



Dit pdf bestand bevat alle beschikbare talen van het opgevraagde document.

Ce fichier pdf reprend toutes langues disponibles du document demandé.

This pdf file contains all available languages of the requested document.

Dieses PDF-Dokument enthält alle vorhandenen Sprachen des angefragten Dokumentes.

COPRO vzw - Onpartijdige instelling voor de controle van bouwproducten
COPRO asbl - Organisme impartial de contrôle de produits pour la construction
COPRO - A not-for-profit impartial product control body for the construction industry

Z.1. Researchpark - Kranenberg 190 - BE-1731 Zellik (Asse)
T +32 (0)2 468 00 95 - info@copro.eu - www.copro.eu

KBC IBAN BE20 4264 0798 0156 - BIC KREDBEBB - BTW/TVA/VAT BE 0424.377.275 - RPR Brussel/RPM Bruxelles/RLP Brussels



TECHNICAL PRESCRIPTIONS

FOR

**VITRIFIED CLAY PIPE SYSTEMS FOR DRAINS
AND SEWERS**

Part 1 : Requirements for pipes, fittings and joints

Version 3.0 dated 2023-06-06

COPRO - A not-for-profit impartial product control body for the construction industry

Z.1 Research Park
Kranenberg 190
BE - 1731 Zellik (Asse)

T. +32 (0)2 468 00 95
info@copro.eu
www.copro.eu

VAT 0424.377.275
KBC IBAN BE20 4264 0798 0156
RLP Brussels

CONTENTS

FOREWORD	3
1 INTRODUCTION.....	4
1.1 TERMINOLOGY.....	4
1.2 AVAILABILITY OF THIS PTV	5
1.3 STATUS OF THIS PTV	5
1.4 HIERARCHY OF RULES AND REFERENCE DOCUMENTS	6
1.5 QUESTIONS AND COMMENTS	6
2 POSITIONING OF TECHNICAL PRESCRIPTIONS	7
2.1 PTV FORMAT	7
2.2 OBJECTIVES.....	7
2.3 SCOPE	7
2.4 REFERENCE DOCUMENTS	8
3 PRESCRIPTIONS	9
3.1 PRODUCTION UNIT AND EQUIPMENT	9
3.2 RAW MATERIALS, JOINT MATERIALS AND COUPLING MATERIALS.....	9
3.3 PRODUCTION PROCESS.....	11
3.4 PIPES AND FITTINGS.....	11
3.5 JOINT ASSEMBLIES	19
4 TEST METHODS	23
4.1 SAMPLING.....	23
4.2 SAMPLE PREPARATION	23
4.3 HIGH CHEMICAL RESISTANCE OF SOFT CAST POLYURETHANE	23
5 PRODUCT IDENTIFICATION	26
5.1 PRODUCT NAME	26
5.2 IDENTIFICATION.....	26
6 APPLICATION OF THE PRODUCT (informative).....	28
6.1 APPLICATION OF THE PRODUCT	28
6.2 INSTALLATION OF THE PRODUCT	28

FOREWORD

This document contains the technical requirements for pipes, fittings and joints for vitrified clay pipe systems for drains and sewers. The requirements included in these PTV respond to needs established by the various interested parties according to local customs.

The conformity of pipes, fittings and joints can be certified under the voluntary BENOR mark. With the BENOR mark, the supplier has to declare the performance of pipes, fittings and joints for all the characteristics relevant to guaranteeing the application and limit values imposed by this PTV 895-1.

BENOR certification is based on full product certification in accordance with EN ISO/IEC 17067.

The CE mark applies to pipes, fittings and joints for vitrified clay pipe systems for drains and sewers, coming under the area of application of EN 295-1. Pursuant to European Regulation (EU) no. 305/2011 (Construction Product Regulation – CPR) dated 2011-03-09, the CE mark relates to the essential characteristics of the product specified in EN 295-1, Annex ZA, Table ZA.1.

The CE mark is the only mark to declare that the product complies with the declared performance of the essential characteristics covered by EN 295-1.

1 INTRODUCTION

1.1 TERMINOLOGY

1.1.1 Definitions

Article	Set of units of a product with the same characteristics and performance that are produced in a specific manner and comply with the technical data sheet.
Supplier	The party having to ensure that the product complies with the technical requirements. This definition can apply to the producer, the dealer, the importer or the distributor.
Impartial body	Body that is independent of the supplier or user and is entrusted with conducting the acceptance test on delivery.
Joints	Component used in an assembly of a vitrified clay product with another (vitrified clay) product.
Junction	Piece specially designed to create a three-way connection.
Producer	The party responsible for producing the product.
Product	The result of an industrial activity or process. Meant by this in the context of these technical requirements is the product. It is the collective term for all articles and product types to which this PTV applies.
Product unit	An individual produced item. Different product units can form an article.
Production unit	Technical facility/facilities tied to a geographical location used by a producer and in which one or more products are made.
Test	Technical action comprising the determination of one or more properties of a raw material or product according to a specified process.
Reference document	Document specifying the technical characteristics with which the materials, equipment, raw materials, production process and/or the product must comply (a standard, specification or any other technical specification).

