SLOVENSKI STANDARD
SIST EN 295-3:1996

01-december-1996

Keramične cevi, fazonski kosi in spoji za odvod odpadne vode in kanalizacijo - 3. del: Preskusne metode

Vitrified clay pipes and fittings and pipe joints for drains and sewers - Part 3: Test methods

Steinzeugrohre und Formstücke sowie Rohrverbindungen für Abwasserleitungen und -kanäle - Teil 3: Prüfverfahren

Tuyaux et accessoires en gres et assemblages de tuyaux pour les réseaux de branchement et d'assainissement - Partie 3: Méthode d'essai

Ta slovenski standard je istoveten z: EN 295-3:1991

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91.140.80	Drenažni sistemi	Drainage systems
93.030	Zunanji sistemi za odpadno vodo	External sewage systems

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Vitrified clay pipes and fittings and pipe joints for drains and sewers - Part 3: Test methods

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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.

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CEN

European Committee for Standardization
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Foreword

This part of the European Standard for vitrified clay pipes is the third of three parts which were drafted by WG2 "Vitrified clay pipes" of the Technical Committee CEN/TC 165 "Waste water engineering", Secretariat of which is held by DIN.

"Vitrified clay pipes and fittings and pipe joints for drains and sewers Part 1: Requirements" contains the complete specification, "Vitrified clay pipes and fittings and pipe joints for drains and sewers Part 2: Quality control and Sampling" contains the complete quality control. Other parts may be added later.

On drafting this standard the provisional results already available of CEN/TC 165/WG1 "General requirements on pipes, fittings, pipe joints including sealings and manholes" or other relevant working group of TC165 were taken into account. When further results are received, any necessary amendment will be made.

In accordance with the Common CEN/CENELEC Rules, the following countries are bound to implement this European Standard:-

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Vitrified clay pipes in permanent or in temporary contact with water intended for human consumption will not affect the quality of that water. Therefore this standard does not contravene the EC-Council Directives 75/440, 79/869, 80/778.

This standard takes into account the essential requirements of the EC-Council Directive for construction products (89/106) and the Draft Directive on the treatment of municipal waste water (COM (89) 518).

the drawings of the French or German version shall be used.

1.1 Object and field of application

This part of this European Standard is the specification for the methods of test for requirements of EN 295-1.

NOTE: Where reference is made to clauses in EN 295-1 it is clearly stated.

Throughout the clauses in this standard reference to pipes includes pipe sections as defined in clause 1.3.8 of EN295-1 where these are suitable and permitted for the tests.

1.2 References

EN 295-1 1991 Vitrified clay pipes and fittings and pipe joints for drains and sewers : Part 1: Specification.

EN 10002-1 1990 Metallic materials - Tensile testing - Part 1:Method of test (at ambient temperature).

ISO 37 1977 Rubber, vulcanised - Determination of tensile stress-strain properties.

ISO/R 527 1966 Plastics - Determination of tensile properties

ISO 815 1972 Vulcanized rubbers - Determination of compression set under constant deflection at normal and high temperatures.

ISO 868 1985 Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness).

ISO 1133 1991 Plastics - Determination of melt mass flow rate (MFR) and the melt volume flow rate (MVR) of thermoplastics.

ISO 1431-1 1989 Rubber, vulcanised or thermoplastic - Resistance to ozone cracking - Part 1 : Static strain test.

ISO 4648 1978 Rubber, vulcanised - Determination of dimensions of test pieces and products for test purposes

1.3 Symbols

A Outside diameter of spigot moulding, in millimetres (invert conformity test).

A_L Minimum overall length of sample, in millimetres (tensile strength and elongation at break - polypropylene sleeve couplings).

a Lever arm length, in metres (bending moment resistance test).

a_M Measurement from inside of pipe barrel to mid point of inside of socket fairing, in millimetres (invert conformity test).

a_p Width of pressure beam, in millimetres (crushing strength test and bending tensile strength test).

a_{sp} Measurement from inside of pipe barrel to outside of spigot moulding, in millimetres (invert conformity test).

B Nominal length of external barrel of pipe unobstructed by socket shape and/or jointing configuration, in millimetres (crushing strength test).

B_e Width at ends, in millimetres (tensile strength and elongation at break - polypropylene sleeve couplings).

B_t Distance from the outside surface of the spigot moulding to the internal bore of the pipe at one point at which the outside diameter of the spigot moulding (A) was measured, in millimetres (invert conformity test).

b Specimen width, in millimetres (fatigue strength test).

b_3 Specimen width, in millimetres (bending tensile strength test).

C Length of narrow parallel portion of sample, in millimetres (tensile strength and elongation at break for polypropylene sleeve couplings).

CR Resistance index for jointing material.

C_t Distance from the outside surface of the spigot moulding to the internal bore of the pipe at the opposite end to B_t of the diameter measured as the outside diameter of the spigot (A), in millimetres (invert conformity test).

