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TECHNICAL REQUIREMENTS

PTV 832-1

TECHNICAL REQUIREMENTS

FOR

ELASTOMERIC SEALS in VULCANIZED RUBBER

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FOREWORD

This document contains the technical requirements for elastomeric seals for pipe joint seals in water and drainage applications. The elastomeric seals are made of vulcanized rubber. The requirements included in these PTV respond to needs established by the various interested parties according to local customs. The requirements can be divided in 2 parts – obligated requirements and voluntary requirements. For the obligated requirements, this PTV refers to the standard NBN EN 681-1. For the additional, voluntary requirements, this PTV describes requirements and test methods. A manufacturer can decide for each seals to which additional requirements his seals comply.

The conformity of elastomeric seals can be certified under the voluntary BENOR mark. With the BENOR mark, the supplier has to declare the performance of the elastomeric seals for all the characteristics relevant to guaranteeing the application and limit values imposed by this PTV 832-1.

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

The CE mark applies to elastomeric seals in vulcanized rubber coming under the area of application of NBN EN 681-1. 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 elastomeric seals in vulcanized rubber specified in NBN EN 681-1, Annex ZA, Table ZA.1.

The CE mark is the only mark to declare that the elastomeric seals in vulcanized rubber complies with the declared performance of the essential characteristics covered by NBN EN 681-1.

1 INTRODUCTION

1.1 TERMINOLOGY

1.1.1 Definitions

Functional dimension	A functional dimension is a dimension that affects the performance, ease of use and functionality of the product article.
Impartial body	Body that is independent of the supplier or user and is entrusted with conducting the assessment of deliveries.
Producer	The party responsible for producing elastomeric seals.
Product	The result of an industrial activity or process. Meant by this in the context of these technical regulations is elastomeric seals. It is the collective term for all articles and product types to which these PTV apply.
Product 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.
Production unit	Technical facility/facilities tied to a geographical location used by a producer and in which one or more products are made.
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).
Supplier	The party having to ensure that elastomeric seals complies with the technical regulations. This definition can apply to the producer, the dealer, the importer or the distributor.
Test	Technical action comprising the determination of one or more properties of a raw material or product according to a specified process.
Type test	A series of checks for initially establishing (initial type testing) or, possibly, periodically confirming (repeat type testing) the characteristics of an article or product type and its conformity.

1.1.2 Abbreviations

PTV Technical Requirements

All symbols and abbreviations described in NBN EN 681-1 are also valid in this PTV.

1.1.3 References

ISO 3302-1	Rubber - Tolerances for products - Part 1: Dimensional tolerances
ISO 37	Rubber, vulcanized or thermoplastic - Determination of tensile stress-strain properties
ISO 815-1	Rubber, vulcanized or thermoplastic - Determination of compression set - Part 1: At ambient or elevated temperatures
ISO 188	Rubber, vulcanized or thermoplastic - Accelerated ageing and heat resistance tests
ISO 815-2	Rubber, vulcanized or thermoplastic - Determination of compression set - Part 2: At low temperatures
ISO 1817	Rubber, vulcanized or thermoplastic - Determination of the effect of liquids
ISO 3387	Rubber - Determination of crystallization effects by hardness measurements
NBN EN 681-1	Elastomeric seals – Material requirements for pipe joint seals used in water and drainage applications – 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 regulations, 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 Management body of COPRO.

1.3 STATUS OF THIS PTV

1.3.1 Version of this PTV

This PTV concerns version 3.0 which replace version 2.0.

1.3.2 Approval of this PTV

This PTV was approved by the Sectoral Commission on the 12th of November 2024.

1.3.3 Confirmation of this PTV

This PTV was confirmed by the Management body of COPRO on the 3rd of December 2024.

1.3.4 Registration of this PTV

This PTV was submitted to BENOR non-profit organisation on the 9th of December 2024.

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 regulations 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 Tender document

If certain rules from the applicable tender document are inconsistent with these technical regulations, the supplier can report this to COPRO.

