SLOVENSKI STANDARD
SIST EN 13787:2003

01-januar-2003

Elastomeri za regulatorje tlaka plina in pripadajoče varnostne naprave za vstopne tlake do 100 bar

Elastomers for gas pressure regulators and associated safety devices for inlet pressures up to 100 bar

Elastomere für Gas-Druckregelgeräte und zugehörige Sicherheitseinrichtungen für Eingangsdrücke bis 100 bar

Elastomeres pour régulateurs de pression de gaz et dispositifs de sécurité associés pour pressions amont jusqu'a 100 bar

Ta slovenski standard je istoveten z: **EN 13787:2001**

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23.060.40	Tlačni regulatorji	Pressure regulators
83.140.50	Tesnila	Seals

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EUROPEAN STANDARD

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Elastomères pour régulateurs de pression de gaz et dispositifs de sécurité associés pour pressions amont jusqu'à 100 bar

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This European Standard was approved by CEN on 15 September 2000.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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

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Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 235 "Gas pressure regulators and associated safety devices for use in gas transmission and distribution", the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by April 2002, and conflicting national standards shall be withdrawn at the latest by April 2002.

This European Standard includes one informative annex (Annex A) and one normative annex (Annex B related to a special national condition for Sweden).

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

1 Scope

This European Standard specifies the minimum requirements for elastomeric materials intended to be used as static seals, dynamic seals or diaphragms in the gas pressure regulators covered by EN 334 and in the safety devices for gas pressure regulating stations and installations covered by the corresponding European Standards, as well as the relevant test methods to assess these requirements.

This European Standard applies to elastomeric materials for use with gases of the first and second gas families to EN 437, for inlet pressures less than or equal to 100 bar, and in an operating temperature range between –10 °C, (or –20 °C when applicable), and +60 °C.

This European Standard also gives some additional characteristics and recommendations for their application likely to be requested for elastomers in the order specifications, and the corresponding test methods (see informative Annex A).

This European Standard only applies for type testing.

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 any 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 (including amendments).

EN 334, *Gas pressure regulators for inlet pressures up to 100 bar.*

EN 437, *Test gases – Test pressures – Appliance categories.*

EN 549, *Rubber materials for seals and diaphragms for gas appliances and gas equipment.*

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, *Rubber, vulcanized or thermoplastic – Determination of compression set at ambient, elevated or low temperatures.*

ISO 1817, *Rubber, vulcanized – Determination of the effect of liquids.*

3 Terms and definitions

For the purposes of this European Standard, the following definitions apply:

3.1
static seal
component which ensures a seal between two parts of a gas pressure regulator or parts of its associated safety devices which do not have relative movement (‘O’ rings, sheet gaskets, etc.)

NOTE Adapted from EN 549.

3.2
dynamic seal
component which ensures a seal between two parts of a gas pressure regulator or parts of its associated safety devices which have relative movement (lip seals, some 'O' rings)

NOTE Adapted from EN 549.

3.3
diaphragms

3.3.1
diaphragm
membrane of rubber material located in a fixture and serving as a flexible gas tight partition between two chambers

[EN 549]

3.3.2
main diaphragm
diaphragm, the function of which is to detect the feedback of the controlled variable and/or the diaphragm which provides the thrust to move the control member

[EN 334]

3.3.3
control member
movable part of the regulator which is positioned in the flow path to restrict the flow through the regulator. A control member may be a plug, ball, disk, vane, gate, diaphragm, etc.

[EN 334]

3.4
seat ring
part assembled in a component of the regulator to provide a removable soft seat

[EN 334]

4 Characteristics

4.1 General requirements

Elastomeric materials used for non reinforced diaphragms and static and dynamic seals, shall conform to the required values and tolerances given in Table 1. Test methods are detailed in clause 5.

All materials shall be free from porosity, inclusion, blisters and surface imperfections visible to the naked eye.

