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

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

Version 3.0 dated 2023-06-06

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FOREWORD

This document contains the technical requirements for pipes and joints for pipe jacking 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 and joints can be certified under the voluntary BENOR mark. With the BENOR mark, the supplier has to declare the performance of pipes and joints for all the characteristics relevant to guaranteeing the application and limit values imposed by this PTV 895-7.

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

The CE mark applies to pipes and joints for pipe jacking for vitrified clay pipe systems for drains and sewers, coming under the area of application of EN 295-7. 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 295-7, 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 295-7.

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 file.
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.
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 295-7; clause 3 are also valid in this PTV.

1.1.2 Abbreviations

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 10088-2	Stainless steels – Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes
EN 295-3	Vitrified clay pipe systems for drains and sewers – Part 3: Test methods
EN 295-7	Vitrified clay pipe systems for drains and sewers – Part 7: Requirements for pipes and joints for pipe jacking
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 requirements, 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 2.4 which will lead to version 3.0 and will replace version 2.3.

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 Governing body 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 and joints for pipe jacking 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 and joints for pipe jacking used for vitrified clay pipe systems for drains and sewers.
- 2.2.1.2 According to the legislation in the Member State where pipes and joints for pipe jacking 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 295-7. 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 295-7, 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 295-7. This PTV imposes additional application requirements.

The requirements included in this PTV for the pipes and joints for pipe jacking 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 295-7.

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 REQUIREMENTS

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, COUPLING MATERIALS AND LOAD TRANSFER RINGS

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 for pipe jacking 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 pipes according this PTV, the rubber sealing element shall comply with the PTV 832-1, including clause 3.4.18.

3.2.4 Stainless steel sleeves

3.2.4.1 To be considered as a stainless steel sleeve, suitable for the use in pipes according this PTV, the stainless steel shall comply with EN 295-7, clause 5.1.3 and shall be 1.4571 or 1.4404 from EN 10088-2, Table 3.

3.2.5 Polypropylene sleeve couplings

3.2.5.1 To be considered as a polypropylene sleeve coupling, suitable for connecting pipes according to 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.

3.2.6 Load transfer rings

3.2.6.1 To be considered as a load transfer ring, suitable for the use in pipes according to this PTV, the load transfer ring shall comply with EN 295-7, Clause 5.2.

3.3 PRODUCTION PROCESS

There aren't any requirements for the production process.

3.4 PIPES FOR PIPE JACKING

3.4.1 General

3.4.1.1 The pipes for pipe jacking shall meet the requirements set out in Clauses 3.4.2 to 3.4.21.

3.4.1.2 The supplier shall in each case declare the performance for the characteristics set out in Clauses 3.4.2 to 3.4.21 for the pipes for pipe jacking 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 for pipe jacking shall be sound and shall be free from such defects as would impair their function when in service.

3.4.1.4 Relevant dimensions of pipes or pipe sections shall be measured after grinding or cutting of ends.

3.4.2 Water absorption

See EN 295-7, Clause 4.1.

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 295-7, Clause 4.2.2 and 4.2.3.

3.4.5 Continuity of invert

See EN 295-7, Clause 4.2.4.

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

To be considered as pipes for pipe jacking for vitrified clay pipe systems for drains and sewers according to this PTV, the calculated difference in invert levels between pipes shall not exceed $0,01 \times \text{DN}$ for all diameters.

3.4.6 External diameter

See EN 295-7, Clause 4.2.5.

3.4.7 Length

See EN 295-7, Clause 4.2.6.

3.4.8 Squareness of ends

See EN 295-7, Clause 4.2.7.

Squareness of ends is determined in accordance with Clause 5.2 of EN 295-3.

3.4.9 Deviation from straightness

See EN 295-7, Clause 4.2.8.

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

3.4.10 Crushing strength

See EN 295-7, Clause 4.3.1.

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 295-7 Clause 4.3.2.

3.4.11 Bending tensile strength

See EN 295-7, Clause 4.3.2.

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.

3.4.12 Compressive strength

See EN 295-7, Clause 4.3.3.

