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TECHNICAL REQUIREMENTS

PTV 832-5

BENOR

TECHNICAL REQUIREMENTS

FOR

ELASTOMERIC BEARINGS in VULCANIZED RUBBER

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FOREWORD

This document contains the technical requirements for elastomeric bearings made from vulcanized rubber (further in this document called “elastomeric bearings”). The requirements included in these PTV respond to needs established by the various interested parties according to local customs.

The test methods and the requirements laid out in NBN EN 681-1 along with accompanying addenda were considered in establishing these requirements so that a uniform nomenclature is maintained for producers of elastomer in vulcanized rubber.
Bearings for gully tops and manhole covers made of cast-iron can also consist of other materials. These materials may possibly be described in other normative documents.
The PTV describing cast iron covers and gully tops will refer to this PTV in the article concerning elastomeric bearings. This PTV only describes the elastomeric bearing requirements. The effectiveness of the cast iron product and bearing combination is not included in this PTV. This is dealt with in the PTV relating to cast iron covers and gully tops.

The conformity of the elastomeric bearings can be certified under the voluntary BENOR mark. With the BENOR mark, the supplier has to declare the performance of the elastomeric bearings for all the characteristics relevant to guaranteeing the application and limit values imposed by this PTV 832-5.

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

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 the elastomeric bearings.
Product	The result of an industrial activity or process. Meant by this in the context of these technical requirements is the elastomeric bearing. 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 the elastomeric bearing complies with the technical requirements. 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

CR	Chloroprene Rubber
EPDM	Ethylene Propylene Diene Monomer
NBR	Nitrile Butadiene Rubber
PTV	Technical Requirements
SBR	Styrene Butadiene Rubber

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

1.1.3 References

ISO 34-2	Rubber, vulcanized or thermoplastic - Determination of tear strength - Part 2: Small (Delft) test pieces
ISO 37	Rubber, vulcanized or thermoplastic - Determination of tensile stress - strain properties
ISO 48	Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD)
ISO 188	Rubber, vulcanized or thermoplastic - Accelerated ageing and heat resistance tests
ISO 815-1	Rubber, vulcanized or thermoplastic - Determination of compression set - Part 1: At ambient or elevated temperatures
ISO 1431-1	Rubber, vulcanized or thermoplastic - Resistance to ozone cracking - Part 1: Static and dynamic strain testing
ISO 1817	Rubber, vulcanized or thermoplastic - Determination of the effect of liquids
ISO 3302-1	Rubber: Tolerances for products – Part 1: Dimensional tolerances
ISO 4649	Rubber, vulcanized or thermoplastic - Determination of abrasion resistance using a rotating cylindrical drum device
NBN EN 681-1	Elastomeric seals - Materials 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 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 Management body of COPRO.

1.3 STATUS OF THIS PTV

1.3.1 Version of this PTV

This PTV concerns version 4.0 which replace version 3.0.

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 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 Tender document

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

1.5 QUESTIONS AND COMMENTS

Questions or comments concerning these technical requirements 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 bearings are drawn up by the Sectoral Commissions of COPRO for elastomeric seals and cast iron.

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 bearings made from vulcanized rubber used for gully tops and manhole covers made of cast iron.

2.3 SCOPE

2.3.1 Subject of these technical requirements

2.3.1.1 Elastomeric bearings made from vulcanized rubber (SBR, CR, EPDM or NBR) used for gully tops and manhole covers made of cast iron.

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

There are no applicable standards.

2.4.2 Tender documents

There are no applicable tenders.

2.4.3 Test methods

The applicable test methods are:

ISO 34-2	Rubber, vulcanized or thermoplastic - Determination of tear strength - Part 2: Small (Delft) test pieces
ISO 37	Rubber, vulcanized or thermoplastic - Determination of tensile stress - strain properties
ISO 48	Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD)
ISO 188	Rubber, vulcanized or thermoplastic - Accelerated ageing and heat resistance tests
ISO 815-1	Rubber, vulcanized or thermoplastic - Determination of compression set - Part 1: At ambient or elevated temperatures
ISO 1431-1	Rubber, vulcanized or thermoplastic - Resistance to ozone cracking - Part 1: Static and dynamic strain testing
ISO 1817	Rubber, vulcanized or thermoplastic - Determination of the effect of liquids
ISO 3302-1	Rubber: Tolerances for products – Part 1: Dimensional tolerances
ISO 4649	Rubber, vulcanized or thermoplastic - Determination of abrasion resistance using a rotating cylindrical drum device

2.4.4 Other

There are no other applicable reference documents.

