



SLOVENSKI STANDARD
SIST EN 549:1996

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Nadomešča:
SIST EN 291:1996

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

iTeh STANDARD PREVIEW
Matériaux a base de caoutchouc pour joints et membranes destinés aux appareils a gaz
et appareillages pour le gaz **(standards.iteh.ai)**

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ICS:

83.140.50	Tesnila	Seals
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EUROPEAN STANDARD

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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 et membranes destinés aux appareils à gaz et appareillages pour le gaz

Elastomer-Werkstoffe für Dichtungen und Membranen in Gasgeräten und Gasanlagen

This European Standard was approved by CEN on 1994-11-08. 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard was prepared by the Technical Committee CEN/TC 108 "Sealing materials and lubricants for gas appliances and gas equipment" of which the secretariat is held by NNI. This European Standard is a compilation of EN 278:1991, EN 279:1991 and EN 291:1992.

The Annex A is normative and contains "Verification of components by physical and chemical testing", Annex B is also normative and contains "Verification of components by infra-red spectrometric method".

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

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 December 1995, and conflicting national standards shall be withdrawn at the latest by December 1995.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

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Introduction

This European Standard specifies the requirements for materials to be used for the manufacture of seals and diaphragms. It specifies for that purpose, tests to be carried out on standardised 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 such as safety and control devices 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 vulcanized rubber materials used in gas appliances and equipment in contact with 1st, 2nd and 3rd family combustible gases. 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.

The normal range of operating temperatures covered by this standard is 0 °C to + 60 °C. Tests are also included for applications using diaphragms within the range - 20 °C to + 80 °C and seals within the range - 20 °C to + 150 °C. For temperatures outside these ranges the user should contact the manufacturer regarding the suitability of the rubber material.

This standard includes two normative annexes for the verification that a component (finished product) was produced from a previously type tested material complying with requirements of this standard as declared by the appliance or equipment manufacturer or supplier of the component.

This standard is not applicable to silicone rubber used either above 200 mbar nominal pressure or at temperatures below 0 °C with 3rd family gases as there is possibility of condensation. This standard is also not applicable to seals and diaphragms for devices in gas transmission systems nor in such equipment used in 1st and 2nd family gas distribution systems.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ISO 37	Rubber vulcanized - Determination of tensile stress-strain properties
ISO 48	Vulcanized rubbers - Determination of hardness (Hardness between 30 and 85 IRHD)
ISO 188	Rubber vulcanized - Accelerated ageing or heat-resistance tests
ISO 247	Rubber - Determination of ash
ISO 471	Rubber - Standard temperatures, humidities and times for the conditioning and testing of test pieces
ISO 815	Rubber, vulcanized or thermoplastic - Determination of compression set at ambient elevated or low temperatures
ISO 1400	Vulcanized rubbers of high hardness (85 to 100 IRHD) - Determination of hardness
ISO 1407	Rubber - Determination of solvent extract

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ISO 1431-1:1989	Rubber vulcanized or thermoplastic - Resistance to ozone cracking - Part 1: Static strain test
ISO 1817:1985	Rubber, vulcanized - Determination of the effect of liquids
ISO 4648	Rubber, vulcanized or thermoplastic - Determination of dimensions of test pieces and products for test purposes
ISO 4650	Rubber - Identification - Infra-red spectrometric method.

3 Definitions

For the purposes of this standard the following definitions apply:

- 3.1 **component**: Finished product manufactured from rubber material.
- 3.2 **seal**: A component used as an interface between parts of a gas appliance or parts of gas equipment to achieve gas tightness.
- 3.2.1 **static seal**: A component which ensures a seal between two parts of a gas appliance or parts of gas equipment which do not have relative movement ("O" rings, sheet gaskets, etc.).
- 3.2.2 **dynamic seal**: A component which ensures a seal between two parts of a gas appliance or parts of gas equipment which have relative movement (lip seals, valve pads and some "O" rings).
- 3.3 **diaphragm**: A membrane of rubber material located in a fixture and serving as a flexible gas tight partition between two chambers.
- 3.4 **reinforcement**: Woven or unwoven material arranged in or on the rubber type material, thus reinforcing certain properties of such, for example the bursting strength of diaphragms.

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4 Manufacturer's declared information

The manufacturer responsible for the production of material complying with this standard shall ensure that he declares the following information which shall be documented:

- a unique material reference;
- the nominal hardness;
- the maximum working temperature of the material;
- the minimum working temperature of the material;
- whether the material is resistant to ozone;
- for reinforced material, a full specification of the reinforcement, for example type for material, basic construction and decitex.

NOTE: 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.

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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		values in degrees C									
		A1	B1	C1	D1	E1	A2	B2	C2	D2	E2
Range of operating temperature	from	0	0	0	0	0	-20	-20	-20	-20	-20
	to	60	80	100	125	150	60	80	100	125	150

NOTE: Seals can be manufactured from materials of Class A1 to E1 and A2 to E2, whilst diaphragms are prepared from Class A1 to B1 and A2 to B2.

Table 2: Hardness classes

Class	values in IRHD		
	H1	H2	H3
Nominal hardness range	< 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 would be B2/H3.

6 Requirements

6.1 General

Materials shall be free from porosity, inclusion, blisters and surface imperfections visible to the naked eye even after cutting.

6.2 Physical and chemical properties of rubber materials used for the manufacture of seals

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

Table 3: Requirements for material used for manufacture seals

Property	Unit	Hardness Class		
		H1	H2	H3
<u>Hardness</u>				
Tolerance on stated nominal hardness	IRHD	± 5	± 5	± 5
<u>Tensile strength</u>	MPa	≥ 5	≥ 7	≥ 7
<u>Elongation at break</u>	%	≥ 125	≥ 125	≥ 125
<u>Compression set</u>				
- at high temperature ¹⁾	%	≤ 40	≤ 40	≤ 40
- at low temperature 0 °C	%	≤ 40	≤ 40	≤ 40
- at low temperature -20 °C	%	≤ 50	≤ 50	≤ 50
<u>Resistance to ageing</u>				
- change in hardness, max.	IRHD	± 10	± 10	± 10
- change in tensile strength, max.	%	- 40	- 40	- 40
- change in elongation at break, max.	%	- 40	- 40	- 40
<u>Resistance to gas ²⁾</u>				
- change in mass after immersion, max.	%	+ 10 - 5	+ 10 - 5	+ 10 - 5
- change in mass after drying, max.	%	+ 5 - 8	+ 5 - 8	+ 5 - 8
<u>Resistance to lubricants ³⁾</u>				
- change in hardness, max.	IRHD	± 10	± 10	± 10
- change in mass, max.	%	+ 15 - 10	+ 15 - 10	+ 15 - 10
<u>Resistance to ozone ⁴⁾</u>		no cracks		

1) The test piece shall not be damaged by adhering to the surface of the test apparatus. standards.iteh.ai/catalog/standards/sist/996ec267-3332-4ce4-b183-1501e92181-n-549-1994

2) 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 %.

3) For silicone material the requirement for change in hardness and mass are ± 15 IRHD and + 10 %; - 1 % respectively.

4) This requirement is only applicable if the material has been declared by the manufacturer to be ozone resistant.