1.5 QUESTIONS AND COMMENTS

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

2 POSITIONING OF TECHNICAL REQUIREMENTS

2.1 PTV REDACTION

2.1.1 Redaction of this PTV

These technical requirements for the elastomeric seals in vulcanized rubber are drawn up by the Sectoral Commission of COPRO for elastomeric seals.

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 elastomeric seals in vulcanized rubber used for pipe joint used in water and drainage applications.

2.2.1.2 According to the legislation in the Member State where elastomeric seals in vulcanized rubber for pipe joint in water and drainage applications is 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 Performance Declaration in accordance with the harmonized standard NBN EN 681-1. 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 behavior.

2.3 SCOPE

2.3.1 Subject of these technical regulations

2.3.1.1 The subject of these technical requirements is the same as the scope in NBN EN 681-1, 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 harmonized standard NBN EN 681-1. This PTV imposes additional application requirements and/or provisions for an area of application that is more specifically defined or delineated.

The requirements included in this PTV for the elastomeric seals in vulcanized rubber for the pipe joint used in water and drainage applications 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 NBN EN 681-1.

2.4.2 Tenders

There aren't any applicable tenders.

2.4.3 Test methods

ISO 3302-1	Rubber - Tolerances for products - Part 1: Dimensional tolerances
ISO 48	Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD)
ISO 37	Rubber, vulcanized or thermoplastic - Determination of tensile stress-strain properties
ISO 815-1	Rubber, vulcanized or thermoplastic - Determination of compression set - Part 1: At ambient or elevated temperatures
ISO 188	Rubber, vulcanized or thermoplastic - Accelerated ageing and heat resistance tests
ISO 9691	Rubber - Recommendations for the workmanship of pipe joint rings - Description and classification of imperfections
ISO 1817	Rubber, vulcanized or thermoplastic - Determination of the effect of liquids

2.4.3 Other

There aren't any other applicable reference documents.

3 REQUIREMENTS

3.1 PRODUCTION UNIT AND EQUIPMENT

There aren't any requirements for the production unit and the equipment.

3.2 RAW 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. Elastomeric components of composite seals not exposed to the contents of the pipeline are not required to meet Clause 3.2.1.2.

3.2.1.2 For cold and hot potable water applications, the materials shall not impair the quality of the water under the conditions of use.

3.3 PRODUCTION PROCESS

There aren't any requirements for the production process.

3.4 ELASTOMERIC SEALS

3.4.1 General

3.4.1.1 The elastomeric seals in vulcanized rubber meet all the obligatory requirements set out in Clauses 3.4.2 to 3.4.13 and voluntarily the additional requirements set out in Clauses 3.4.14 to 3.4.18. If the elastomeric seal meets any optional requirement as specified in Clauses 3.4.14 to 3.4.18, it shall be appropriately identified according Clause 5.2.2 of this PTV.

3.4.1.2 The supplier shall in each case declare the performance for the characteristics set out in Clauses 3.4.2 to 3.4.13 for the elastomeric seals in vulcanized rubber for pipe joints used in water and drainage applications. The supplier shall also declare the performance for the applicable additional characteristics set out in Clauses 3.4.14 to 3.4.18 for the elastomeric seals in vulcanized rubber for pipe joints used in water and drainage applications. If it concerns an essential characteristic, the supplier shall declare this on its Declaration Of Performance.

3.4.1.3 An elastomer colored coating can be applied to the elastomeric seals in vulcanized rubber. This coating, with a maximum thickness of 0,2 mm, is to be applied in a co-extrusion process and vulcanized along in one process with the elastomeric seal in vulcanized rubber.

If the thickness of the coloured coating does not exceed 0,2 mm, the characteristics of the elastomeric seal formulated in Clause 3.4.1.1 are maintained.

3.4.2 Dimensional tolerances (obligatory)

See NBN EN 681-1, Clause 4.2.1.

All functional and non-functional dimensions are declared by the producer.