All definitions described in EN 295-1; Clause 3 are also valid in this PTV.

1.1.2 Abbreviation

PTV Technical Prescriptions

All symbols and abbreviations described in EN 295-1, Clause 4 are also valid in this PTV.

1.1.3 References

CPR	Construction Product Regulation
EN 295-1	Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints
EN 295-3	Vitrified clay pipe systems for drains and sewers – Part 3: Test methods
EN 681-4	Elastomeric seals - Materials requirements for pipe joint seals used in water and drainage applications - Part 4: Cast polyurethane sealing elements
EN ISO/IEC 17067	Conformity assessment - Fundamentals of product certification and guidelines for product certification schemes
PTV 832-1	Technical prescriptions for elastomeric seals: Part 1: Vulcanized Rubber

This PTV contains dated and undated references. Only the cited version applies to dated references. The latest version always applies to undated references, including any errata, addenda and amendments.

Of all the EN standards referred to in these prescriptions, the corresponding Belgian publication NBN EN applies in each case. COPRO can allow the use of a publication other than the Belgian one provided its content is identical to that of the Belgian publication.

1.2 AVAILABILITY OF THIS PTV

The current version of this PTV is available free of charge on the COPRO website.

A paper version of this PTV can be ordered from COPRO. COPRO has the right to charge for this.

No changes may be made to the original PTV approved by the sectoral commission and/or confirmed by the Governing body of COPRO.

1.3 STATUS OF THIS PTV

1.3.1 Version of this PTV

This PTV concerns version 3.0 and replaces version 2.0.

1.3.2 Approval of this PTV

This PTV was approved by the sectoral commission on 2023-06-20.

1.3.3 Confirmation of this PTV

This PTV was confirmed by the Board of Directors of COPRO on 2023-09-18.

1.3.4 Registration of this PTV

This PTV was submitted to the association BENOR on 2023-09-19.

1.4 HIERARCHY OF RULES AND REFERENCE DOCUMENTS

1.4.1 Legislation

If certain rules contained in this PTV are inconsistent with applicable law, the rules arising from the legislation shall prevail. It is the responsibility of the supplier to monitor this and report any contradictions to COPRO in advance.

1.4.2 Directives concerning health and safety

If certain technical requirements are inconsistent with the directives concerning health and safety, such directives shall prevail. It is the responsibility of the supplier to monitor this and report any contradictions to COPRO in advance.

1.4.3 Special specification

If certain rules from the applicable special specification are inconsistent with these technical prescriptions, the supplier can report this to COPRO.

1.5 QUESTIONS AND COMMENTS

Questions or comments concerning these technical prescriptions are directed to COPRO.

2 POSITIONING OF TECHNICAL PRESCRIPTIONS

2.1 PTV FORMAT

2.1.1 Format of this PTV

These technical prescriptions for the pipes, fittings and joints for vitrified clay pipe systems for drains and sewers are drawn up by the Sectoral Commission for clay products of COPRO.

2.2 OBJECTIVES

2.2.1 Purpose of this PTV

- 2.2.1.1 The aim of this PTV is to specify requirements for the pipes, fittings and joints used for vitrified clay pipe systems for drains and sewers.
- 2.2.1.2 According to the legislation in the Member State where pipes, fittings and joints for vitrified clay pipe systems for drains and sewers are brought onto the market, the performance for some essential characteristics has to be declared for the CE mark by the supplier on the basis of its Declaration of Performance in accordance with the harmonised standard EN 295-1. Unless other statutory provisions apply, the supplier has the choice in the context of the CE mark to declare no performance for one or more essential characteristics. This PTV clarifies some requirements and adds supplementary provisions with regard to use and sustainable behaviour.

2.3 SCOPE

2.3.1 Subject of these technical prescriptions

- 2.3.1.1 The subject of these technical prescriptions is the same as the scope in EN 295-1, Clause 1.
- 2.3.1.2 The area of application of this PTV is entirely or partially covered by the intended use included in the harmonised standard EN 295-1. This PTV imposes additional application requirements.

The requirements included in this PTV for the pipes, fittings and joints for the 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, respond to needs determined by the various interested parties according to local construction technologies and customs.

2.3.2 Circulars

COPRO can supplement this PTV with one or more circulars forming an integral part of this PTV.

2.4 REFERENCE DOCUMENTS

2.4.1 Product standards

The applicable product standard is EN 295-1.

2.4.2 Tender documents

The applicable tender documents are SB 250, CCT Qualiroutes, TB 2015 and special tender documents.

2.4.3 Test methods

The applicable test methods are prescribed in EN 295-3 and Clause 4 of this PTV.

2.4.4 Other

Other applicable reference documents are mentioned in Clause 1.1.3.

