SLOVENSKI STANDARD
SIST EN 549:2019

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Nadomešča:
SIST EN 549:1996

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: **EN 549:2019**

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83.140.50	Tesnila	Seals
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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 matériels pour le gaz

Elastomer-Werkstoffe für Dichtungen und Membranen in Gasgeräten und Gasanlagen

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 549:2019) 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 European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2020, and conflicting national standards shall be withdrawn at the latest by January 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes 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 Regulation 2016/426 relating to appliances burning gaseous fuels.

For relationship with EU Regulation 2016/426, see informative Annex ZA, which is an integral part of this document.

The following main technical changes have been made compared to EN 549:1994:

a) Clause 8, “Evaluation of life-time for material used to manufacture seals” added;

b) Clause 9, “Infrared spectra of the material” added;

c) resistance to condensate/liquid phase of combustible gases added;

d) low temperature classes added;

e) ozone resistance for diaphragms is now mandatory;

f) informative Annex D added.

NOTE Verification of identity of material is described in the informative Annex D.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document 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 in general does not allow the preparation of necessary test samples for carrying out 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.

1 Scope

This document 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 437:2018, additionally LPG, bio methane and bio LPG, in the same quality, are covered. It also establishes a classification based on temperature range and hardness. This document is applicable to materials from which homogeneous seals and homogeneous or reinforced diaphragms are manufactured.

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 document, 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 document is –40 °C to +150 °C.

For applications with potential condensation, this document is not applicable for silicon rubber, e.g. above 200 hPa (200 mbar) nominal pressure or at temperatures below 0 °C with 3rd family gases.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 1183-1:2019, *Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method, liquid pycnometer method and titration method (ISO 1183-1:2019)*

ISO 37:2017, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 48-2:2018, *Rubber, vulcanized or thermoplastic — Determination of hardness – Part 2: 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 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.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
rubber material
vulcanised mixture of rubber and ingredients used to manufacture rubber material

3.2
component
finished product manufactured from rubber material

Note 1 to entry For example. 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 condensate/liquid phase of combustible gas;

— for reinforced material, a full specification of the reinforcement, including at least:

— type of material (for example polyester, nylon, cotton or silk);

— grammage (g/m^2);

— yarn type;

— basic construction;

— yarn count in warp and weft;

— yarn twist.

Diaphragms shall be ozone resistant. Due to the potential risk of damage 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

Class	H1	H2	H3
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 Requirements for rubber material used to manufacture seals

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

Table 3 — Requirements for rubber material used to manufacture seals

Property	Unit	Hardness class		
		H1	H2	H3
Hardness				
Tolerance on stated nominal hardness	IRHD-M	±5	±5	±5
Tensile strength	MPa	≥ 5	≥ 7	≥ 7
Elongation at break	%	≥ 125	≥ 125	≥ 125
Compression set				
— at high temperature[a]	%	≤ 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
Resistance to ageing				
— 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

Property	Unit	Hardness class		
		H1	H2	H3
Resistance to gas[b]				
— change in mass after immersion, max.	%	+10 −5	+10 −5	+10 −5
— change in mass after drying, max.	%	+5 −8	+5 −8	+5 −8
Resistance to condensate/liquid phase of *combustible gases*[c]				
— change in mass after immersion, max.	%	+ 20	+ 20	+ 20
— change in mass after drying, max.	%	− 15	− 12	− 10
Resistance to lubricant[d]				
— change in hardness, max.	IRHD-M	±10	±10	±10
— change in mass, max.	%	+15 −10	+15 −10	+15 −10
Resistance to ozone[e]		no cracks		

a The test piece shall not be damaged by adhering to the surface of the test apparatus.

b 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 %.

c This requirement is only applicable if the material has been declared as resistant to condensate/liquid phase of combustible gases

d For silicone material the requirement for change in hardness and mass are ± 15 IRHD and $^{+10}_{-1}$ % respectively.

e This requirement is only applicable if the material has been declared to be ozone resistant.

6.3 Requirements for rubber material used to manufacture diaphragms

When tested in accordance with the methods detailed in Clause 7standard test pieces shall be used.

The material used to manufacture diaphragms shall comply with the requirements given in Table 4.