BS EN 295-1:2013

BSI Standards Publication

Vitrified clay pipe systems for drains and sewers

Part 1: Requirements for pipes, fittings and joints

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National foreword

This British Standard is the UK implementation of EN 295-1:2013. It supersedes BS EN 295-1:1991 and, together with BS EN 295-2:2013, BS EN 295-4:2013, BS EN 295-5:2013, BS EN 295-6:2013, and BS EN 295-7:2013, it supersedes BS EN 295-10:2005, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/505, Wastewater engineering.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Published by BSI Standards Limited 2013.

ISBN 978 0 580 70646 2

ICS 23.040.50; 91.140.80; 93.030

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 28 February 2013.

Amendments issued since publication

Date	Text affected

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 295-1

February 2013

ICS 93.030

Supersedes EN 295-1:1991, EN 295-10:2005

English Version

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

Systèmes de tuyaux et accessoires en grès pour les réseaux de branchement et d'assainissement - Partie 1: Exigences pour tuyaux, accessoires et assemblages

Steinzeugrohrsysteme für Abwasserleitungen und -känale - Teil 1: Anforderungen an Rohre, Formstücke und Verbindungen

This European Standard was approved by CEN on 1 December 2012.

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Ref. No. EN 295-1:2013: E

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Foreword

This document (EN 295-1:2013) has been prepared by Technical Committee CEN/TC 165 “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of an identical text or by endorsement, at the latest by August 2013, and conflicting national standards shall be withdrawn at the latest by August 2013.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 295-1:1991 and together with EN 295-2:2013, EN 295-4:2013, EN 295-5:2013, EN 295-6:2013 and EN 295-7:2013 it supersedes EN 295-10:2005.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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

a) new dimensions included in Table 13 and Table 14 and dimensions for products no longer manufactured deleted;

b) requirements for the resistance to high pressure water jetting added;

c) requirements for water absorption added;

d) reaction to fire added;

e) Annex ZA added;

f) editorially revised.

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

— *Part 1: Requirements for pipes, fittings and joints* (the present document)

— *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*

Guidance on design, installation and operation of sewers and drains constructed from vitrified clay pipes is given in EN 295-1:2013, Annex B.

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According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, 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 vitrified clay pipes, fittings and flexible joints for buried drain and sewer systems for the conveyance of wastewater (including domestic wastewater, surface water and rainwater) under gravity and periodic hydraulic surcharge or under continuous low head of pressure.

This standard also specifies requirements for rubber, polyurethane and polypropylene materials and other components used for jointing clay pipes and fittings.

This standard specifies different strength classes, systems of joint dimensions, lengths and fittings.

NOTE 1 The specifiers/purchasers can select them according to their requirements.

This standard does not apply to special fittings, adaptors and compatible accessories, perforated pipes and fittings, manholes and inspection chambers and pipes and joints for pipe jacking, which are specified in other parts of the standard series EN 295.

NOTE 2 Corresponding provisions for the evaluation of conformity (ITT and FPC) and sampling and those for the test methods are further specified in EN 295-2 and EN 295-3, respectively.

2 Normative references

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

EN 295-2:2013, *Vitrified clay pipe systems for drains and sewers — Part 2: Evaluation of conformity and sampling*

EN 295-3:2012, *Vitrified clay pipe systems for drains and sewers — Part 3: Test methods*

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

EN 681-4, *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Part 4: Cast polyurethane sealing elements*

EN 1610:1997, *Construction and testing of drains and sewers*

3 Terms and definitions

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

3.1
nominal size
DN
numerical designation of size which is a convenient round number equal to or approximately equal to the internal diameter in millimetres

3.2
curvature
angle subtended by the length of a curved fitting at the centre of a circle of nominal radius through the centreline of the fitting

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3.3
joint assembly
adjacent ends of pipes, fittings or adaptors and the means of joining them

3.4
joint system
dimensions of a joint related to spigot or socket

Note 1 to entry: Joint systems C, D and I are related to internal diameters of sockets, and joint systems E to H are related to the spigot outside diameters.

3.5
sealing element
factory made component which seals the joint

3.6
fairing
any component located within a joint to reduce dimensional tolerances of sealing surfaces

3.7
minimum internal diameter
smallest internal diameter measured within 100 mm of the ends of the pipe

3.8
pipe section
short length of pipe barrel equal to or greater than 300 mm

3.9
nominal length
numerical designation of length approximately equal to the internal length of the pipe barrel

4 Symbols and abbreviations

4.1 Symbols

F_N crushing strength, in kN/m

F_S shear load, in kN

d_3 spigot outside diameter, in mm

d_4 internal diameter of socket or fairing, in mm

p_0 initial air pressure, in kPa

Δp pressure drop, in kPa

W_{15} water addition needed to maintain watertightness test pressure, in l/m^2

4.2 Abbreviations

BMR bending moment resistance

CWT classified without the need for testing

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5 Requirements for pipes and fittings

5.1 Materials, manufacture, water absorption and appearance

5.1.1 Materials

Pipes and fittings shall be made from suitable natural clays to enable the pipe body to be fired to vitrification that is with a glass matrix, so that the final product is in accordance with this standard.

