INTERNATIONAL STANDARD

ISO 2782-1

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Rubber, vulcanized or thermoplastic — Determination of permeability to gases —

Part 1: Differential-pressure methods

Caoutchouc vulcanisé ou thermoplastique — Détermination de la perméabilité aux gaz —

Partie 1: Méthodes à pression différentielle

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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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

This second edition cancels and replaces the first edition (ISO 2782-1:2012), which has been technically revised. A new Clause on simplified pressure sensor method has been added (see Clause 6).

ISO 2782 consists of the following parts, under the general title *Rubber, vulcanized or thermoplastic — Determination of permeability to gases*:

— *Part 1: Differential-pressure methods*

— *Part 2: Equal-pressure method*

Introduction

The measurement of the permeability of rubber to gases is important in the evaluation of compounds for products such as inner tubes, tubeless-tyre liners, hoses, balloons and other gas-containing products, as well as seals and diaphragms. The measurement is also of theoretical importance in the study of the characteristics of gas diffusion and gas solubility in relation to polymer structure.

This part of ISO 2782 proposes three different methods for the determination of the permeability to gases of vulcanized or thermoplastic rubber under a differential partial pressure, which are

— pressure sensor method which allows a complete characterization of a material,

— simplified pressure sensor method which is appropriate when only the gas permeability coefficient is needed (routine control, specification verification, design, etc.), and

— gas-chromatographic method.

Rubber, vulcanized or thermoplastic — Determination of permeability to gases —

Part 1: Differential-pressure methods

WARNING 1 — Persons using this part of ISO 2782 should be familiar with normal laboratory practice. This part of ISO 2782 does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

WARNING 2 — Certain procedures specified in this part of ISO 2782 might involve the use or generation of substances, or the generation of waste, that could constitute a local environmental hazard. Reference should be made to appropriate documentation on safe handling and disposal after use.

1 Scope

This part of ISO 2782 specifies three methods for the determination of the permeability to gases of vulcanized or thermoplastic rubber under a differential partial pressure.

The three methods specified are as follows:

— pressure sensor method (using vacuum): for determining the gas transmission rate, gas permeability coefficient, gas diffusion coefficient and gas solubility coefficient;

— simplified sensor method (using applied pressure): for determining the gas permeability coefficient only;

— gas-chromatographic method: for determining the gas transmission rate and gas permeability coefficient.

These methods apply to vulcanized and thermoplastic rubbers of hardness not less than 35 IRHD (international rubber hardness degrees) and to both single gases and mixtures of gases.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 18899:2013, *Rubber — Guide to the calibration of test equipment*

ISO 23529:2010, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*