3 PRESCRIPTIONS

3.1 PRODUCTION UNIT AND EQUIPMENT

3.1.1 Production unit

3.1.1.1 The production unit meets the requirements of the applicable reference documents.

The production unit (in its entirety and all its parts) is presumed to comply with all the applicable laws concerning the environments, operation, economic, et cetera.

3.1.2 Production equipment

The supplier has equipment suitable for production according to the reference documents.

3.2 RAW MATERIALS, JOINT MATERIALS AND COUPLING MATERIALS

3.2.1 General

3.2.1.1 The materials shall be free of any substances which may have a deleterious effect on the fluid being conveyed, or on the life of the seal, or on the pipe or fitting.

3.2.2 Clay

3.2.2.1 Pipes and fittings shall be made from suitable natural clays to enable the body to be fired to vitrification, so that the final product is in accordance with EN 295-1.

3.2.3 Vulcanized rubber sealing elements

3.2.3.1 To be considered as a vulcanized rubber sealing element, suitable for the use in combination with pipes and fittings according this PTV, the rubber sealing element shall comply with PTV 832-1, including Clause 3.4.18.

3.2.4 Hard cast polyurethane sealing elements

3.2.4.1 To be considered as a hard cast polyurethane sealing element, suitable for the use in the socket of pipes according this PTV, the polyurethane sealing element shall comply with EN 295-1, Clause 6.1.4.

3.2.5 Soft cast polyurethane sealing elements

3.2.5.1 To be considered as a soft cast polyurethane sealing element, suitable for the use on the spigot of pipes according this PTV, the polyurethane sealing element shall meet the requirements set out in Clauses 3.2.5.2 to 3.2.5.9.

3.2.5.2 Dimensional tolerances

See EN 681-4, Clause 4.2.1.

3.2.5.3 Imperfections and defects

See EN 681-4, Clause 4.2.2.

3.2.5.4 Hardness

See EN 681-4, Clause 4.2.3.

Shore A hardness measurements shall be used instead of IRHD.

3.2.5.5 Tensile strength and elongation at break

See EN 681-4, Clause 4.2.4.

3.2.5.6 Compression set in air

See EN 681-4, Clause 4.2.5.

3.2.5.7 Accelerated ageing in air

See EN 681-4, Clause 4.2.6.

3.2.5.8 Stress relaxation in compression

See EN 681-4, Clause 4.2.7.

3.2.5.9 High chemical resistance

High chemical resistance shall not be greater than the values given in table 1.

Table 1: High chemical resistance

Property	Unit	Requirement
ΔV_7	%	≤ 5
$\Delta \text{Shore A}_7$	Shore A	≤ 10
$\Delta \text{Shore A}_{7/7}$	Shore A	≤ 5

In this context is:

- ΔV_7 : relative change in volume as % after depositing the test fluid for seven days at (23 ± 2) °C.
- Δ Shore A_7 : change in Shore A hardness after depositing in the test fluid for seven days at (23 ± 2) °C.
- Δ Shore $A_{7/7}$: change in Shore A hardness after depositing in the test fluid for seven days at (23 ± 2) °C and then drying out for seven days at normal temperature.

High chemical resistance is tested in accordance to clause 4.3 of this PTV.

3.2.6 Polypropylene sleeve couplings

3.2.6.1 To be considered as a polypropylene sleeve coupling, suitable for connecting pipes according this PTV, the polypropylene sleeve coupling shall comply with EN 295-1, Clause 6.1.3.

Vulcanized rubber sealing elements used in combination with polypropylene sleeve couplings according to this PTV shall comply with Clause 3.2.3 of this PTV.

3.3 PRODUCTION PROCESS

There aren't any requirements for the production process.

3.4 PIPES AND FITTINGS

3.4.1 General

3.4.1.1 The pipes and fittings meets the requirements set out in Clauses 3.4.2 to 3.4.22.

3.4.1.2 The supplier shall in each case declare the performance for the characteristics set out in Clauses 3.4.2 to 3.4.22 for the pipes and fittings for vitrified clay pipe systems for drains and sewers. If it concerns an essential characteristic, the supplier shall declare this on its Declaration of Performance.

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

3.4.2 Water absorption

See EN 295-1, Clause 5.1.3.

Water absorption is determined in accordance with Clause 28 of EN 295-3.

3.4.3 Appearance

See EN 295-1, Clause 5.1.4.

3.4.4 Internal diameter

See EN 295-1, Clause 5.2.

To be considered as pipes and fittings for vitrified clay pipe systems for drains and sewers according to this PTV, the minimum internal diameter has to conform EN 295-1. The internal diameter shall not be greater than the values given in table 2.

Table 2: Internal diameter

Nominal size DN	Maximum internal diameter mm	Nominal size DN	Maximum internal diameter mm	Nominal size DN	Maximum internal diameter mm
100	104	350	355	800	812
125	130	400	406	900	914
150	156	450	455	1000	1025
200	205	500	505	1200	1230
250	256	600	609	1400	1435
300	307	700	710		

Other nominal sizes can be manufactured to comply with this PTV, providing that the minimum internal diameter shall not be less than 97,5 % of the nominal size and shall not be greater than 102,5 % of the nominal size, rounded by the nearest whole millimetre.