To be considered as an elastomeric seal in vulcanized rubber for pipe joints in water and drainage applications according to this PTV, the tolerances are as specified in ISO 3302-1, with the following classes:

- Class M2 for the functional dimensions of molded profiles,
- Class M3 for the non-functional dimensions of molded profiles,
- Class E1 for the functional dimensions of extruded profiles,
- Class E2 for the non-functional dimensions of extruded profiles.

The functionality of dimensions is established on the technical data sheet of the product.

The tolerance for the length is ± 1 %.

3.4.3 Imperfections and defects (obligatory)

All products should be free of defects or irregularities which could affect their function.

Surface imperfections in zones involved in the sealing function of the product shall be considered as defects.

Surface imperfections in zones not involved in the sealing function of the product shall not be considered as defects.

Major surface imperfections in zones not involved in the sealing function of the product can be considered as defects. The producer shall incorporate in his quality manual what is understood by a major surface imperfection.

3.4.4 Hardness (obligatory)

See NBN EN 681-1, Clause 4.2.3.

3.4.5 Tensile strength and elongation at break (obligatory)

See NBN EN 681-1, Clause 4.2.4.

3.4.6 Compression set in air (obligatory)

See NBN EN 681-1, Clause 4.2.5.

The compression to be applied according to Clause 4.1.2 of ISO 815-1, is determined using the declared nominal hardness for the product article.

3.4.7 Accelerated ageing in air (obligatory)

See NBN EN 681-1, Clause 4.2.6.

3.4.8 Stress relaxation in compression (obligatory)

See NBN EN 681-1, Clause 4.2.7.

3.4.9 Volume change in water (obligatory)

See NBN EN 681-1, Clause 4.2.8.

3.4.10 Ozone resistance (obligatory)

See NBN EN 681-1, Clause 4.2.9.

3.4.11 Tear strength for joint seals for hot water supply (obligatory)

Requirements are given in Table 3 of NBN EN 681-1.

This characteristic is determined according to ISO 34-2.

3.4.12 Compression set in water for joint seals for hot water supply (obligatory)

Requirements are given in Table 3 of NBN EN 681-1.

This characteristic is determined according to Clause 4.2.11 of NBN EN 681-1.

3.4.13 Splices of pre-vulcanized profile ends – strength of spliced joints (obligatory)

To be considered as an elastomeric seal in vulcanized rubber for pipe joints in water and drainage applications according to this PTV, maximum 3 splices per seal are allowed.

The strength of spliced joints is determined according to Annex C of NBN EN 681-1.

When viewed without magnification, there shall be no visible separation in the cross sectional area of the splice.

3.4.14 Low temperature performance at -25 °C (optional)

When the high temperature resistance (Clause 3.4.17) is also applicable, this test is carried out after conditioning the seal and the splices according Clause 3.4.17.

For the determination of the low temperature performance at -25 °C, the compression set and change in hardness is determined.

Compression set at -25 °C is determined according to the provisions of Method 1 of ISO 815-2, using type B test pieces.

Change in hardness at -25 °C is determined according to ISO 3387.

Requirements for the compression set at -25 °C and for the change in hardness at -25 °C are given in Table 2 of NBN EN 681-1.

3.4.15 Volume change in oil (optional)

When the high temperature resistance (Clause 3.4.17) is also applicable, this test is carried out after conditioning the seal and the splices according Clause 3.4.17.

Volume change in oil is determined according to ISO 1817. The volume change shall be determined after 72 hours immersion in standard oils n° 1 and n° 3 at a temperature of 70 °C.

Requirements for the volume change in oil are given in Table 2 of NBN EN 681-1.

3.4.16 Chemical resistance (optional)

After being submitted to the conditions mentioned in Clause 4.3, the seal shall comply with the requirements given in following table.

Property	Unit	Requirement
Change in volume, maximum	%	± 10
Change in tensile strength, maximum	%	- 20
Change in elongation at break, maximum	%	+ 10/- 40

After being tested according to Clause 4.4, there shall be no visible separations in the cross sectional area of the splice, when viewed without magnification.

When the high temperature resistance (Clause 3.4.17) is also applicable, the chemical resistance is carried out after conditioning the seal and the splices according Clause 3.4.17.