5.1.2 Manufacture

Pipes and fittings shall be sound and shall be free from such defects as would impair their function when in service.

NOTE Pipes and fittings are regarded as rigid (stiff) and the joints as flexible; all have high corrosion resistance.

Fittings may be completed by fixing fired parts together. Products may be surface treated after firing. Applicable dimensional and performance requirements for fittings shall be as specified in Annex A.

5.1.3 Water absorption

Pipes and fittings shall have a water absorption value of less than 6 % when tested in accordance with EN 295-3:2012, Clause 28.

5.1.4 Appearance

Pipes and fittings can be unglazed or glazed on the interior and/or exterior. When glazed they need not be glazed on the jointing surfaces of the spigot and/or socket.

Visual imperfections, such as missing glaze, unevenness, creasings in the transition from pipe to socket and slight surface damage are acceptable, providing the impermeability, durability and flow characteristics of the pipes and fittings are unaffected.

5.2 Internal diameter

The internal diameter shall not be less than the values given in Table 1.

Table 1 — Internal diameter

Nominal size DN	Minimum internal diameter mm	Nominal size DN	Minimum internal diameter mm
100	96	450	439
125	121	500	487
150	146	600	585
200	195	700	682
225	219	800	780
250	244	900	878
300	293	1 000	975
350	341	1 200	1 170
400	390	1 400	1 365

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Other nominal sizes can be manufactured to comply with this standard, providing that the minimum internal diameter shall be not less than 97,5 % of the nominal size, rounded to the nearest whole millimetre.

5.3 Length

The preferred nominal lengths of pipes of DN 200 and greater shall be either in accordance with Table 2 or in whole multiples of 0,25 m. There are no preferred nominal lengths for DN 100, DN 125 and DN 150 pipes or straight fittings.

Table 2 — Preferred nominal lengths

Nominal size DN	**Preferred nominal lengths** m				
200	1,5	–	2,0	2,5	–
225	1,5	1,75	2,0	–	–
250	1,5	–	2,0	2,5	–
300	1,5	–	2,0	2,5	–
≥ 350	1,5	–	2,0	2,5	3,0
NOTE Lengths of 1,0 m, 1,6 m and 1,85 m are also preferred for the range DN 200 to DN 450.					

The length shall be measured to the nearest whole millimetre. The tolerance on the declared nominal length of pipes and straight fittings shall be from – 1 % to + 4 %, or ± 10 mm, whichever is the larger.

5.4 Squareness of ends

When tested in accordance with EN 295-3:2012, 5.1, the deviation from squareness measured at the ends of pipes and straight fittings shall be not greater than 6 mm for sizes up to and including DN 300. For sizes greater than DN 300, the deviation shall not exceed 2 % of DN.

5.5 Deviation from straightness

When tested in accordance with EN 295-3:2012, Clause 6, the deviation from straightness of the barrel of a pipe, measured to the nearest whole millimetre, shall be not greater than the values given in Table 3.

Table 3 — Deviation from straightness

Nominal size	**Maximum deviation from straightness** mm/m of nominal length
DN < 150	5
150 ≤ DN < 200	4,5
200 ≤ DN ≤ 300	4
DN > 300	3

5.6 Water seal of trapped fittings

Trapped fittings for drainage outside buildings and sewerage shall provide a minimum water seal depth of 50 mm.

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5.7 Angle of curvature and radius of bends

The preferred nominal angles of curvatures of bends and tolerances shall be as given in Table 4.

Table 4 — Angle of curvature of bends

Preferred nominal angle of curvature of bends	11,25°	15°	22,5°	30°	45°	90°
Tolerance on angle	± 3°		± 4°		± 5°	

The centreline radius shall be not less than the nominal size in millimetres. Shorter radius bends are permitted up to and including DN 150.

5.8 Branch angle of junctions

The preferred nominal angles of junction arms are 45° and 90°. The tolerance for the branch angle shall be ± 5° of the nominal value.

5.9 Crushing strength (F_N)

When tested in accordance with EN 295-3:2012, Clause 7, the crushing strength (F_N) of pipes or pipe sections shall be not less than the values given in Tables 5 to 7.

Table 5 — Crushing strength for DN 100, DN 125 and DN 150 pipes

Nominal size DN	**Minimum crushing strength** F_N kN/m		
100	28	34	40
125	–	34	–
150	28	34	40

Higher crushing strengths can be declared for DN 100, DN 125 or DN 150 pipes, provided that the increase is in steps of 6 kN/m.

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