BS EN 295-5:2013

BSI Standards Publication

Vitrified clay pipe systems for drains and sewers

Part 5: Requirements for perforated pipes and fittings

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National foreword

This British Standard is the UK implementation of EN 295-5:2013. It supersedes BS EN 295-5:1994 and, together with BS EN 295-1:2013, BS EN 295-2:2013, BS EN 295-4:2013, BS EN 295-6:2013, and BS EN 295-7:2013, it supersedes BS EN 295-10:2005, which is withdrawn.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.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Vitrified clay pipe systems for drains and sewers - Part 5: Requirements for perforated pipes and fittings

Systèmes de tuyaux en grès vitrifié pour les collecteurs d'assainissement et les branchements - Partie 5: Exigences applicables aux tuyaux perforés et raccords

Steinzeugrohrsysteme für Abwasserleitungen und -kanäle - Teil 5: Anforderungen an gelochte Rohre und Formstücke

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

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Foreword

This document (EN 295-5:2013) 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of an identical text or by endorsement, at the latest by August 2013, and conflicting national standards shall be withdrawn at the latest by August 2013.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 295-5:1994 and together with EN 295-1:2013, EN 295-2:2013, EN 295-4:2013, 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:

— requirements for the resistance to high pressure water jetting added;

— requirements for water absorption added;

— reaction to fire added;

— Annex ZA added;

— 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*

— *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* (the present document)

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

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

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1 Scope

This European Standard specifies requirements for perforated pipes and compatible fittings made from vitrified clay with or without sockets for use in land drains and drainage of waste tips. They are also used for percolation into the ground.

This standard specifies different strength classes and areas of perforations.

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

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 295-1:2013, *Vitrified clay pipe systems for drains and sewers — Part 1: Requirements for pipes, fittings and joints*

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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 295-1:2013 and the following apply.

3.1
area of perforations
total area of holes or slots per metre length measured on the inside of the pipe

4 Requirements for pipes and fittings

4.1 Material, manufacture, water absorption and appearance

For material, manufacture, water absorption and appearance, perforated pipes and fittings shall comply with EN 295-1:2013, 5.1.

4.2 Internal diameter

The internal diameter shall not be less than the values according to Table 1.

Table 1 — Internal diameter

Nominal size DN	**Minimum internal diameter** mm
75	72
100	96
125	121
150	146
200	195
225	219
250	244
300	293
350	341
400	390
450	439
500	487
600	585

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 mm.

4.3 Length

Preferred lengths of pipes and straight fittings are not specified in this standard.

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 – 2 % to + 5 %, or ± 10 mm, whichever is the larger.

4.4 Deviation from straightness

When tested in accordance with EN 295-3:2012, Clause 6, the deviation from straightness of the barrel of a pipe shall not be greater than the values given in Table 2, measured to the nearest whole millimetre.

Table 2 — Deviation from straightness

Nominal size DN	**Maximum deviation from straightness** mm/m of nominal length
< 150	6
≥ 150 to ≤ 250	5
> 250	4

4.5 Angle of curvature and radius of bends

The preferred nominal angles of curvature of bends are 15°; 22,5°; 30° and 45°. The tolerance on angle shall be ± 5° of the nominal value.

The centreline radius shall not be less than the nominal size in millimetres.

4.6 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.

4.7 Perforations

4.7.1 General

The holes in perforated pipes shall be either circular or slotted, and shall be cleanly cut. They shall be positioned in rows parallel to the longitudinal axis of the pipe, the holes in each row being spaced equidistantly. The permissible deviation of the spacing between the holes in any row shall not exceed ± 20 mm. Pipes need not be perforated within 100 mm of their ends. Fittings need not be perforated.

The diameter of circular holes at the inside of the pipe shall be not greater than 13 mm. If slots are used instead of circular holes, the width of slots at the inside of the pipe shall be not greater than 8 mm.

4.7.2 Arrangement of perforations

The perforations shall be arranged in one of the following configurations shown in Figure 1:

a) totally perforated pipe (TP) which is symmetrically perforated around its entire circumference;

b) locally perforated pipe (LP) which is symmetrically perforated over up to 270° of its circumference;

c) multipurpose pipe (MP), which is symmetrically perforated over up to 120° of its circumference.