Tensile strength and elongation at break before and after conditioning shall be determined according to ISO 37.

Change in volume shall be determined according to Clause 4.7 of this PTV.

3.4.17 High temperature resistance (optional)

A manufacturer can declare that his elastomeric seals in vulcanized rubber can resist a high temperature T °C for a certain period H minutes.

After conditioning the seals including splices according Clause 4.5, the seals and the splices shall comply with all the obligatory requirements set out in Clauses 3.4.2 to 3.4.13 and voluntary requirements set out in Clauses 3.4.14 to 3.4.18.

3.4.18 High chemical resistance (optional)

After being submitted to the conditions mentioned in Clause 4.6, the change in volume ΔV_7 shall be calculated according to Clause 4.7.

ΔV_7 shall be lower than or equal to 5 %.

3.5 CLASSIFICATION

3.5.1 Classification

The elastomeric seals in vulcanized rubber for which the performance for following characteristics complies with the requirements of the Clause mentioned, will be categorized as follows:

- Low temperature performance at -25 °C – Clause 3.4.14: L;
- Volume change in oil – Clause 3.4.15: O;
- Chemical resistance – Clause 3.4.16: C;
- High temperature resistance – Clause 3.4.17: HT-temperature-time (f.e. HT-135 °C-15 min);
- High chemical resistance – Clause 3.4.18: HC.

3.6 TYPE TESTING

3.6.1 General

Type tests can be executed on a finished product or on laboratory samples. In case of laboratory samples, the producer has to assure that the relevant properties of the laboratory sample are identical as the finished products.

The conditions in which the type test is carried out shall be representative of the particular product article. This means that the conditions for the type test (production parameters, raw materials used, test parameters) has to be identical or representative for the final product.

The type test is conducted under the responsibility of the producer.

3.6.2 Scope

The type test is conducted on each product article of elastomeric seals in vulcanized rubber.

3.6.3 Requirements

All characteristics of Clause 3.4 of this PTV are determined in the type test.

If during the production of a new product article a raw material and supplier is used for which type testing was already performed on an existing product article, the producer only needs to determine the properties according to Clause 3.4.2.

3.6.4 Type test report

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

3.6.5 Validity

Only type test reports approved by the producer are valid.

A type test is valid until there are changes in raw materials or production method that modifies the characteristics of the final product.

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 product article, including possible changes in identification (see also article 3.6.5).

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

4 TEST METHODS

4.1 SAMPLING

4.1.1 Sampling

According to NBN EN 681-1, Clause 7.1.

4.2 SAMPLE PREPARATION

4.2.1 Sample preparation

According to NBN EN 681-1, Clause 5.1.

4.2.2 Test temperature

According to NBN EN 681-1, Clause 5.2.

4.3 Chemical resistance of the seal

4.3.1 Aim and principle

This test is used to determine the resistance of the seal to a liquid with ph1 and pH12 for a certain period. Therefore the samples are tested before immersion and after immersion in a liquid with pH1 and pH12.

4.3.2 Instruments

ISO 1817, Clause 4.

4.3.3 Sample preparation

The samples used for testing before and after immersion shall be prepared according the relevant test procedure.

4.3.4 Method

Test pieces, prepared according to the applicable test method, are immersed according ISO 1817 in a liquid with pH1 and pH12 at 45 °C ± 2 °C for 28 days.

4.3.5 Test results

The difference in test result before and after immersion is expressed as a percentage.

4.3.6 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 date of the test,
- the test result for each characteristic before and after conditioning,
- the difference in percentage for each characteristic,
- a reference to PTV 832-1, Clause 3.4.16.

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

4.4 Chemical resistance of the splice

4.4.1 Aim and principle

This test is used to determine the resistance of the splice to a liquid with ph1 and pH12 for a certain period. Therefore the splice is immersed into a liquid with pH1 and pH12 and then elongated and examined.

4.4.2 Instruments

According to ISO 1817, Clause 4.