Compressive strength is determined in accordance with Clause 27 of EN 295-3.

3.4.13 Jacking strength

See EN 295-7, Clause 4.3.4.

3.4.14 Maximum working jacking load

See EN 295-7, Clause 4.3.5.

3.4.15 Fatigue strength under cyclic load

See EN 295-7, Clause 4.3.6.

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

See EN 295-7, Clause 4.4.

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

3.4.17 Airtightness

See EN 295-7, Clause 4.5.

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.

3.4.18 Chemical resistance

See EN 295-7, Clause 4.6.

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

3.4.19 Hydraulic roughness

See EN 295-7, Clause 4.7.

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

3.4.20 Abrasion resistance

See EN 295-7, Clause 4.8. Maximum values for the abrasion resistance are given in table 2.

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

Table 2: 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.

3.4.21 Resistance against high pressure water jetting

See EN 295-7, Clause 4.9.

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

3.5 JOINT ASSEMBLIES FOR PIPE JACKING

3.5.1 General

- 3.5.1.1 Joint assemblies of pipes for pipe jacking shall meet the requirements set out in Clauses 3.5.2 to 3.5.6 and voluntary the additional requirement set out in Clause 3.5.7.
- 3.5.1.2 The supplier shall in each case declare the performance for the characteristics set out in Clauses 3.5.2 to 3.5.6 for the joint assemblies of pipes for pipe jacking for vitrified clay pipe systems for drains and sewers. The supplier shall also declare the performance for the applicable additional characteristic set out in Clauses 3.5.7 for the joints for pipe jacking 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 295-7, Clause 5.3, 5.4 and 5.5.

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 Chemical and physical resistance to effluent

See EN 295-7, Clause 5.6, 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 3.

Table 3: 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.

3.5.5 Thermal cycling stability

See EN 295-7, Clause 5.7.

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.

3.5.6 Long-term thermal stability

See EN 295-7, Clause 5.8.

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

3.5.7 Airtightness of jointed pipes (voluntary)

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 4. The measured change in pressure shall not exceed $\Delta p = 15$ mbar from the initial air pressure p_0 .

Table 4: Testing time

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

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 5 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

Sampling and sample preparation is executed in accordance with the relevant clauses of the EN 295-2.

All the test methods are mentioned in the relevant clauses of this PTV.

5 PRODUCT IDENTIFICATION

5.1 PRODUCT NAME

5.1.1 Official name

The official name has to be in accordance to article 7 of EN 295-7.

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 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

The following information must be given on each product unit:

- all relevant information as foreseen in EN 295-7, Clause 8;
- reference to this PTV;
- the class for the abrasion resistance (see Clause 3.4.20);
- the class for the chemical and physical resistance to effluent (see Clause 3.5.4).

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.

5.2.2.3 Coupling materials

5.2.2.3.1 Stainless steel sleeves

As according to this PTV, stainless steel sleeves shall meet the requirements of this PTV. If delivered separately they shall be marked with reference to PTV 895-7.

5.2.2.3.2 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 895-7.

5.2.2.4 Load transfer rings

As according to this PTV, load transfer rings shall meet the requirements of this PTV. If delivered separately they shall be marked with reference to PTV 895-7.

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 for pipe jacking.

6.1.2 Application of a load transfer ring

Load transfer rings are used between adjacent pipe ends in order to transfer jacking loads safely during installation.

Materials used for load transfer rings shall be in accordance with the manufacturer's declared specification and correlated to the design of the load transfer ring appropriate to the ground conditions encountered, method of construction and length of installation et cetera.

6.1.3 Application of stainless steel sleeves

The sleeves shall be edge dressed and free from sharp edges.

When stainless steel sleeves are butt welded, the welds shall have full penetration and be continuous across the full width of the sleeves.

When filler metal is used for the welds, it shall be compatible with the stainless steel sleeve material, and in compliance with the recommendations of the stainless steel sleeve material manufacturer.

After welding, oxides shall be removed.

The internal surface of the sleeve shall be finished to provide a sealing surface.