3.4.5 Length

See EN 295-1, Clause 5.3.

3.4.6 Squareness of ends

See EN 295-1, Clause 5.4.

Squareness of ends is determined in accordance with Clause 5.1 of EN 295-3.

3.4.7 Deviation from straightness

See EN 295-1, Clause 5.5.

Deviation from straightness is determined in accordance with Clause 6 of EN 295-3.

3.4.8 Water seal of trapped fittings

See EN 295-1, Clause 5.6.

3.4.9 Angle of curvature and radius of bends

3.4.9.1 Bends with a socket

See EN 295-1, Clause 5.7.

To be considered as pipes and fittings for vitrified clay pipe systems for drains and sewers according to this PTV, the dimensions of the bend shall be as given in table 3.

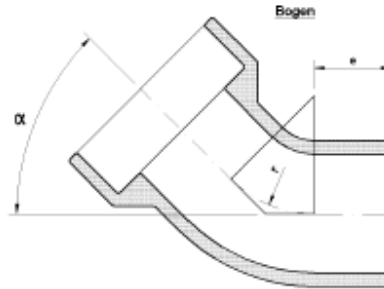


Table 3: Dimensions of bends

DN	e min. in mm.	Bend length in mm							
		15° ± 3°		30° ± 4°		45° ± 5°		90° ± 5°	
			Max dev.		Max dev.		Max dev.		Max dev.
100	70	250	± 25	250	± 25	250	± 25	*	± 25
125	70	250	± 25	250	± 25	250	± 25	*	± 25
150	75	260	± 25	260	± 25	260	± 25	*	± 25
200	85	270	± 25	270	± 25	270	± 25	*	± 25
250	85	350	± 25	350	± 25	350	± 25	*	± 30
300	85	370	± 30	370	± 30	370	± 30	*	± 30

* The bend length shall be declared by the manufacturer

Bends > DN 300 can be manufactured as a segmented bend with 2 or 3 segments.

The bend length has to be measured, using a talmeter, at the inside of the bend. Only the product articles which have been incorporated in table 3 are submitted to requirements concerning bend length.

The radius is determined according to a method proposed by the manufacturer.

3.4.9.2 Bends without a socket

See EN 295-1, Clause 5.7.

To be considered as pipes and fittings for vitrified clay pipe systems for drains and sewers according to this PTV, the dimensions of the bend shall be as give in table 4.

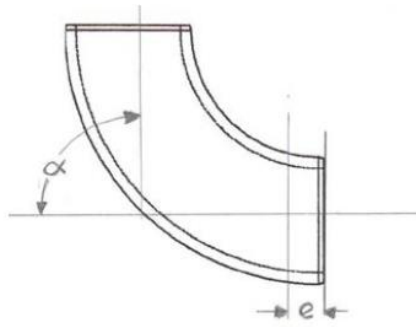


Table 4: Dimensions of bends

DN	E min. in mm.	Bend length in mm							
		15° ± 3°		30° ± 4°		45° ± 5°		90° ± 5°	
			Max dev.		Max dev.		Max dev.		Max dev.
100	40	*	± 25	*	± 25	*	± 25	*	± 25
125	40	*	± 25	*	± 25	*	± 25	*	± 25
150	50	*	± 25	*	± 25	*	± 25	*	± 25
200	60	*	± 25	*	± 25	*	± 25	*	± 25
250	85	*	± 25	*	± 25				
300	90	*	± 30	*	± 30				

* The bend length shall be declared by the manufacturer

Bends > DN 300 can be manufactured as a segmented bend with 2 or 3 segments.

The bend length has to be measured, using a talmeter, at the inside of the bend.

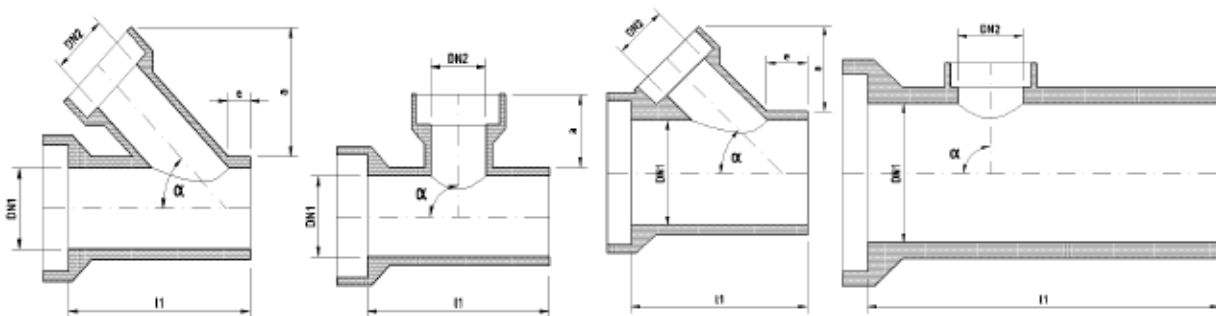
The radius is determined according to a method proposed by the manufacturer.