3 REQUIREMENTS

3.1 PRODUCTION UNIT AND EQUIPMENT

There are no requirements for the production unit and the equipment.

3.2 RAW MATERIALS

There are no requirements for the raw materials.

3.3 PRODUCTION PROCESS

There are no requirements for the production process.

3.4 ELASTOMERIC BEARINGS

3.4.1 General

3.4.1.1 The elastomeric bearing meets all the obligatory requirements set out in Clauses 3.4.2 to 3.4.14 and voluntary the additional requirements set out in Clauses 3.4.15 and 3.4.16. If the bearing meets any optional requirement as specified in Clauses 3.4.15 or 3.4.16, they 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 articles 3.4.2 to 3.4.14. Requirements for low temperature performance and volume change in oil are optional. If in the following clauses reference is made to a clause of NBN EN 681-1, then, in the corresponding clauses of NBN EN 681-1, the references to table 2 and 3 are replaced with a reference to table 1 of this PTV.

3.4.1.3 The requirements set out in table 1 are depending on the hardness category to which the bearing belongs (see 3.5 Classification and table 2: Hardness categories).

3.4.2 Dimensional tolerances (obligatory)

All functional dimensions are declared by the producer. For these dimensions, the tolerances are as specified in ISO 3302-1, class M2 for the dimensions of moulded profiles and class E2 for the dimensions of extruded profiles. For extruded profiles 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)

Clause 4.2.3 of NBN EN 681-1 applies.

Taking into account the hardness categories stated in Clause 3.5.1, requirements are mentioned in table 1 of this PTV.

3.4.5 Tensile strength and elongation at break (obligatory)

Clause 4.2.4 of NBN EN 681-1 applies, except for the requirements, which are mentioned in table 1 of this PTV.

3.4.6 Compression set in air (obligatory)

Clause 4.2.5 of NBN EN 681-1 applies, except that

- the compression set only has to be determined at 23 °C, at 70 °C and at - 10 °C,

- the requirements mentioned in table 1 of this PTV.

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)

Clause 4.2.6 of NBN EN 681-1 applies, except that

- the aging only has to be determined at 70 °C,

- the requirements mentioned in table 1 of this PTV.

3.4.8 Volume change in water (obligatory)

Clause 4.2.8 of NBN EN 681-1 applies, except that

- the volume change only has to be determined at 70 °C,

- the requirements mentioned in table 1 of this PTV.

3.4.9 Ozone resistance (obligatory)

Clause 4.2.9 of NBN EN 681-1 applies, taking into account

- an ozone concentration of 25 pphm,

- that the requirements mentioned in table 1 of this PTV.

3.4.10 Abrasion resistance (obligatory)

The abrasion resistance is determined according to ISO 4649.

Requirements are mentioned in table 1 of this PTV.

3.4.11 Tear strength (obligatory)

The tear strength is determined according to ISO 34-2.

Requirements are mentioned in table 1 of this PTV.

3.4.12 Chemical resistance (obligatory)

After being submitted to the conditions mentioned in Clause 4.3, the bearing shall comply with the requirements given in table 1.For bearings containing splices, supplementary the chemical resistance of the splice is determined. For this, the splice shall be submitted to the conditions mentioned in Clause 4.4. There shall be no visible separations in the cross sectional area of the splice, when viewed without magnification.

3.4.13 Resistance to de-icing salts (obligatory)

The resistance to de-icing salts is determined according to ISO 1817 in a liquid for 7 days at 23 °C ± 2 °C. The liquid consist of 97 % in mass of drinking water and 3 % in mass of NaCl.

Requirements are mentioned in table 1 of this PTV.

3.4.14 Splices of vulcanized profile ends – strength of spliced joints (obligatory)

To be considered as an elastomeric bearing from vulcanized rubber used for gully tops and manhole covers made of cast iron, maximum three splices per bearing 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.

3.4.15 Low temperature performance at -25 °C (Optional)

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 1 of this PTV.

3.4.16 Volume change in oil (Optional)

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 1 of this PTV.

