SLOVENSKI STANDARD
SIST EN 681-2:2000

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Elastomerna tesnila – Zahteve za materiale za tesnila za uporabo v napeljavah za vodo in kanalizacijo – 2. del: Plastomerni elastomeri

Elastomeric Seals - Materials requirements for pipe joint seals used in water and drainage applications - Part 2: Thermoplastic elastomers

Elastomer-Dichtungen - Werkstoff-Anforderungen für Rohrleitungs-Dichtungen für Anwendungen in der Wasserversorgung und Entwässerung - Teil 2: Thermoplastische Elastomere

Garnitures d'étanchéité en caoutchouc - Spécification des matériaux pour garnitures d'étanchéité utilisées dans le domaine de l'eau et du drainage - Partie 2: Elastomeres thermoplastiques

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This European Standard was approved by CEN on 3 June 2000.

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.

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 Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This european Standard 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of an identical text or by endorsement, at the latest by January 2001, and conflicting national standards shall be withdrawn at the latest by January 2001.

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.

This part has been prepared in response to requests from CEN/TC 155 for a material specification for thermoplastic elastomer seals for use in conjunction with non-pressure thermoplastic pipe systems.

A European Standard will be prepared for microbiological deterioration requirements and when published it is intended that materials comply with the requirements of that standard.

It is recommended that third party inspection be carried out at least twice a year without previous notice, the assessment body complying with the requirements of EN 45011 and EN 45012 or equivalent.

Part 1 of this Standard is based on ISO 4633 and ISO 9631, bringing these two sets of requirements (for cold and hot water respectively) under one specification. The major changes from ISO 4633 and ISO 9631 have been to incorporate requirements for effect on water quality and ozone resistance. The emphasis in respect of low temperature testing has moved away from hardness measurement to compression set, which is more discriminating.

Part 3 has been prepared in response to requests from those sections of the pipeline industry which employ cellular seals of vulcanized rubber.

Part 4 has been prepared in response to requests from those sections of the pipeline industry which employ cast polyurethane seals.

This standard should be used where appropriate with product standards which specify performance requirements for joints.

Seals and pipe joints using thermoplastic elastomers should be designed and tested to take into account the different requirements compared with those specified in Part 1 of this standard.

In accordance with the common CEN/CENELEC Rules member states are required to transpose the European Standard into a national standard no later than six months following its date of adoption (DOA) by the BT. At this time any existing national standards having the same scope are withdrawn (DOW).

Annex A is informative.

1 Scope

This standard specifies requirements for materials used for moulded seals only of thermoplastic elastomers (TPE) used in joints of:

1) thermoplastic piping systems for non pressure waste water discharge (intermittent flow up to 95 °C) inside buildings;

2) thermoplastic piping systems for non-pressure underground drainage and sewerage (continuous flow up to 45 °C and intermittent flow up to 95 °C);

3) thermoplastic rainwater piping systems.

General requirements for finished joint seals are also given; any additional requirements called for by the particular application are specified in the relevant product standards taking into account that the performance of pipe joints is a function of the seal material properties, seal geometry and pipe joint design.

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.

ISO 37	Rubber, vulcanized or thermoplastic - Determination of tensile stress-strain properties
ISO 48	Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10 and 100 IRHD)
ISO 188	Rubber, vulcanized - Accelerated ageing or heat-resistance tests
ISO 471	Rubber - Temperatures, humidities and times for conditioning and testing
ISO 815	Rubber, vulcanized or thermoplastic - Determination of compression set at ambient, elevated or low temperatures

ISO 1431-1	Rubber, vulcanized or thermoplastic - Resistance to ozone cracking - Part 1: Static strain test
ISO 1817	Rubber, vulcanized - Determination of the effect of liquids
ISO 2859-1	Sampling procedures for inspection by attributes - Part 1 : Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection
ISO 3302-1	Rubber - Tolerances for products - Part 1: Dimensional tolerances
ISO 3384:1999	Rubber, vulcanized or thermoplastic - Determination of stress relaxation in compression at ambient and at elevated temperatures
ISO 3951	Sampling procedures and charts for inspection by variables for percent nonconforming
ISO 4661-1	Rubber, vulcanized or thermoplastic - Preparation of samples and test pieces - Part 1: Physical tests
ISO 9691:1992	Rubber - Recommendations for the workmanship of pipe joint rings - Description and classification of imperfections
EN ISO 9002	Quality systems – Model for quality assurance in production, installation and servicing (ISO 9002:1994)
EN ISO 9003	Quality systems – Model for quality assurance in final inspection and test (ISO 9003:1994)

3 Definitions

For the purposes of this standard the following definition applies.