C_1 Distance between seal and load application line for F_Z, in metres (shear resistance test).

C_2 Distance between right hand support and load line for F_E, in metres (shear resistance 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 socket moulding, in millimetres (invert conformity test).

DN Nominal size - a numerical designation of size which is a convenient round number equal to or approximately equal to the bore, in millimetres (bending moment resistance test).

D_S Deviation from straightness of a pipe barrel, in millimetres (straightness test).

D_W Width of narrow parallel portion of sample, in millimetres (tensile strength and elongation at break).

d Distance between centres of bottom bearing strips, in metres (bending moment resistance test).

d_i Average internal diameter of pipeline, in metres (hydraulic roughness determination).

d_{50} d_{80} d_{20} Particle size not exceeded by 50%, 80% or 20% by mass of the material, in millimetres (abrasion resistance test).

d_1 Barrel internal diameter, in millimetres (bending tensile strength test).

E Small radius of sample, in millimetres (tensile strength and elongation at break).

E_t Distance from the internal surface of the socket moulding to the internal bore of the pipe at one point at which the inside diameter of the socket moulding (D) was measured, in millimetres (invert conformity test).

F Large radius of sample, in millimetres (tensile strength and elongation at break).

F_B Force at failure, in kilonewtons (bending tensile strength test).

F_E Nominal self weight of stopper, in kilonewtons (shear resistance test).

F_i Force for upper and lower limit, in kilonewtons (fatigue strength test).

F_N Crushing strength, in kilonewtons per metre.

F_R Nominal self weight of pipe, in kilonewtons (shear resistance test).

F_S Shear load, in kilonewtons (shear resistance test).

F_t Distance from the internal surface of the socket moulding to the internal bore of the pipe at the opposite end to E_t of the diameter measured as the inside of the socket moulding (D), in millimetres (invert conformity test).

F_W Weight of water in pipe, in kilonewtons (shear resistance test).

F_Z Applied load, in kilonewtons (shear resistance test).

G Distance between reference lines, in millimetres (tensile strength and elongation at break).

G_m Mean annular gap, in millimetres (invert conformity test).

g Acceleration due to gravity, in metres per second squared (hydraulic roughness determination).

h_x Pressure head at point x, in metres (hydraulic roughness determination).

h_y Pressure head at point y, in metres (hydraulic roughness determination).

IRHD International Rubber Hardness Degrees of bearing strips/facings, in degrees IRHD (crushing strength test).

k_s Hydraulic roughness, in millimetres (hydraulic roughness determination).

L_H Length between x and y, in metres (hydraulic roughness determination).

L_N Nominal length of pipe, in millimetres (straightness test).

L_T Test length of pipe, in millimetres (straightness test).

L_3 Centre line distance between supports, in millimetres (bending tensile strength test).

l_4 Centre line distance between supports, in millimetres (fatigue strength test).

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).

M^1 Required bending moment resistance, in kilonewton metres (bending moment resistance test).

M_1 Test piece mass before treatment, in grammes (chemical resistance test).

M_2 Test piece mass after treatment, in grammes (chemical resistance test).

m_o Mass of test piece prior to conditioning, in grammes (resistance index test).

P_b Total applied load, in kilonewtons (bending moment resistance test).

Q Flow rate, in cubic metres per second (hydraulic roughness determination).

S Support span, in metres (bending moment resistance test).

S_f Specimen wall thickness, in millimetres (fatigue strength test).

Sh_O Shore hardness of test piece prior to conditioning, in degrees (resistance index test).

S_{min} & S_{max} Extreme values of difference in invert, in millimetres (invert conformity test).

S_S Distance between seal and right hand support, in metres (shear resistance test).

S_t Standard deviation, in millimetres (invert conformity test).

s_f Specimen wall thickness, in millimetres (fatigue strength test).

s_1 Specimen wall thickness, in millimetres (bending tensile strength test).

t Test times, in minutes (polyurethane relaxation test).

U Degree of nonuniformity of particles (abrasion resistance test).

V_o Volume of test piece prior to conditioning, in cubic millimetres (resistance index test).

W Section modulus, in cubic millimetres (bending tensile strength test).

W_{15} Water addition in 15 minutes, in litres per square metre (watertightness test).

α_K Correction factor (bending tensile strength test).

α_{kf} Correction factor (fatigue strength test).

β Half the depth of a socket fairing, in millimetres (invert conformity test).

Δa Measurement of difference in invert levels, in millimetres (invert conformity test).

Δm_{14} Difference between m_0 and the mass 14 days after conditioning, in grammes (resistance index test).

ΔSh Difference between Sh_o and the Shore hardness after conditioning, in degrees (resistance index test).

$\Delta\sigma_{i;j}$ Stress relaxation at t=10^i and t=10^j minutes, in newtons per square millimetre (polyurethane relaxation tests).

