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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 16010 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 4, *Products (other than hoses)*.

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

## 1 Scope

This International Standard specifies requirements for elastomeric materials used in seals for supply pipes and fittings, ancillaries and valves at operating temperatures in general from  $-5^{\circ}\text{C}$  up to  $50^{\circ}\text{C}$  and in special cases from  $-15^{\circ}\text{C}$  up to  $50^{\circ}\text{C}$  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 International Standard should be used where appropriate with product standards which specify performance requirements for joints.

This International Standard 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 4.2.8 and 4.2.9 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 International Standard 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 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, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 188:1998, *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 1431-1, *Rubber, vulcanized or thermoplastic — Resistance to ozone cracking — Part 1: Static and dynamic strain testing*

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

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

ISO 3384:2005, *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 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

## 4 Requirements

### 4.1 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.