Thermoplastic elastomer : a polymer or blend of polymers that does not require vulcanization or crosslinking during processing, yet has elastic properties, at its service temperature. These properties disappear at processing temperature, so that further processing is possible, but return when the material is returned to its service temperature.

4 Classification

A nominal hardness of materials shall be specified within the ranges in table 1.

Table 1 - Hardness classification

Hardness class	50	60	70
Range of hardness, IRHD	46 / 55	56 / 65	66 / 75

The three classes of hardness for materials for pipe joints seals are specified in table 2.

5 Finished seal requirements

5.1 Dimensional tolerances.

Tolerances shall be specified from the appropriate classes in ISO 3302-1.

5.2 Imperfections and defects

The seals shall be free of defects or irregularities which could affect their function. Classification of imperfections shall be according to ISO 9691:1992 as follows:

- surface imperfections in zones involved in the sealing function as described in 4.1.1 of ISO 9691:1992 shall be considered as defects.

- surface imperfections in zones not involved in the sealing function as described in 4.1.2.1b) of ISO 9691:1992 shall not be considered as defects.

NOTE 1 Major surface imperfections in zones not involved in the sealing function as described in 4.1.2.1a) of ISO 9691:1992 could be considered as defects. This should be agreed between the interested parties; the acceptance criteria depend upon the seals' type or design respectively.

NOTE 2 Internal imperfections as described in 4.2 of ISO 9691:1992 could be considered as defects. The compressive force can be determined according to ISO 7743[1)]. The acceptable limiting values of the compressive force should be agreed between the interested parties; they depend upon the seals' type or design respectively.

5.3 Hardness

When determined by the micro-test method specified in ISO 48, on samples prepared in accordance with 6.1.2, the hardness shall comply with the requirements given in table 2.

NOTE If the dimensions of a seal are appropriate, the normal test method specified in ISO 48 can be used, provided that the micro-test method is used for reference purposes.

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1) ISO 7743 *Rubber, vulcanized or thermoplastic - Determination of compression stress-strain properties*

For the same seal, the difference between the minimum and maximum hardness values shall not be more than 5 IRHD. Each value shall be within the specified tolerances.

5.4 Tensile strength and elongation at break

The tensile strength and elongation at break shall be determined by the method specified in ISO 37 in the direction perpendicular to the mould flow on dumb-bell test pieces, preferably cut out of a seal or out of a sample plate.The results obtained on sample plate test pieces shall.be accepted.

Sample plates shall be prepared as specified in 6.1.1 and 6.1.3. The tensile strength and elongation at break shall comply with the requirements given in table 2.

5.5 Compression set in air

5.5.1 General.

If the test piece is taken from a seal, then the measurement shall be carried out as far as possible in the direction of compression of the seal in service at 25 % compression.

5.5.2 Compression set at 23 °C and 70 °C

When determined by the method specified in ISO 815, at 23 °C and 70 °C, using the small type B test piece, the compression set shall comply with the requirements given in table 2.

5.5.3 Low temperature compression set at - 10 °C

When determined by the method specified in ISO 815 at - 10 °C, using the small type B test piece, and the (30 ± 3) min recovery measurement, the compression set of seals used in drainage and sewerage applications shall comply with the requirements given in table 2.

5.6 Accelerated ageing in air.

Test pieces prepared for the determination of hardness according to 5.3 and for the determination of tensile strength and elongation at break (see 5.4) shall be aged in air by the normal oven method specified in ISO 188, for 7 days at 70 °C.

The changes in hardness, tensile strength and elongation at break shall comply with the requirements given in table 2.

5.7 Stress relaxation in compression.

The stress relaxation shall be determined at 23 °C by method A of ISO 3384:1999 using the small cylindrical test piece after applying mechanical and thermal conditioning. Measurements shall be taken after 3 h 1, 3 and 7 days for the 7 day test and after 3 h 1, 3, 7, 30 and 100 days for the 100 days test. The best fit straight line shall be determined by regression analysis using a logarithmic time scale and the