
**Reusable rubber contraceptive
diaphragms —**

**Part 5: — Determination of tensile
properties**

*Diaphragmes contraceptifs réutilisables en caoutchouc —
Partie 5: Détermination des propriétés de résistance à la traction*
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International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet central@isocs.iso.ch
X.400 c=ch; a=400net; p=iso; o=isocs; s=central

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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.

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 8009-5 was prepared by Technical Committee ISO/TC 157, *Mechanical contraceptives*.

This second edition cancels and replaces the first edition (ISO 8009-5:1985), of which it constitutes a minor revision.

ISO 8009 consists of the following parts, under the general title *Reusable rubber contraceptive diaphragms*.

Part 1: Classification, sampling and requirements

Part 2: Determination of size

Part 3: Determination of dome thickness

Part 4: Freedom from visible defects

Part 5: Determination of tensile properties

Part 6: Determination of deterioration after accelerated ageing

Part 7: Determination of compression resistance of coil spring and flat spring diaphragms

Part 8: Determination of twisting during compression of coil spring and flat spring diaphragms

Part 9: Packaging and labelling

Part 10: Recommendations for storage

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Reusable rubber contraceptive diaphragms —

Part 5: Determination of tensile properties

1 Scope

This part of ISO 8009 specifies a method for determining the tensile properties of the dome of reusable rubber contraceptive diaphragms.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 8009. At the time of the publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8009 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.

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ISO 8009-3:1985, *Reusable rubber contraceptive diaphragms - Part 3: Determination of dome thickness.*

3 Principle

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A test piece is cut from the dome of a diaphragm and stretched until it breaks. The tensile force and elongation at break are measured.

4 Apparatus

4.1 Die, for cutting rings having an internal circumference of $100 \text{ mm} \pm 0,5 \text{ mm}$ and a radial width of $2 \text{ mm} \pm 0,02 \text{ mm}$.

4.2 Dial gauge, as specified in ISO 8009-3.

4.3 Tensile testing machine, capable of an essentially constant rate of traverse and complying with the following requirements:

- able to apply a force ranging from 0 to 50 N;
- having two roller test specimen holders; the diameters of the rollers should be approximately 15 mm;
- having a roller separation speed of $(8,5 \pm 0,8) \text{ mm/s}$ [$(500 \pm 50) \text{ mm/min}$].

5 Preparation of test piece

From the dome of each diaphragm to be tested, cut a ring-shaped test piece using the cutting die (4.1).

The test piece shall be obtained by cutting with one stroke of the press. Only test pieces which have been completely separated at the first attempt shall be used.

6 Procedure

6.1 Using the dial gauge measure, to the nearest 0,01 mm, the thickness of the disc remaining from the inside of the test ring cut from the dome. Take the median value of three measurements, made at different locations close to the edge of the disc, to use in 7.1.

6.2 Place the test piece over the rollers of the tensile testing machine, and stretch it until it breaks.

6.3 Measure the force at break to the nearest 0,1 N and the separation distance between the centres of the rollers to the nearest millimetre.

7 Expression of results

7.1 The tensile strength, σ , expressed in megapascals, of each test piece is given by the formula

$$\sigma = \frac{F}{2 wt}$$

where

F is the breaking force, in newtons;

w is the width of the test piece (i.e. 2 mm);

t is the thickness of the test piece, in millimetres.

The result shall be rounded to the nearest megapascal.

7.2 The elongation at break, E , expressed as a percentage, of each test piece is given by the formula

$$E = \frac{2D + G - C}{C} \times 100$$

where

C is the internal circumference of the ring (i.e. 100 mm);

D is the final distance between the centres of the rollers, in millimetres;

G is the circumference of the roller, in millimetres.

The result shall be rounded to the nearest 10 %.

8 Test report

The test report shall include the following information:

- a) identification of the sample;
- b) number of samples tested;
- c) tensile strength and elongation at break of each test piece;
- d) date of testing.

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