3.4.10 Branch angle of junctions

3.4.10.1 Junctions with a socket

See EN 295-1, Clause 5.8.

To be considered as pipes and fittings for vitrified clay pipe systems for drains and sewers according to this PTV, the dimensions of the branch angle of the junctions has to be according table 5.



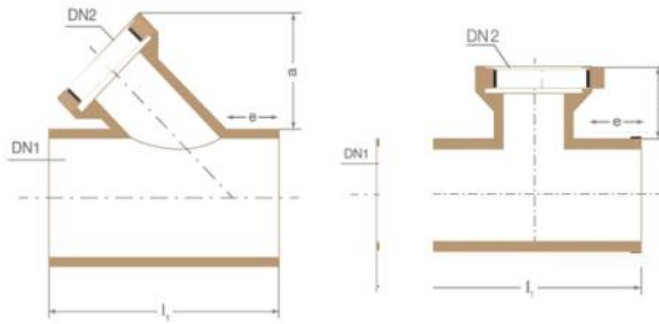


Table 5: Dimensions of junctions

DN 1	DN 2	e min in mm (4)	a max in mm (3)		Regular length l1 in mm (1)						
			Angle 45°	Angle 90°	(2)	500	600	750	1000	2000	2500
100	100	70	240		X						
125	100	70	240		X						
	125	70	260	160	X						
150	100	75	240		X						
	125	75	260		X						
	150	75	270	160	X						
200	100	85	250	170		X					
	125	85	300	170		X					
	150	85	305	170		X	X				
	200	85	350	180			X				
250	125	85	300	170		X				X	X
	150	85	300	170		X	X			X	X
	200	85	350	180			X			X	X
300	125	85	300	170		X				X	X
	150	85	300	170		X	X			X	X
	200	85	350	200			X			X	X
350 & 450	125	85		170				X	X	X	X
	150	85		170				X	X	X	X
	200	85		200				X	X	X	X
400	125	85		170				X	X	X	X
	150	85		170				X	X	X	X
	200	85		200				X	X	X	X
500 - 800	125	95		170				X	X	X	X
	150	95		170				X	X	X	X
	200	95		200				X	X	X	X

(1) The tolerance on the length l1 shall be from -1 % to +4 % or ± 10 mm, whichever is the larger.

(2) Chosen by the manufacturer, but not less than 400 mm.

(3) The value of a max is only relevant for product articles which are assemble before the firing process.

(4) The value of e min is not applicable for T-pipes.

3.4.10.2 Junctions without a socket

See EN 295-1, Clause 5.8.

To be considered as pipes and fittings for vitrified clay pipe systems for drains and sewers according to this PTV, the dimensions of the branch angle of the junctions has to be according table 6.

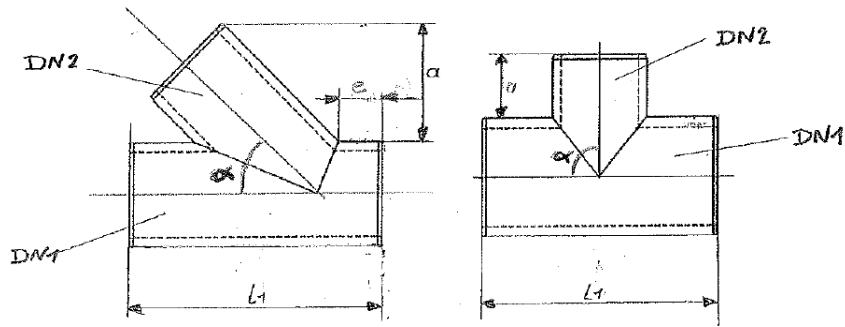


Table 6: Dimensions of junctions

DN 1	DN 2	e min in mm	a max in mm (1)		Rugalar length l1 in mm	
			45°	90°	45°	90°
100	100	40	160	115	350	350
150	100	50	165	95	450	450
	150	50	215	120	450	450
200	100	60	135	112	500	500
	150	60	180	112	500	500
	200	60	280	112	600	600
250	150	70	265	140	500	500
	200	70	290	140	700	700
300	150	90	240	110	600	500
	200	90	260	110	800	600

(1) The value of a_{max} is only relevant for product articles which are assembled before the firing process.

3.4.11 Crushing strength

See EN 295-1, Clause 5.9.

Crushing strength shall be determined in accordance with Clause 7 of EN 295-3.

If required the crushing strength can be calculated from the bending tensile strength, as described in EN 295-1 Clause 5.10.

3.4.12 Bending tensile strength

See EN 295-1, Clause 5.10.

The manufacturer can choose between the following two possibilities:

- Either the bending tensile strength is determined according to EN 295-3 Clause 8.
- Either the bending tensile strength is calculated from the crushing strength according to the formula mentioned in EN 295-3 Clause 11.3.