Table 1 — Requirements of elastomers for seals and diaphragms

Property	Units	Hardness Class				
		50	60	70	80	90
Hardness Tolerances on stated nominal hardness	IRHD	± 5	± 5	± 5	± 5	+3 / –5
Tensile strength, minimum	MPa	6	9	9	10	10
Elongation at break, minimum	%	400	300	200	150	80
Compression set [a] - at 70 °C, after 24 h - where applicable, at –10 °C after 24 h or at –20 °C after 24 h	 % %	 25 40 50	 25 40 50	 25 40 50	 25 40 50	 25 40 50
Resistance to ageing - Change in hardness - Change in tensile strength - Change in elongation at break	 IRHD % %	 ± 10 ± 15 +10 / –25	 ± 10 ± 15 +10 / –25	 ± 10 ± 15 +10 / –25	 ± 8 ± 15 +10 / –25	 ± 6 ± 15 +10 / –25
Resistance to gas (n-pentane) - Change in mass after immersion (72 h, 23 °C) - Change in mass after drying (168 h, 40 °C), maximum	 % %	 +10 / –5 +5 / –10	 +10 / –5 +5 / –10	 +10 / –5 +5 / –10	 +10 / –5 +5 / –8	 +10 / –5 +5 / –8
Resistance to lubricants Oil IRM 902, 168 h at 70 °C - Change in hardness - Change in mass	 IRHD %	 ± 10 +15 / –10	 ± 10 +15 / –10	 ± 10 +15 / –10	 ± 10 +15 / –10	 ± 10 +15 / –10

[a] When the diaphragm has a function of detection, this test is not applicable (see 4.2.2).

Materials used for reinforced diaphragms should meet the requirements of Table 1. Moreover, specific additional tests may be necessary.

4.2 Additional characteristics

4.2.1 The requirements given in 4.1 are intended for general use, however, for some applications, particularly with regard to the design of the regulator or the safety device, and according to the provisions of the order specification, additional characteristics may be asked for.

For testing these additional characteristics, the test methods given in informative Annex A should be used, taking into account test conditions and assessment criteria set up in the order specification.

For such additional characteristics, the 4.2.2 to 4.2.4 should be considered.

4.2.2 For parts in contact with the atmosphere, under normal conditions of use, elastomers resistant to ozone should be used. In particular, this characteristic should be taken into account when the diaphragm has a function of detection.

4.2.3 Where the diaphragm is used as a sensing system, compression set is not considered to be relevant and should be replaced by a type test in the regulator standard EN 334 or in the appropriate EN standard for safety devices, as applicable.

4.2.4 For seat rings the values are the same as in Table 1, but additional tests such as tear strength and abrasion could be introduced as quoted in informative Annex A.

5 Test methods for general requirements

5.1 General conditions of testing

Unless otherwise specified, tests are carried out at a temperature of (23 ± 2) °C.

5.2 Hardness

The hardness is measured by IRHD, preferably according to the micro-test method specified in ISO 48.

5.3 Tensile strength and elongation at break

Tensile strength and elongation at break are measured according to ISO 37 and expressed in MPa and percentage respectively. The test is performed preferably on dumb bell test pieces of type 2.

5.4 Compression set

Tests are carried out according to ISO 815 (type B test piece) under the following conditions:

— at high temperature: after 24 h at 70 °C;

— at low temperature: after 24 h at –10 °C or –20 °C.

5.5 Resistance to ageing

Changes in hardness, tensile strength, elongation at break are measured to 5.2 and 5.3 respectively after ageing in accordance to ISO 188, at a temperature of 70 °C for 168 h (7 days).

5.6 Resistance to gas

Resistance to gas is measured in percentage of change in mass after immersion in n-pentane ($72\,^{0}_{-2}$) h at (23 ± 2) °C, and after drying ($168\,^{0}_{-2}$) h at 40 °C, according to the test method given in ISO 1817.

5.7 Resistance to lubricants

Resistance to lubricants is measured according to the test method given in ISO 1817, under the following specific conditions:

— immersion during ($168\,^{0}_{-2}$) h in oil IRM 902 at 70 °C;

— changes in mass and hardness are determined with reference to the initial mass and hardness of the samples.