



**SLOVENSKI STANDARD**  
**oSIST prEN 549:2017**  
**01-julij-2017**

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**Gumeni materiali za tesnila in membrane v plinskih aparatih in plinskih napravah**

Rubber materials for seals and diaphragms for gas appliances and gas equipment

Elastomer-Werkstoffe für Dichtungen und Membranen in Gasgeräten und Gasanlagen

Matériaux à base de caoutchouc pour joints d'étanchéité et membranes destinés aux appareils à gaz et appareillages pour le gaz

**Ta slovenski standard je istoveten z: prEN 549**

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NORME EUROPÉENNE  
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English Version

## Rubber materials for seals and diaphragms for gas appliances and gas equipment

Matériaux à base de caoutchouc pour joints d'étanchéité et membranes destinés aux appareils à gaz et appareillages pour le gaz

Elastomer-Werkstoffe für Dichtungen und Membranen in Gasgeräten und Gasanlagen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 208.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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**prEN 549:2017 (E)**

## **European foreword**

This document (prEN 549:2017) has been prepared by Technical Committee CEN/TC 208 “Elastomeric seals for joints in pipework and pipelines”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 549:1994.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2009/142/EC relating to appliances burning gaseous fuels.

For relationship with EU Directive 2009/142/EC, see informative Annex ZA, which is an integral part of this document.

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## Introduction

This European Standard specifies the requirements for rubber materials to be used for the manufacture of seals and diaphragms. It specifies for that purpose, tests to be carried out on standardized test pieces taken from sheets of material, since the small size of most components does not, in general, allow for the necessary standard samples to be prepared from them in order to undertake the complete range of tests.

It may be necessary to carry out supplementary tests on the component mounted in the gas appliance, or in equipment, to confirm the functional suitability of the component. Such tests should be performed under the most severe service conditions envisaged in the appropriate standards for the gas appliances and/or equipment.

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## 1 Scope

This standard specifies requirements and associated test methods for rubber materials used in gas installations, gas equipment and gas appliances in contact with 1st, 2nd and 3rd family combustible gases as classified in EN 437 e.g. natural gas, LPG, bio methane bio LPG. It also establishes a classification based on temperature range and hardness. This standard is applicable to materials from which are manufactured homogeneous seals and homogeneous or reinforced diaphragms.

Since the dimensions and shape of the components differ from those of standard test pieces taken from sheet material as used for type testing of the rubber materials according to this standard, tolerances have been made in the requirements specified by Annex A for the components with respect to those specified for standard test pieces.

The range of operating temperatures covered by this standard is - 40 °C to + 150 °C.

This standard is not applicable for silicone rubber used either above 200 hPa (200 mbar) nominal pressure or at temperatures below 0 °C with 3rd family gases, as there is the possibility of condensation.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 37:2011, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 48:2010, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 188:2011, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 815-1:2014, *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 1: At ambient or elevated temperatures*

ISO 815-2:2014, *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 2: At low temperatures*

ISO 1407:2011, *Rubber — Determination of solvent extract*

ISO 1431-1:2012, *Rubber, vulcanized or thermoplastic — Resistance to ozone cracking — Part 1: Static and dynamic strain testing*

ISO 1817:2015, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 4650:2012, *Rubber — Identification — Infrared spectrometric methods*

ISO 11346:2014, *Rubber, vulcanized or thermoplastic — Estimation of life-time and maximum temperature of use*

ISO 23529:2016, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.



**3.1****rubber material**

vulcanised rubber material

**3.2****component**

finished product manufactured from rubber material

Note 1 to entry: E.g. O-Rings, diaphragms, ...

**3.3****seal**

component used as an interface between parts of a gas appliance or parts of gas equipment to ensure gas tightness

**3.4****diaphragm**

component located in a fixture and serving as a flexible gas tight partition between two chambers

**3.5****reinforcement**

material arranged in or on the elastomeric material, thus reinforcing certain properties of such

Note 1 to entry: for example, the bursting strength of diaphragms

**3.6****rubber compound**

mixture of raw rubber and ingredients used to manufacture rubber material

**4 Product's information**

The following information shall be documented:

- a unique rubber material reference;
- the nominal hardness;
- the maximum working temperature;
- the minimum working temperature;
- whether the material is resistant to ozone;
- whether the material is resistant to liquid phase of combustible gas;
- for reinforced material, a full specification of the reinforcement, including at least:
  - a) type of material (polymer);
  - b) grammage;
  - c) yarn type;
  - d) basic construction;

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- e) yarn count in warp and weft;
- f) yarn twist.

