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TECHNICAL REQUIREMENTS

PTV 832-4

BENOR

TECHNICAL REQUIREMENTS

FOR

ELASTOMERIC SEALS in CAST POLYURETHANE SEALING ELEMENTS

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

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CONTENTS

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 cast polyurethane. 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 681-4. 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 832-4.

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

The CE mark applies to elastomeric seals in cast polyurethane sealing elements coming under the area of application of NBN EN 681-4. 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 cast polyurethane sealing elements specified in NBN EN 681-4, Annex ZA, Table ZA.1.

The CE mark is the only mark to declare that the elastomeric seals in cast polyurethane sealing elements comply with the declared performance of the essential characteristics covered by NBN EN 681-4.

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 681-4 are also valid in this PTV.

1.1.3 References

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 1817	Rubber, vulcanized or thermoplastic - Determination of the effect of liquids
NBN EN 681-4	Elastomeric seals – Material requirements for pipe joint seals used in water and drainage applications - Part 4: Cast polyurethane sealing elements

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 organization 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 cast polyurethane sealing elements 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 cast polyurethane sealing elements 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 cast polyurethane sealing elements 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 681-4. 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 681-4, 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 681-4. 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 cast polyurethane sealing elements 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 681-4.

2.4.2 Tenders

There aren't any applicable tenders.

2.4.3 Test documents

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 1817	Rubber, vulcanized or thermoplastic - Determination of the effect of liquids

2.4.4 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.

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 cast polyurethane sealing elements meet all the obligatory requirements set out in Clauses 3.4.2 to 3.4.8 and voluntary the additional requirements set out in Clause 3.4.9. If the seal meets the optional requirement as specified in Clause 3.4.9, 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 3.4.8 for the elastomeric seals in cast polyurethane sealing elements for pipe joints used in water and drainage applications. The supplier shall also declare the performance for the additional characteristic set out in Clause 3.4.9 for the elastomeric seals in cast polyurethane sealing elements for pipe joints used in water and drainage applications, if it is applicable. If it concerns an essential characteristic, the supplier shall declare this on its Declaration Of Performance.

3.4.2 Dimensional tolerances (obligatory)

See NBN EN 681-4, Clause 4.2.1.

All functional dimensions are declared by the producer. For these dimensions, the tolerances are as specified in ISO 3302-1, class M2.

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 681-4, Clause 4.2.3.

3.4.5 Tensile strength and elongation at break (obligatory)

See NBN EN 681-4, Clause 4.2.4.

3.4.6 Compression set in air (obligatory)

See NBN EN 681-4, Clause 4.2.5.

3.4.7 Accelerated ageing in air (obligatory)

See NBN EN 681-4, Clause 4.2.6.

3.4.8 Stress relaxation in compression (obligatory)

See NBN EN 681-4, Clause 4.2.7.

3.4.9 High chemical resistance (optional)

When tested according Clause 4.3, the following maximum levels may not be exceeded:

Property	Unit	Requirement
ΔV_7	%	≤ 5
$\Delta IRHD_7$	IRHD	≤ 10
$\Delta IRHD_{7/7}$	IRHD	≤ 5

In this context is:

- ΔV_7: relative change in volume as % after depositing the test fluid for seven days at (23 ± 2) °C.
- $\Delta IRHD_7$: change in IRHD hardness after depositing in the test fluid for seven days at (23 ± 2) °C.
- $\Delta IRHD_{7/7}$: change in IRHD hardness after depositing in the test fluid for seven days at (23 ± 2) °C and then drying out for seven days at normal temperature.

3.5 CLASSIFICATION

3.5.1 Classification

The elastomeric sealsin cast polyurethane sealing elements for which the performance for following characteristics complies with the requirements of the clause mentioned will be categorized as follows:

- High chemical resistance – Clause 3.4.9: HC.

3.6 TYPE TESTING

3.6.1 General

Type tests are executed on laboratory samples. The producer has to assure that the relevant properties of the laboratory sample are identical to 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 cast polyurethane sealing element.

3.6.3 Requirements

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

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.

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

See NBN EN 681-4, Clause 7.1.

4.2 SAMPLE PREPARATION

4.2.1 Sample preparation

See NBN EN 681-4, Clause 5.1.

4.2.2 Test temperature

See NBN EN 681-4, Clause 5.2.

4.3 High chemical resistance

4.3.1 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 and the change in hardness are determined. Also the change in hardness is measured after conditioning a piece of the seal at pH0 and pH14 for a certain time and the conditioning the test piece for seven days at specific conditions for air-drying.

4.3.2 Instruments

See ISO 1817, Clause 3.1 and 3.3.

See ISO 48, Clause 5.

4.3.3 Sample preparation

The test samples for the determination of the change in volume 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).

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

4.3.4 Method

$\Delta V_{7:}$

- Measure the dimensions of the test sample and calculate the volume. The volume shall be determined at 0,005 cm³ => V_0;
- 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;
- Remove the test samples out of the test fluid and measure the dimensions within 5 minutes after removal out of the test fluid. Calculate the volume V_1 at 0,005 cm³.

$\Delta IRHD_7$:

- Measure the IRHD of the test samples according ISO 48 = $IRHD_0$. Method M is referred. Another method of ISO 48 can be accepted, but in case of doubt, method M is used for reference 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;
- Remove the test samples out of the test fluid and measure the IRHD according ISO 48 within 5 minutes after removal out of the test fluid => $IRHD_1$. The method of ISO 48 used before exposure to the test fluid shall be used after exposure.

$\Delta IRHD_{7/7}$:

- Measure the IRHD of the test samples according ISO 48 => $IRHD_2$. Method M is referred. Another method of ISO 48 can be accepted, but in case of doubt, method M is used for reference 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;
- 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 NBN EN ISO 291;
- Remove the test samples and measure the IRHD according ISO 48 within 5 minutes after removal out of the drying conditions => $IRHD_3$. The method of ISO 48 used before exposure to the test fluid shall be used after exposure and drying;

- If possible, the determination of $IRHD_1$ and $IRHD_3$ can be done on the same test samples. Then $IRHD_0$ and $IRHD_2$ are the same.

4.3.5 Result

The result ΔV_7 is calculated as follows: $\Delta V_7 = abs((V_1-V_0)/V_0) * 100$ %.

The result $\Delta IRHD_7$ is calculated as follows: $abs(IRHD_1-IRHD_0)$.

The result $\Delta IRHD_{7/7}$ is calculated as follows: $abs(IRHD_3-IRHD_2)$.

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 start-date and the end-date of the test,
- V_0, V_1 and ΔV_7,
- $IRHD_0$, $IRHD_1$, $IRHD_2$, $IRHD_3$, $\Delta IRHD_7$ and $\Delta IRHD_{7/7}$,
- a reference to PTV 832-4, Clause 3.4.9.

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

Elastomeric seal in cast polyurethane sealing elements

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

The seal is cast directly on the pipe or fitting.

5.2.2 Marking

Since the seal is cast directly on the pipe or fitting, the seals can't be marked. Therefore, the marking for the seal shall be added to the marking of the pipe or fitting. This marking shall be as follows if not covered by the requirements of another standard implementing PTV 832-4:

- referral to this PTV 832-4,

- the applicable classification according Clause 3.5 of this PTV 832-4.