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Elastomeric seals — Material requirements for seals used in pipes and fittings carrying gaseous fuels and hydrocarbon fluids

Garnitures d'étanchéité en élastomères — Exigences matérielles pour les joints utilisés dans les canalisations et les raccords véhiculant des combustibles gazeux et des hydrocarbures liquides

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 4, *Products other than hoses*.

This second edition cancels and replaces the first edition (ISO 16010:2005), which has been technically revised.

The main changes compared to the previous edition are as follows:

— normative references has been updated to the latest version

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Elastomeric seals — Material requirements for seals used in pipes and fittings carrying gaseous fuels and hydrocarbon fluids

1 Scope

This document specifies requirements for elastomeric materials used in seals for supply pipes and fittings, ancillaries and valves at operating temperatures in general from –5 °C up to 50 °C and in special cases from –15 °C up to 50 °C, for the following:

a) general applications (see Table 4, type G series):

   — gaseous fuel [manufactured, natural and liquefied petroleum gas (LPG) in the gaseous phase],

   — hydrocarbon fluids with an aromatic content up to 30 % (by volume), including LPG in the liquid phase;

b) special applications (see Table 4, type H):

   — materials suitable for carrying gaseous fuels containing gas condensates and hydrocarbon fluids of unrestricted aromatic content.

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. This document is used where appropriate with product standards which specify performance requirements for joints.

This document is applicable to joint seals for all pipeline materials, including iron, steel, copper and plastics.

In the case of composite sealing rings, the requirements in 5.2.8 and 5.2.9 apply only when the materials used for any elastomeric parts come into contact with gaseous fuel or hydrocarbon fluid.

Elongation at break, tensile strength, compression set and stress relaxation requirements for materials of hardness classes 80 and 90 apply only when they constitute that part of the seal which participates directly in the sealing function or contributes directly to long-term stability.

This document is not applicable to the following:

— seals made from cellular materials;

— seals with enclosed voids as part of their design;

— seals required to be resistant to flame or to thermal stress;

— seals which contain splices joining pre-vulcanized profile ends.

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.

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The following referenced documents are indispensable for the application 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.

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

ISO 48-2, *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, *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 1: At ambient or elevated temperatures*

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

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

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

ISO 3302-1, *Rubber — Tolerances for products — Part 1: Dimensional tolerances*

ISO 3384-1:2011, *Rubber, vulcanized or thermoplastic — Determination of stress relaxation in compression at ambient and at elevated temperatures*

ISO 9691:1992, *Rubber — Recommendations for the workmanship of pipe joint rings — Description and classification of imperfections*

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

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

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

4 Classification

Five classes of material for pipe seals are specified in Tables 2 and 3.

A nominal hardness shall be specified within the ranges in Table 1.

Table 1 — Hardness classification

Hardness class	50	60	70	80	90
Range of hardness, IRHD	46 to 55	56 to 65	66 to 75	76 to 85	86 to 95

5 Requirements

5.1 Materials

The materials shall be free of any substances which may have a deleterious effect on the life of the seals, or on the pipe or fittings.

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