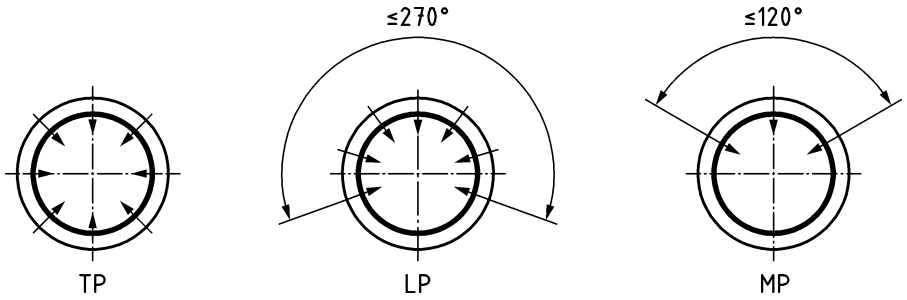

Figure 1 — Arrangement of perforations

4.7.3 Area of perforations

The total area of holes measured at the pipe internal surface shall be either:

— Type A: not less than 3 mm^2 per millimetre nominal size per metre nominal length; or

— Type B: not less than 10 000 mm^2 per metre nominal length.

4.8 Crushing strength (F_N)

When tested in accordance with EN 295-3:2012, Clause 7, with no perforations under the top bearer, the crushing strength (F_N) of pipes or pipe sections shall be not less than the values given in Tables 3 and 4.

Table 3 — Crushing strength for pipes DN 75 to DN 150

Nominal size DN	**Minimum crushing strength F_N** kN/m		
75	20	22	28
100	20	22	28
125	20	22	28
150	20	22	28

Higher crushing strengths may be declared for DN 75 to DN 150 pipes, provided that the increase is in steps of 6 kN/m.

Table 4 — Crushing strength for pipes ≥ DN 200

Nominal Size DN	**Class**		
	95	120	160
	Minimum crushing strength F_N kN/m		
200	–	24	32
225	–	28	36
250	–	30	40
300	–	36	48
350	–	42	56
400	38	48	64
450	43	54	72
500	48	60	80

The crushing strength of other nominal sizes shall be calculated in accordance with Formula (1).

$$F_N = \frac{\text{Class} \times DN}{1000} \quad (1)$$

Higher crushing strengths than those given in Table 4 can be declared providing that they conform to the requirements of the next higher class. Classes are restricted to 95, 120 and 160, thereafter in increments of 20.

NOTE For the purpose of structural design, the nominal wall thickness and/or nominal outside diameter are provided by the manufacturer.

4.9 Chemical resistance

When tested in accordance with EN 295-3:2012, Clause 13, the loss of material from the test piece shall be declared.

NOTE Under normal conditions of use, vitrified clay pipes are considered to be resistant to chemical attack and expected to show typical values of loss of material between 0,1 % and 0,25 %.

4.10 Fatigue strength under cyclic load

Where the resistance to fatigue under cyclic loads is required, it shall be demonstrated by testing in accordance with EN 295-3:2012, Clause 11, when test pieces shall not fail.

5 Joint assemblies

This standard does not specify requirements for joints. Perforated pipes can be fitted with flexible joints (e.g. according to EN 295-1) or used with other joints. Where necessary, the joint material requirements shall be agreed between the manufacturer and the specifier/purchaser.

6 Common requirements for pipes and fittings

6.1 Reaction to fire

Where the use of perforated vitrified clay pipes and fittings is subject to national regulatory requirements on reaction to fire, their reaction to fire performance shall be declared. Perforated vitrified clay pipes and fittings in use are classified as Class A1 without the need for testing (CWT) in accordance with the relevant Commission decision[1)].

NOTE1 Vitrified clay, as a homogeneously distributed material for these products, is considered as material of known and stable performance with respect to the reaction to fire performance as it does not consist of any organic material and consequently does not contribute to the fire. Under this condition it may be considered as the Class A1 material.

NOTE 2 The class of reaction to fire performance of perforated vitrified clay pipes with their joints is regarded as the class for the constituent material (i.e. vitrified clay).