In any case the bending tensile strength σ_{bz} has to be minimum 18 N/mm². This guarantees fatigue strength under cyclic load.

3.4.13 Bending moment resistance (BMR)

See EN 295-1, Clause 5.11

Bending moment resistance is determined in accordance with Clause 9 of EN 295-3.

The highest value of the bending moment resistance for which the product conforms shall be declared on the technical data sheet.

3.4.14 Bonding strength of adhesive used for fixing fired clay parts together

See EN 295-1, Clause 5.12.

Bonding strength of adhesive used for fixing fired clay parts together is determined in accordance with Clause 10 of EN 295-3.

3.4.15 Fatigue strength under cyclic load (optional)

See EN 295-1, Clause 5.13.

If required, fatigue strength under cyclic load is determined in accordance with Clause 11 of EN 295-3.

As there is a correlation between fatigue strength under cyclic load and bending tensile strength, the fatigue strength under cyclic load can be guaranteed without testing and instead determine the bending tensile strength.

3.4.16 Watertightness of pipes and junctions

See EN 295-1, Clause 5.14.

Watertightness of pipes and junctions is determined in accordance with Clause 12 of EN 295-3.

3.4.17 Chemical resistance

See EN 295-1, Clause 5.15.

Chemical resistance is determined in accordance with Clause 13 of EN 295-3.

3.4.18 Hydraulic roughness (optional)

See EN 295-1, Clause 5.16.

Hydraulic roughness is determined in accordance with Clause 14 of EN 295-3.

3.4.19 Abrasion resistance

See EN 295-1, Clause 5.17. Maximum values for the abrasion resistance are given in table 7.

Abrasion resistance is determined in accordance with Clause 15 of EN 295-3.

Table 7: Abrasion resistance

Class AH	Class AN
0,25 mm	0,50 mm

The class is part of the identification of the product (see Clause 5.1.1) and shall be declared on the technical data sheet.

3.4.20 Airtightness

See EN 295-1, Clause 5.18.

Airtightness is determined in accordance with Clause 16 of EN 295-3. The monitoring equipment used to measure pressure loss should be accurate to within 1 mbar.

3.4.21 Tightness of fittings

See EN 295-1, Clause 5.19.

Tightness is determined in accordance with Clause 12 or Clause 16 of EN 295-3. Depending whether the test is carried out using a water test or an air test.

3.4.22 Resistance against high pressure water jetting

See EN 295-1, Clause 5.20.

Resistance against high pressure water jetting is determined in accordance with Clause 17 of EN 295-3.

3.5 JOINT ASSEMBLIES

3.5.1 General

- 3.5.1.1 Joint assemblies of pipes and fittings shall meet the requirements set out in Clauses 3.5.2 to 3.5.8 and optionally the additional requirement set out in Clause 3.5.9.
- 3.5.1.2 The supplier shall in each case declare the performance for the characteristics set out in Clauses 3.5.2 to 3.5.8 for the joint assemblies of pipes and fittings for vitrified clay pipe systems for drains and sewers. The supplier shall also declare the performance for the applicable additional characteristic set out in Clause 3.5.9 for the joint assemblies of pipes and fittings for vitrified clay pipe systems for drains and sewers. If it concerns an essential characteristic, the supplier shall declare this on its Declaration of Performance.

3.5.2 Watertightness under deflection and shear load

See EN 295-1, Clause 6.2.

Watertightness of joint assemblies under angular deflection and shear load is determined in accordance with Clause 21 of EN 295-3.

The highest value of deflection for which the product conforms shall be declared on the technical data sheet.

3.5.3 Increased watertightness of jointed pipes at 1 bar

The increased watertightness of jointed pipes at 1 bar shall be tested in accordance with EN 295-3 Clause 21.1 without shear load or angular deflection at a pressure of 1 bar \pm 0,05 bar. During the testing time of 15 minutes no visual leakage may occur.

3.5.4 Continuity of invert in joint assemblies

See EN 295-1, Clause 6.3.

Continuity of invert in joint assemblies is determined in accordance with Clause 22 of EN 295-3.

This characteristic is only applicable for socketed pipes.

3.5.5 Joint interchangeability of pipes and fittings in joint assemblies

According to EN 295-1, Clause 6.4.

The jointing system according to Clause 6.4 of EN 295-1 shall be declared by the manufacturer in the technical data sheet of the article.

3.5.6 Chemical and physical resistance to effluent of joint assemblies

See EN 295-1, Clause 6.5, taking into account that there will be a distinction between solutions for extreme conditions (class CH) and solutions for normal conditions (class CN), as described in table 8.