It is recommended that diaphragms should be ozone resistant. Because of the potential interruption of any protective surface coating, such as waxes, by dynamic flexing such methods of protection against ozone attack shall not be used without additional protective additives.

## 5 Classification

Materials shall be classified according to temperature range and hardness as given in Table 1 and Table 2 respectively.

**Table 1 — Temperature classes**

Class	Range of operating temperature (°C)	
	from	to
A1	0	60
B1	0	80
C1	0	100
D1	0	125
E1	0	150
A2	- 20	60
B2	- 20	80
C2	- 20	100
D2	- 20	125
E2	- 20	150
A3	- 30	60
B3	- 30	80
C3	- 30	100
D3	- 30	125
E3	- 30	150
A4	- 40	60
B4	- 40	80
C4	- 40	100
D4	- 40	125
E4	- 40	150

**Table 2 — Hardness classes**

<b>Class</b>	<b>H1</b>	<b>H2</b>	<b>H3</b>
Nominal hardness range (IRHD-M)	< 45	45 to 60	> 60 to 90

**EXAMPLE** The classification of a rubber material applicable over the temperature range of – 20 °C to + 80 °C with a declared nominal hardness of 70 IRHD-M would be B2/H3.

## 6 Requirements

### 6.1 General

Test pieces shall be free from internal and external defects such as porosity, inclusion, blisters and surface imperfections visible to the naked eye.

### 6.2 Physical and chemical properties of rubber materials for seals

When tested in accordance with the methods detailed in Clause 7, using standard test pieces, the material shall comply with the requirements given in Table 3.

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Table 3 — Requirements for rubber material used to manufacture seals

Property	Unit	Hardness class		
		H1	H2	H3
<i>Hardness</i>				
Tolerance on stated nominal hardness	IRHD-M	±5	±5	±5
<i>Tensile strength</i>				
	MPa	≥ 5	≥ 7	≥ 7
<i>Elongation at break</i>				
	%	≥ 125	≥ 125	≥ 125
<i>Compression set</i>				
— at high temperature <sup>a</sup>	%	≤ 40	≤ 40	≤ 40
— at low temperature 0 °C	%	≤ 40	≤ 40	≤ 40
— at low temperature - 20 °C	%	≤ 50	≤ 50	≤ 50
— at low temperature - 30 °C	%	≤ 70	≤ 70	≤ 70
— at low temperature - 40 °C	%	≤ 75	≤ 75	≤ 75
<i>Resistance to ageing</i>				
— change in hardness, max.	IRHD-M	±10	±10	±10
— change in tensile strength, max.	%	- 40	- 40	- 40
— change in elongation at break, max.	%	- 40	- 40	- 40
<i>Resistance to gas<sup>b</sup></i>				
— change in mass after immersion, max.	%	+10 -5	+10 -5	+10 -5
— change in mass after drying, max.	%	+5 -8	+5 -8	+5 -8
<i>Resistance to liquid phase of combustible gases<sup>e</sup></i>				
— change in mass after immersion, max.	%	+35	+35	+30
— change in mass after drying, max.	%	-15	-12	-10
<i>Resistance to lubricant<sup>c</sup></i>				
— change in hardness, max.	IRHD-M	±10	±10	±10
— change in mass, max.	%	+15 -10	+15 -10	+15 -10
<i>Resistance to ozone<sup>d</sup></i>				
		no cracks		
<p><sup>a</sup> The test piece shall not be damaged by adhering to the surface of the test apparatus.</p> <p><sup>b</sup> For silicone material there is no requirement for change in mass after immersion as swelling by some such materials may be substantial, the requirement for change in mass after drying, is ± 5 %.</p> <p><sup>c</sup> For silicone material the requirement for change in hardness and mass are ± 15 IRHD and <math>\begin{matrix} +10 \\ -1 \end{matrix}</math> % respectively.</p> <p><sup>d</sup> This requirement is only applicable if the material has been declared to be ozone resistant.</p> <p><sup>e</sup> This requirement is only applicable if the material has been declared to be liquid phase of combustible gases resistant</p>				