Table 1: Requirements for the elastomeric bearings

				Requirements for hardness category	
Property	**Unit**	**Test Method**	**Clause**	**80**	**90**
Permissible tolerance on nominal hardness	IRHD	ISO 48	3.4.4	± 5	± 5
Tensile strength, minimum	MPa	ISO 37	3.4.5	8	8
Elongation at break, minimum	%	ISO 37	3.4.5	125 %	100 %
Compression set in air, maximum		ISO 815-1	3.4.6		
72 h at 23 °C	%			30	30
24 h at 70 °C	%			30	30
72 h at -10 °C	%			60	60
Accelarated ageing in air, 7 days at 70 °C		ISO 188	3.4.7		
Change in hardness, maximum	IRHD	ISO 48		+ 8 / - 5	+ 8 / - 5
Change in tensile strength, maximum	%	ISO 37		- 20	- 20
Change in elongation at break, maximum	%	ISO 37		+ 10 / - 40	+ 10 / - 40
Volume change in water, maximum		ISO 1817	3.4.8		
7 days at 70 °C	%			+ 8 / - 1	+ 8 / - 1
Ozon resistance	-	ISO 1431-1	3.4.9	No cracking when viewed without magnification	
Abrasion resistance, maximum	mm^3	ISO 4649	3.4.10	300	300
Tear strength, minimum	N	ISO 34-2	3.4.11	20	20
Chemical resistance of the bearing		Clause 4.3	3.4.12		
Change in volume, maximum	%	Clause 4.5		± 10	
Change in tensile strength, maximum	%	ISO 37		- 20	
Change in elongation at break, maximum	%	ISO 37		+ 10 / - 40	
Chemical resistance of the splice		PTV 832-5, Clause 4.4	3.4.12	No visual separation	
Resistance to de-icing salts		ISO 1817	3.4.13		
Change in volume, maximum	%	Clause 4.5		± 10	
Change in tensile strength, maximum	%	ISO 37		- 20	
Change in elongation at break, maximum	%	ISO 37		+ 10 / - 40	

Optional requirements

Compression set, maximum					
72 h at -25 °C	%	ISO 815-1	3.4.15	70	70
Volume change in oil, maximum	%	ISO 1817	3.4.16		
72 h at 70 °C					
Oil n° 1				± 10	± 10
Oil n° 3				+ 50 / - 5	+ 50 / - 5

3.5 CLASSIFICATION

3.5.1 Classification

Two hardness grades for the elastomeric bearings are specified in table 2. A nominal hardness shall be specified within the range mentioned in table 2. The requirements stated in table 1 are depending on this classification.

Table 2: hardness categories

Hardness category	80	90
Range of hardness (IRHD)	76 tot 85	86 to 95

Note: By limiting the option of 76 being the minimum nominal hardness, then any bearing complying with this PTV achieves a minimum hardness of 71 IRHD.

The bearings 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 3.4.15: L.

Volume change in oil – Clause 3.4.16: O.

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 typetesting 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

When there is a change in

- raw material (new supplier, new type of raw material, new specification of the raw material);
- equipment;
- production process

the producer has to examine the influence of this change with respect to the conformity of the final product. In case of a significant impact, the type testing is repeated.

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.

4.3 CHEMICAL RESISTANCE OF THE BEARING

4.3.1 Aim and principle

This test is used to determine the resistance of the bearing to a liquid with pH2 and pH12 for a certain period. Therefore the samples are tested before immersion and after immersion in a liquid with pH2 and pH12.

4.3.2 Instruments

According to 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 pH2 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 samples,
- 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,
- a reference to PTV 832-5, 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 pH2 and pH12 for a certain period. Therefore the splice is immersed into pH2 and pH12 and then elongated and examined.

4.4.2 Instruments

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 pH2 and pH12,
- the extension is performed at 50 °C ± 2 °C,
- the extension is maintained for 5 min instead of 1 minute.

4.4.5 Test 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 832-5, Clause 3.4.16.

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

4.5 Change in volume

4.5.1 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.

4.5.2 Instruments

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

4.5.3 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).

4.5.4 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.

4.5.5 Result

The change in volume is calculated as follows:

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

4.5.6 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 bearing.

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 bearing or packaging unit (if marking on the bearing is impossible):

- name and address of the supplier and/or producer,
- name(s) of the bearing,
- reference to PTV 832-5,
- production date,
- abbreviation of the rubber (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.