Table 8: Test solutions for normal and extreme conditions

Class CH	Class CN
Sulphuric acid solution c (H ₂ SO ₄) = 0.5 mol/L (pH = 0 approximately)	Sulphuric acid solution c (H ₂ SO ₄) = 0.005 mol/L (pH = 2.0 approximately)
Nitric acid solution c (HN0 ₃) = 1 mol/L (pH = 0 approximately)	Nitric acid solution c (HN0 ₃) = 0.01 mol/L (pH = 2.0 approximately)
Sodium hydroxide solution c (NaOH) = 1 mol/L (pH = 14 approximately)	Sodium hydroxide solution c (NaOH) = 0.01 mol/L (pH = 12.0 approximately)
Sodium hypochlorite solution c (NaOCL) = 1 mol/L stabilised with sodium hydroxide (pH = 14 approximately)	Sodium hypochlorite solution c (NaOCL) = 0.01 mol/L stabilised with sodium hydroxide (pH = 12.0 approximately)

The class is part of the identification of the product (see Clause 5.1.1) and shall be declared on the technical data sheet.

Chemical and physical resistance to effluent of joint assemblies is determined in accordance with Clause 23 of EN 295-3.

3.5.7 Thermal cycling stability of joint assemblies

See EN 295-1, Clause 6.6.

Thermal cycling stability of joint assemblies is determined in accordance with Clause 24.1 of EN 295-3 As an alternative to the test conditions specified in this test method, the following test conditions may also be used:

- Ambient temperature for 2h
- 4 times
 - 8h at (-10 +/- 2) °C
 - 16h at (+70 +/- 2) °C
- 8h at (-10 +/- 2) °C
- Ambient temperature for 2h

The test report must make clear which test conditions were applied.

3.5.8 Long-term thermal stability of joint assemblies

See EN 295-1, Clause 6.7.

Long-term thermal stability of joint assemblies is determined in accordance with Clause 24.2 of EN 295-3.

3.5.9 Airtightness of jointed pipes (optional)

The airtightness of 2 jointed pipes shall be tested under positive pressure in accordance with EN 295-3, Clause 16. The two jointed pipes shall be tested under 200 mbar pressure (p_0) and the time, given in table 9. The measured change in pressure shall not exceed $\Delta p = 15$ mbar from the initial pressure p_0 .

Table 9: Testing time

Nominal size DN	Test period in minutes	Nominal size DN	Test period in minutes
100	5	500	17,5
125	6	600	20
150	7,5	700	22
200	9	800	25
250	10	900	30
300	11	1000	35
350	12.5	1200	19
400	14	1400	22
450	15		

3.6 TYPE TESTING

3.6.1 General

3.6.1.1 The type test comprises laboratory validation of the characteristics.

3.6.1.2 The type test is conducted under the responsibility of the supplier.

3.6.2 Scope

For each article there is conducted a type test.

3.6.3 Requirements

All characteristics of Clause 3.4 and 3.5 which are applicable are determined in the type test.

For some characteristics, the manufacturer may divide the article in different families, according to the requirements foreseen in Clause 1 of EN 295-2.

3.6.4 Type test report

The details and results of the type test are recorded in a type test report by the supplier.

3.6.5 Validity

Type tests are valid as long as there are no modifications conducted (Clause 3.6.6).

3.6.6 Modifications

If a raw material, the composition, the production process or other relevant parameters are adjusted, the supplier must assess the influence of this modification on the characteristics of the article or product type.

It may prove necessary in this regard to re-run part or all of the type test.

4 TEST METHODS

4.1 SAMPLING

4.1.1 Sampling of soft cast polyurethane

See EN 681-4, Clause 7.1.

4.1.2 Sampling of the other products

Sampling of all the other products is executed in accordance with the relevant clauses of the applicable standards.

4.2 SAMPLE PREPARATION

4.2.1 Sample preparation of soft cast polyurethane

See EN 681-4, Clause 5.1.

4.2.2 Sample preparation of the other products

Sample preparation of all the other products is executed in accordance with the relevant clauses of the applicable standards.

4.3 HIGH CHEMICAL RESISTANCE OF SOFT CAST POLYURETHANE

4.3.1 Aim and principle

The aim of this test is to determine the resistance of the seal to environments with pH0 and pH14.

The principle of this test is to condition the sample at pH0 and pH14 for 168 hours after which change in volume and in hardness is determined.

Change in hardness will also be measured after conditioning the sample at pH0 and pH14 for 168 hours and air-drying for seven days at specific conditions.

4.3.2 Instruments

See ISO 1817, Clause 3.1 and 3.3.

See ISO 48, Clause 5.

4.3.3 Sample preparation

Test samples for the determination of change in volume shall have 1 of the following dimensions in mm:

- Cylinder (diameter x height): $(13 \pm 0,5) \times (6,3 \pm 0,3)$, with parallel end faces,
- Cuboid $(11,5 \pm 0,5) \times (11,5 \pm 0,5) \times (6,3 \pm 0,3)$.

Test samples for determination of change in hardness shall be according ISO 48, Clause 6.

4.3.4 Test temperature for soft cast polyurethane

See EN 681-4, Clause 5.2.