4.4.3 Sample preparation

There isn’t any specific sample preparation for this test.

4.4.4 Method

The test is executed according Annex C from NBN EN 681-1, taking into account the following requirements:

- the test pieces are, before the test, conditioned for 7 days at 45 °C ± 2 °C in pH1 and pH12,
- the extension is performed at 50 °C ± 2 °C,
- the extension is maintained for 5 minutes instead of 1 minute.

4.4.5 Result

Examine the splice under tension without magnification.

4.4.6 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 date of the test,
- the result of the examination,
- a reference to PTV 832-1, Clause 3.4.16.

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

4.5 High temperature resistance

4.5.1 Aim and principle

This test is used to determine the resistance of the seal and the splices to a temperature T for a certain time H. The principle is that the seal and the splices are conditioned at a certain temperature for a certain time and then all the relevant tests are executed.

4.5.2 Instruments

An oven as specified in ISO 188.

4.5.3 Sample preparation

There isn't any specific sample preparation. The whole seal and the splices are conditioned.

4.5.4 Method

The seals with the joints is aged in the oven at a temperature T + 15 °C for a time H + 15 minutes.

After this ageing, the seal and the joints are stored at room temperature for 24 hours and then submitted to the relevant tests.

4.5.5 Result

The result for every specific test is determined according the relevant test method.

4.5.6 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 date of the test,
- the temperature T and the time H,
- the result of each relevant characteristic,
- a reference to PTV 832-1, Clause 3.4.17.

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

4.6 High chemical resistance

4.6.1 Aim and principle

This test is used to determine the resistance of the seal to environments with pH0 and pH14. The principle is that a piece of the seal are conditioned at pH0 and pH14 for a certain time and then the change in volume is determined.

4.6.2 Instruments

ISO 1817, Clause 4.

4.6.3 Sample preparation

According to Clause 4.7.

4.6.4 Method

Expose the test samples to sulphuric acid (pH level about 0) and caustic soda (pH level about 14) over 168 hours at a temperature of 23 ± 2 °C.

4.6.5 Result

Change in volume ΔV_7 is calculated according to Clause 4.7.

4.6.6 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,
- provisions of Clause 4.7,
- a reference to PTV 832-1, Clause 3.4.18.

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

4.7 Change in volume

4.7.1 Aim and principle

The purpose of this test is to determine the change in volume of a test piece that was subjected to some form of conditioning. For this purpose, the volume of the test piece is measured before and after conditioning. The difference between these two volumes is the change in volume.

4.7.2 Instruments

Instrument for measuring the dimensions of the test piece, having a scale graduated in divisions of 0,01 mm.

4.7.3 Sample preparation

The test samples shall have one of the following dimensions in mm:

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

4.7.4 Method

Measure the dimensions of the test piece before conditioning and calculate the volume V_0. The volume shall be expressed with an accuracy of 0,005 cm³.

After conditioning, measure the dimensions within 5 minutes after removal out of the test liquid and calculate the volume V_1. The volume shall be expressed with an accuracy of 0,005 cm³.

4.7.5 Result

The change in volume is calculated as follows:

$\Delta V = (V_1-V_0)/V_0 * 100\ \%$.

4.7.6 Test report

The test report sets out at least the value of V_0, V_1 and ΔV.

5 PRODUCT IDENTIFICATION

5.1 PRODUCT NAME

5.1.1 Official name

Elastomeric seal in vulcanized rubber.

5.1.2 Commercial name

The commercial is freely chosen by the supplier insofar 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 The product shall be delivered in a package.

5.2.1.2 Each packaging unit is identified.

5.2.2 Identification

The following information must be given on each packaging unit:

- name and address of the supplier and/or producer,
- name(s) of the product,
- reference to PTV 832-1,
- production date,
- abbreviation of the rubber quality (NBR, SBR, EPDM),
- the applicable classification according Clause 3.5 of this PTV 832-1.

At least the following information must be stated on each individual elastomeric profile:

- name of the product,
- production period or production day or any reference that makes it unambiguously clear when the product was produced.