally located on their supports.

The top and bottom bearers shall both have a minimum thickness of 25 mm. When bearing strips are used the widths of the bearers shall be not less than those of the corresponding bearer strips as shown in Figure 5 a). Bearers shall be located such that they are aligned both longitudinally and transversely.