INTERNATIONAL STANDARD

ISO 4648

Second edition
1991-03-01

Rubber, vulcanized or thermoplastic — Determination of dimensions of test pieces and products for test purposes

Caoutchouc vulcanisé ou thermoplastique — Détermination des dimensions des éprouvettes et des produits en vue des essais

Reference number
ISO 4648 : 1991 (E)

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.

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.

International Standard ISO 4648 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Sub-Committee SC 2, *Physical and degradation tests*.

This second edition cancels and replaces the first edition (ISO 4648:1978), the scope of which has been extended to include thermoplastic rubbers.

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Printed in Switzerland

Introduction

For the accurate determination of the various properties of rubber such as tensile strength, tear resistance and compression set, it is essential that the dimensions of the test pieces or products used be measured under well specified conditions.

Pressure applied by any part of measuring instruments in contact with soft flexible materials has a significant effect on the results of measurements; in order for results to be accurate and reproducible, it is essential that the above-mentioned pressure be specified.

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Rubber, vulcanized or thermoplastic — Determination of dimensions of test pieces and products for test purposes

1 Scope

This International Standard specifies four methods for the measurement of the dimensions of solid vulcanized or thermoplastic rubber test pieces or products for test purposes, three contact methods, designated A, B and C, and one non-contact method, designated D.

The method to be used is selected according to the magnitude of the dimension to be measured and to the desired accuracy.

Method A — for dimensions less than 30 mm

Method B — for dimensions of 30 mm and up to and including 100 mm

Method C — for dimensions over 100 mm

Method D — non-contact procedure for all dimensions

Other measuring methods may be used when special conditions arise, for example when the test piece or product has a curved surface or complex shape.

For the measurement of dimensions of products for control, refer to ISO 3302.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3302 : 1990, *Rubber — Dimensional tolerances for use with products.*

3 Conditioning and test temperature

The atmosphere and temperature for conditioning and testing shall be in accordance with the requirements of the method of test for which the test pieces are required.

4 Method A — For dimensions less than 30 mm

This method is applicable where the dimension to be measured is less than 30 mm, with the test piece lying between two flat parallel surfaces, and where the other dimensions are such that the application of pressure does not cause any appreciable buckling.

The apparatus used shall consist of a flat rigid base plate on which the test piece or product rests and of a gauge having a flat circular foot of between 2 mm and 10 mm in diameter that is applied to the test pieces or product, exerting a specified pressure.

The gauge shall be capable of measuring the thickness with an error of not more than 1 % or 0,01 mm, whichever is the smaller.

The circular foot shall not extend over the edge of the test piece or product and shall exert a pressure of 22 kPa ± 5 kPa for solid rubber of hardness equal to or greater than 35 IRHD or of 10 kPa ± 2 kPa if hardness is less than 35 IRHD. The nominal masses required to give the specified pressures of 10 kPa ± 2 kPa and 22 kPa ± 5 kPa, in terms of foot diameter, are given for reference in table 1.

Table 1

Foot diameter mm	Mass, in grams, required to give a pressure of	
	10 kPa ± 2 kPa	22 kPa ± 5 kPa
2	3	7
3	7	16
4	13	28
5	20	44
6	29	63
8	51	113
10	80	176

NOTE 1 This type of apparatus may also be used for other types of test piece having no flat parallel surfaces, provided that the measurement conditions are given in the relevant standards.

At least three measurements shall be taken of each dimension to be determined, and the median value reported.

5 Method B — For dimensions of 30 mm and up to and including 100 mm

The measurement of the dimension to be determined shall be taken by means of a vernier calliper capable of measuring the dimension with an error of not more than 1 %. Each measurement shall be taken along a line perpendicular to the opposing faces of the test piece or product defining the dimension to be measured.

The calliper shall be presented to the test piece or product supported so that the dimension to be measured is not strained. The calliper shall be adjusted so that the measuring faces contact the surfaces of the test piece or product without compressing them, and the reading reported.

At least three measurements shall be taken of each dimension to be determined, and the median value reported.

6 Method C — For dimensions over 100 mm

The measurement of the dimension shall be taken by means of a graduated ruler or tape with an error of not more than 1 mm.

Each measurement shall be taken along a line perpendicular to the opposing faces of the test piece or product defining the dimension to be measured.

At least three measurements shall be taken of each dimension to be determined, and the median value reported.

7 Method D — Non-contact method

This method, where no contact with rubber is involved, may be required when the test piece or product has a special shape (for example "O" rings, test pieces taken from hose).

Various types of optical apparatus may be used, for example travelling microscope or projection microscope or shadowgraph.

The gauge shall be capable of measuring the thickness with an error of not more than 1 % or 0,01 mm, whichever is the smaller.

At least three measurements shall be taken of each dimension to be determined, and the median value reported.

8 Test report

The test report shall include the following particulars :

a) a reference to this International Standard;

b) the identification of the sample;

c) the conditioning and test atmosphere used;

d) the method of test used (method A, B, C or D);

e) the result of the determination, i.e. the median value of the individual results.

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UDC [678.4.063 + 678.7] : 620.115.8

Descriptors : rubber, vulcanized rubber, rubber products, tests, test specimens, dimensional measurements.

Price based on 2 pages