
INTERNATIONAL STANDARD



2782

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Rubber, vulcanized — Determination of permeability to gases — Constant pressure method

Caoutchouc vulcanisé — Détermination de la perméabilité aux gaz — Méthode de la pression constante

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2782 was developed by Technical Committee ISO/TC 45, *Rubber and rubber products*, and was circulated to the member bodies in March 1976.

It has been approved by the member bodies of the following countries :

Belgium	Hungary	Sweden
Brazil	India	Switzerland
Canada	Italy	Turkey
Czechoslovakia	Netherlands	United Kingdom
Egypt, Arab Rep. of	Poland	U.S.A.
France	Portugal	Yugoslavia
Germany	Romania	

The member body of the following country expressed disapproval of the document on technical grounds :

U.S.S.R.

Rubber, vulcanized — Determination of permeability to gases — Constant pressure method

0 INTRODUCTION

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

1 SCOPE AND FIELD OF APPLICATION

This International Standard gives basic directions for measuring the permeability of rubber to gases at steady state conditions, when a constant pressure is maintained on each of the end faces of the rubber to be tested. Results obtained by this test procedure should not be extrapolated to thicknesses of material considerably different from that of the test piece.

It applies to solid rubber of a hardness not less than 35 IRHD and to gases such as air, nitrogen, oxygen, hydrogen, liquefied petroleum gas (in gaseous form) and coal gas. Errors may be introduced if the gas used appreciably swells the rubber under test.

2 REFERENCES

ISO 471, *Rubber — Standard temperatures, humidities and times for the conditioning and testing of test pieces.*

ISO 1826, *Rubbers — Time-lapse between vulcanization and testing.*

ISO 3383, *Rubber — General directions for achieving elevated or sub-normal temperatures for tests.*

3 DEFINITION

permeability of rubber to gases : The rate of volume flow of gas under steady state conditions referred to standard temperature and pressure, between opposite faces of a unit cube of solid rubber, when subjected to unit pressure difference and controlled temperature.

4 PRINCIPLE

The cavity of a test cell, maintained at a constant temperature, is divided by a disc test piece into a high pressure and a low (atmospheric) pressure side. The high pressure side is connected to a constant pressure gas reservoir or is of such a volume that, once filled, it stays at a practically constant pressure. The gas permeates into the low pressure side, which is of a very low volume and connected to a capillary tube; this is provided for measuring the permeated volume, while keeping or restoring the same low pressure within this side.

Absolute pressure for the high pressure side is maintained in the range 0,3 to 1,5 MPa* and for the low pressure side it is maintained at the prevailing atmospheric pressure.

For normal comparison of permeability of different rubber vulcanizates, the test temperature is a standard laboratory temperature but higher preferred temperatures may be used where conditions are required to approximate to the service temperature of rubber products. Standard laboratory temperature and higher preferred temperatures shall be selected from ISO 471. When higher preferred temperatures are used, directions given in ISO 3383 shall be observed.

WARNING — Because of the dangers connected with high pressure and flammability, handling of gases should be done by experienced personnel only.

* 1 MPa = 1 N/mm²