ΔV Difference between V_o and the volume after conditioning, in cubic millimetres (resistance index test).

λ Resistance coefficient (hydraulic roughness determination).

σ_i & σ_j Restoring stress at times t=10^i minutes and t=10^j minutes, in newtons per square millimetre (polyurethane relaxation tests).

σ_{bz} Bending tensile strength, in newtons per square millimetre (bending tensile strength test).

2. Test for squareness of ends

A whole pipe is placed horizontally on two supports, situated 75mm from each end of the barrel.

The deviation from squareness is 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.

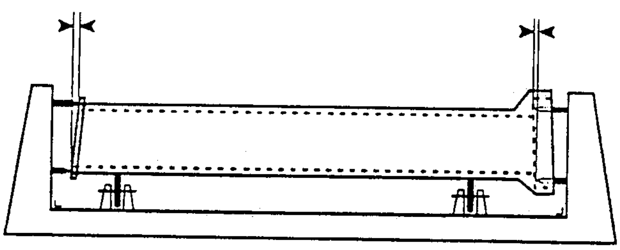

Figure 1 : Measurement of squareness of ends

3. 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 2. It is permissible to test for straightness using any suitable apparatus.

The test length shall be 150mm 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.

L_N is the nominal length of the pipe

L_T is the test length

D_S is the deviation from straightness

$L_T = L_N - 150\text{mm}$

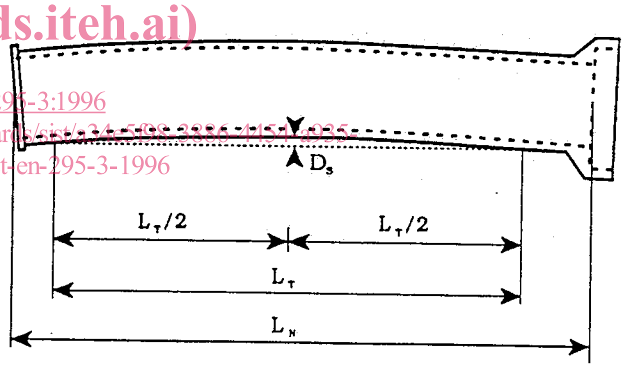

Figure 2 : Straightness test method

4. Crushing strength test

4.1 General

4.1.1 Preconditioning

Prior to crushing strength tests, sample pipes or pipe sections shall be preconditioned.

This shall be effected by either

a) complete immersion in water at ambient temperature for the minimum times given in table 1. The wall thickness is the mean wall thickness of the batch.

Table 1 : Preconditioning time for strength tests

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

or

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

An example of the pressure tank is given in figure 3.

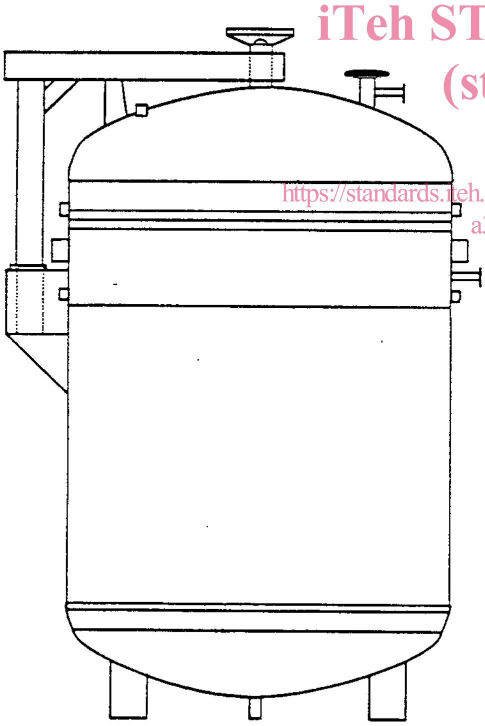

Figure 3 : Example of pressure tank for preconditioning

4.1.2 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.

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 bottom bearers.

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.

4.1.3 Loading

Place the pipe or pipe section not less than 300mm long between the bearer strips.
When using the rigid system described in 4.3.3 the plane of any permitted longitudinal curvature shall be approximately horizontal.

Apply the load to the pipe or pipe section without vibration or sudden shock, at a uniform rate between 0,40 kN per metre of pipe per second and 0,60 kN per metre of pipe per second, or in increments of not more than 0,50 kN per metre 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.

4.2 Bearers and bearing strips/facings

4.2.1 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 25mm. When bearing strips are used the widths of the bearers shall be not less than those of the corresponding bearer strips, see figure 4a.

When bearing facings are used the widths shall be not less than those required to support the pipe and the width of the top bearer is given in table 2, see figure 4b.

The cross-sectional shape of the bearers shall be in accordance with figure 4. The slope of the V surface of the bottom bearer shall be between 0° and 5°.