Conversely, where use of this product is not subject to national regulatory requirements on reaction to fire, either the Class A1 (see above) or Class F (see Note 3) may be declared.

NOTE 3 Class F according to EN 13501-1 is equivalent to "No Performance Determined" (NPD).

6.2 Durability

Perforated vitrified clay pipes and fittings for drains and sewers are products of known and stable performance for defined end use applications with respect to their established durability for which experience has been accumulated over a long period of time.

Durability of crushing strength is ensured by meeting the requirements of 4.1 and 4.9.

6.3 Dangerous substances

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets. In the absence of European harmonised test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

NOTE An informative database covering European and national provisions on dangerous substances is available at the Construction web site on EUROPA accessed through: *http://ec.europa.eu/enterprise/construction/cpd-ds/*".

1) See Decision of the Commission 96/603/EC of 1996-10-04 (see OJEU L 267 of 1996-10-19), as twice amended by 2000/605/EC of 2000-09-26 (see OJEU L 258 of 2000-10-12) and by 2003/424/EC of 2003-06-06 (see OJEU L 144 of 2003-06-12).

7 Designation

Where required for specification and documentation purposes, the following designation shall be used:

— Block 1: Name of product;

— Block 2: Standard number (EN 295-5);

— Block 3: Individual item block,

  — 3.1 Nominal size,

  — 3.2 Length,

  — 3.3 Strength,

  — 3.4 Arrangement of perforation,

  — 3.5 Type of area of perforation.

Example of the designation of a vitrified clay pipe according to EN 295-5 with a nominal size of 150 mm (DN 150), a length of 2,00 m, a crushing strength, F_N of 28 kN/m (FN28), totally perforated (TP) and Type of area of perforation (Type A):

EXAMPLE Perforated pipe — EN 295-5 — DN 150 — 2,00 — FN28 —TP — A

8 Marking

All pipes and fittings according to this standard shall be marked with:

— EN 295-5;

— manufacturer's identification;

— date of manufacturing;

— nominal size (DN....);

— type (LP, MP or TP) and (A or B).

In addition pipes shall be marked with:

— crushing strength, FN in kN/m.

In addition bends and junctions shall be marked with:

— angle.

Marking shall be indelible and wherever practicable impressed before firing.

NOTE 1 Because the marking is impressed before firing wherever practical, the marking of crushing strength is carried out as "FN" for better legibility instead of the symbol "F_N", as used in the standard.

NOTE 2 Where CE marking covers some of the marking requirements of this clause, such requirements need not be repeated here.

9 Evaluation of conformity

9.1 General

Products, manufactured to this standard, shall be subjected to evaluation of conformity procedures as follows:

a) initial type testing; and

b) factory production control by the manufacturer, including product assessment.

9.2 Initial type testing

Perforated vitrified clay pipes and fittings shall be subjected to initial type testing according to relevant sub-clauses and tables of EN 295-2:2013, 5.2, to show conformity with this European Standard.

9.3 Factory production control (FPC)

Perforated vitrified clay pipes and fittings shall be subjected to factory production control according to relevant sub-clauses and tables of EN 295-2:2013, 5.3, to ensure that the declared performance of each stated characteristic is maintained.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of the EU Construction Products Directive

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under the mandate M/131 "Pipes, tanks and ancillaries not in contact with water intended for human consumption", as amended, given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in this annex meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the construction products covered by this annex for the intended uses indicated herein; reference shall be made to the information accompanying the CE marking.

This annex establishes the conditions for the CE marking of the construction products for the uses indicated in Table ZA.1 and shows the relevant clauses applicable.

The scope of this annex is defined by Table ZA.1 and it is the same as in Clause 1.