4.3.5 Method

4.3.5.1 Determination of change in volume ΔV_7

- Measure the dimensions of the test sample and calculate the volume (V_0). The volume shall be determined at $0,005 \text{ cm}^3$;
- Expose the test sample to sulphuric acid (pH level about 0) and caustic soda (pH level about 14) over 168 hours at test temperature;
- Remove the test samples out of the test fluid and measure the dimensions within 5 minutes after removal out of the test fluid. Determine the volume at $0,005 \text{ cm}^3$ (V_1).

4.3.5.2 Determination of change in hardness $\Delta \text{Shore } A_7$

- Measure the hardness Shore A of the test sample according to method M of ISO 48 (Shore A_0). Another method of ISO 48 can be accepted, but in case of doubt, method M shall be used as reference;
- Expose the test sample to sulphuric acid (pH level about 0) and caustic soda (pH level about 14) over 168 hours at test temperature;
- Remove the test sample out of the test fluid and measure the hardness Shore A according to ISO 48 within 5 minutes after removal out of the test fluid (Shore A_1). The same test method of ISO 48 used before exposure to the test fluid shall be used after exposure.

4.3.5.3 Determination of change in hardness $\Delta\text{Shore } A_{7/7}$:

- Measure the hardness Shore A of the test sample according to method M of ISO 48 (Shore A_2). Another method of ISO 48 can be accepted, but in case of doubt, method M shall be used as reference;
- Expose the test samples to sulphuric acid (pH level about 0) and caustic soda (pH level about 14) over 168 hours at test temperature;
- Remove the test samples out of the test fluid and dry them out for seven days at a standard atmosphere 23/50 class 2 according EN ISO 291;
- Measure the hardness Shore A according ISO 48 within 5 minutes after removal out of the drying conditions (Shore A_3). The same test method of ISO 48 used before exposure to the test fluid shall be used after exposure drying;
- If possible, determination of hardness Shore A_1 and hardness Shore A_3 can be performed on the same test samples. In that case value of hardness Shore A_2 can be adopted from the value of hardness Shore A_0 .

4.3.6 Result

ΔV_7 is calculated as follows: $\Delta V_7 = \text{abs}((V_1 - V_0)/V_0) * 100 \%$;

$\Delta\text{Shore } A_7$ is calculated as follows: $\text{abs}(\text{Shore } A_1 - \text{Shore } A_0)$;

$\Delta\text{Shore } A_{7/7}$ is calculated as follows: $\text{abs}(\text{Shore } A_3 - \text{Shore } A_2)$.

4.3.7 Test report

The test report sets out at least:

- the details of the laboratory,
- the details and identification of the sample,
- a description of the packaging in which the sample was delivered (possible damage, et cetera),
- the start-date and the end-date of the test,
- V_0 , V_1 and ΔV_7 ,
- Shore A_0 , Shore A_1 , Shore A_2 , Shore A_3 , $\Delta\text{Shore } A_7$ and $\Delta\text{Shore } A_{7/7}$,
- a reference to PTV 895-1, clause 3.2.4.9.

Each test report is supplemented by an assessment of conformity to the requirements.

5 PRODUCT IDENTIFICATION

5.1 PRODUCT NAME

5.1.1 Official name

The official name has to be in accordance to article 8 of EN 295-1

5.1.2 Commercial name

The commercial name is chosen by the supplier in so far as it does not lead to confusion or clash with the official name.

5.2 IDENTIFICATION

5.2.1 Delivery modes

5.2.1.1 Pipes and fittings are delivered in bulk.

5.2.1.2 Joint materials supplied as separate components are delivered in bulk.

5.2.2 Identification of the products

5.2.2.1 Pipes and fittings

The following information must be given on each product unit:

- all relevant information as foreseen in EN 295-1, Clause 9;
- reference to this PTV;
- the class for the abrasion resistance (see Clause 3.4.19);
- the class for the chemical and physical resistance to effluent (see Clause 3.5.6).

5.2.2.2 Joint materials

5.2.2.2.1 Vulcanized rubber sealing elements

Vulcanized rubber sealing elements which are supplied as separate components, shall be marked with reference to PTV 832-1 and the classification for high chemical resistance.

5.2.2.2.2 Cast polyurethane sealing elements

Identification is not possible. These joint materials are always fixed at a pipe or fitting.

5.2.2.3 Coupling materials

5.2.2.3.1 Polypropylene sleeve couplings

As according to this PTV, polypropylene sleeve couplings shall meet the requirements of this PTV, they shall be marked with reference to PTV 895-1.

6 APPLICATION OF THE PRODUCT (informative)

6.1 APPLICATION OF THE PRODUCT

6.1.1 Application of a lubricant

The lubricant is delivered by the dealer of the pipes and fittings.

6.2 INSTALLATION OF THE PRODUCT

Longitudinal flexibility of buried clay pipe drainage systems is achieved by the provision of flexible joints. These allow for settlement and other movements in the ground. The connection of pipelines to manholes or inspection chambers and buildings is made using sufficient flexible joints so that any additional strains from differential settlement are avoided at the interface between pipe and structure.