Table ZA.1 — Relevant clauses and intended uses for perforated vitrified clay pipes and fittings

Construction products: Perforated vitrified clay pipes and fittings **Intended uses:** Land drains, drainage of waste tips and percolation into the ground			
Essential characteristics	**Requirement clauses in this standard**	**Levels and/or classes**	**Notes**
Reaction to fire [a]	6.1	A1 to F	A1 classified without need for testing (CWT)
Crushing strength [b]	4.8	–	tested acc. to EN 295-3:2012, Clause 7; expressed as value (in kN/m)
Dimensional tolerances, as:			
— Internal diameter	4.2	–	measured according to the requirement clause against the declared nominal value; expressed as “Pass” or “Fail”
— Length	4.3		measured acc. to the requirement clause against the declared nominal value in metres; expressed as “Pass” or “Fail”
— Straightness	4.4		measured acc. to the requirement clause; expressed as “Pass” or “Fail”
— Angle of curvature and radius of bends	4.5		measured acc. to the requirement clause against the declared nominal value in degrees; expressed as “Pass” or “Fail”
— Branch angle of junctions	4.6		measured acc. to the requirement clause against the declared nominal value in degrees; expressed as “Pass” or “Fail”
— Perforations	4.7		measured acc. to the requirement clause; expressed as “Pass” or “Fail”
Release of dangerous substances	6.3	–	see 6.3
Durability of crushing strength, against:			
— Chemical resistance	4.1 and 4.9	–	tested according to EN 295-3:2012, Clause 13; expressed as “Pass” or “Fail

[a] Of the constituent material, i.e. vitrified clay.

[b] For pipes only.

The requirement on a certain characteristic is not applicable in those Member States (MSs) where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these MSs are not obliged to determine nor declare the performance of their products with regards to this characteristic and the option "No performance determined" (NPD) in the information accompanying the CE marking (see ZA.3) may be used.

ZA.2 Procedures for the attestation of conformity of perforated vitrified clay pipes and fittings

ZA.2.1 Systems of attestation of conformity

The systems of attestation of conformity of the perforated vitrified clay pipes and fittings, indicated in Table ZA.1 in accordance with the Decision of the Commission 1999/472/EC of 1999-07-01 *(see OJEU L184 of 1999-07-17)*, as amended by 2001/596/EC of 2001-01-08 *(see OJEU L209 of 2001-08-02)*, as given in Annex III of the mandate M/131 for “Pipes, tanks and ancillaries not in contact with water intended for human consumption”, as amended, are shown in Table ZA.2 for the indicated intended uses and relevant level(s) or class(es).

Table ZA.2 — Systems of attestation of conformity

Products	Intended uses	Level(s) or class(es)	Attestation of conformity systems
Pipes, fittings	In installations for transport/disposal/storage of water not intended for human consumption	–	4
	In installations in areas subject to reaction to fire regulations, used for transport/disposal/storage of water not intended for human consumption	(A1, A2, B and C)* (A1, A2, B, C)**, D and E (A1 to E)***, F	1 3 4
System 1: See Directive 89/106/EEC, Annex III.2.(i), without audit testing of samples. System 3: See Directive 89/106/EEC, Annex III.2.(ii), second possibility. System 4: See Directive 89/106/EEC, Annex III.2.(ii), third possibility.			
* Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material). ** Products/materials not covered by footnote (*). *** Products/materials that do not require to be tested for reaction to fire (e.g. products/materials of Class A1 according to Commission Decision 96/603/EC).			

NOTE 1 Although not specifically mentioned, perforated pipes and fittings are understood to be included.

NOTE 2 The attestation of conformity systems 1 and 3 with regard to installations of the products in areas subject to reaction to fire regulations as given in Table ZA.2 is not applicable because the material used for these products is deemed to satisfy requirements on the material not contributing to fire and which allows the reaction to fire performance of these products to be declared under system 4 (Class A1 without the need of testing).

The attestation of conformity of the products in Table ZA.1 shall be based on the evaluation of conformity procedures indicated in Table ZA.3 resulting from application of the clauses of this European Standard indicated therein.

Table ZA.3 — Assignment of evaluation of conformity tasks for perforated vitrified clay pipes and fittings under system 4

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks under the responsibility of the manufacturer	Factory production control (FPC)	Parameters related to all characteristics of Table ZA.1 relevant for the intended use	9.3
	Initial type testing by the manufacturer	All characteristics of Table ZA.1 relevant for the intended use	9.2

ZA.2.2 EC declaration of conformity

When compliance with the conditions of this annex is achieved, the manufacturer or his agent established in the EEA shall draw up and retain a declaration of conformity (i.e. EC declaration of conformity), which entitles the manufacturer to affix the CE marking. This declaration shall include:

— name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;

NOTE 1 The manufacturer may also be the person responsible for placing the product onto the EEA market, if he takes responsibility for CE marking.

— description of the product (type, identification, use, ...), and a copy of the information accompanying the CE marking;

NOTE 2 Where some of the information required for the declaration is already given in the CE marking, it does not need to be repeated.

— provisions to which the product conforms (i.e. Annex ZA of this European Standard) and a reference to the ITT report(s) and factory production control records (if appropriate);

— particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);

— name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

The above mentioned declaration shall be presented in the language or languages accepted in the Member State in which the product is intended to be used.

ZA.3 CE marking

ZA.3.1 General

The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol shall be in accordance with Directive 93/68/EEC and the accompanying information shall be shown as indicated in ZA.3.2 and ZA.3.3.

ZA.3.2 CE marking on the product

The following information shall be affixed together with the CE marking symbol on each product:

a) manufacturer’s name or identifying mark;

b) last two digits of the year in which the marking was affixed;

c) reference to this European Standard (i.e. EN 295-5);

d) description of the product and its intended use:

   1) nominal size(s),

   2) arrangement and type of perforations,

   3) angle, where applicable;

e) performance of the following characteristics as listed in Table ZA.1:

   1) crushing strength (FN): (not relevant for fittings).

Figure ZA.1 gives an example of the CE marking on the product (*e.g. perforated vitrified clay pipe)*.

CE	*CE conformity marking symbol given in Directive 93/68/EEC*
AnyCo Ltd 13	*Name or identifying mark of the manufacturer* *Last two digits of the year in which the marking was affixed*
EN 295-5 DN 150 − TP − A	*No. of European Standard* *Description of the product*
FN 28	*Information on essential characteristics*

Figure ZA.1 — Example of CE marking on the product

ZA.3.3 CE marking in the accompanying documents

In addition to the CE marking on the product, the following information shall be given together with the CE marking symbol in the commercial documents (e.g. delivery note), accompanying the products:

a) name or identifying mark and the registered address of the manufacturer;

b) last two digits of the year in which the marking was affixed;

c) reference to this European Standard and its year of publication (i.e. EN 295-5:2013);

d) description of the product and its intended use:

   1) designation of the product,

      i) nominal size(s),

      ii) length;

   2) arrangement and area of perforations;

   3) angle, where applicable;

e) performance of the following characteristics, listed in Table ZA.1:

   1) reaction to fire expressed as A1;

   2) crushing strength (F_N): (not relevant for fittings) expressed as tabulated value (in kN/m) according to Tables 3 and 4;

   3) dimensional tolerances: internal diameter, length, straightness, angle of curvature and radius of bends, branch angle of junctions, perforations, expressed as "Pass", where applicable;

   4) release of dangerous substances, where 6.3, Note 1 and Note 2 apply;

   5) durability of crushing strength

      i) against chemical resistance.

The “No performance determined” (NPD) option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements in the Member State(s) of destination.

Figure ZA.2 gives an example of the CE marking to be given in the commercial documents accompanying the products (*e.g. perforated vitrified clay pipes)*.

CE	*CE conformity marking symbol given in Directive 93/68/EEC*
AnyCo Ltd, (*P.O. Box 21, B-1050)* 13	*Name or identifying mark and registered address of the manufacturer* *Last two digits of the year in which the marking was affixed*
EN 295-5:2013 Perforated vitrified clay pipe for land drains, drainage of waste tips and percolation into the ground DN 150 – 1,50 – TP– A	*No. of European Standard and date of its publication* *Description of the product and its intended use and Designation of the product*
Reaction to fire, as class	A1
Crushing strength (F_N)	28 kN/m
Dimensional tolerances, as:	
— Internal diameter	Pass
— Length	Pass
— Straightness	Pass
— Perforations	Pass
Release of dangerous substances	NPD
Durability of crushing strength, against:	Pass
— Chemical resistance	0,15 %

Information on mandated essential characteristics

Figure ZA.2 — Example of CE marking in the accompanying documents

Bibliography

[1] EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

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