
International Standard



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**Rubber condoms —
Part 9 : Determination of tensile properties**

Préservatifs masculins en caoutchouc — Partie 9 : Détermination des propriétés de résistance à la traction

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Foreword

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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 4074/9 was developed by Technical Committee ISO/TC 157, *Mechanical contraceptives*, and was circulated to the member bodies in July 1979.

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

Canada	Italy	ISO 4074-9:1980	Sri Lanka
Czechoslovakia	Korea, Rep. of		Sweden
Denmark	Mexico		United Kingdom
Egypt, Arab Rep. of	Poland		USA
France	Romania		USSR
India	South Africa, Rep. of		

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Brazil
Netherlands

Rubber condoms —

Part 9 : Determination of tensile properties

1 Scope and field of application

Part 9 of ISO 4074 specifies a method for the determination of the tensile properties of rubber condoms.

The test is only applicable to condoms having a sufficiently large smooth area no more than 90 mm from the open end from which a test piece 20 mm in width can be obtained.

2 Principle

Cutting of a test piece from a condom and stretching it until it breaks and, following this, measuring of the tensile force and elongation.

3 Apparatus

3.1 Cutting die consisting of two parallel knives $20 \pm 0,1$ mm apart, set in a press above a suitable board made of plastics material. The length of the cutting edge of each knife shall be not less than 70 mm.

3.2 Micrometer dial gauge firmly held in a rigid stand over a flat base plate. The gauge shall preferably be graduated in divisions of 0,001 mm, and shall comply with the relevant recommendations of ISO/R 463¹⁾ :

The dial gauge shall be fitted with a flat contact of diameter between 3 and 7 mm, square to the plunger and parallel to the base plate, and shall operate with a pressure of 22 ± 5 kPa.

3.3 Tensile testing machine capable of a substantially constant rate of traverse and complying with the following requirements :

a) stresses within a specimen shall be equalized either by rotating one roller mechanically or by lubricating the cylindrical surfaces of the rollers with a material that does not af-

fect the rubber. If one roller is mechanically rotated its rotation frequency shall be approximately 7 min^{-1} ;

b) a load range of 0 to 100 N;

c) a roller separation speed of $8,5 \pm 0,8 \text{ mm/s}$ ($500 \pm 50 \text{ mm/min}$);

d) manual or preferably automatic recording of the separation distance of the rollers and of the load during the test.

4 Preparation of sample specimens

The condom shall be laid flat with its length at right angles to the cutting edges of the die and the test piece shall be obtained by cutting, with one stroke of the press, from a region 80 mm from the open end. Only test pieces which have been completely separated at the first attempt shall be used. The test piece shall be carefully wiped with a quantity of propan-2-ol sufficient to remove any dressing material and allowed to dry for not less than 16 h.

5 Procedure

5.1 Measure, to the nearest 0,001 mm, the single wall thickness of the test piece at not less than four equivalent points around the ring.

5.2 Dust the test piece with talcum powder, lay it flat, and measure, to the nearest millimetre, the distance between the two folded edges.

5.3 Place the test piece over the rollers and stretch it until it breaks.

5.4 At break, measure the load, to the nearest 0,1 N, and the separation distance (between centres of the rollers) to the nearest millimetre.

1) ISO Recommendation R 463, *Dial Gauges Reading in 0,01 mm, 0,001 in and 0,000 1 in.*

6 Expression of results

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

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

where

F is the breaking load, in newtons;

w is the width of the test piece (i.e. 20 mm);

t is the single wall thickness of the test piece, in millimetres (the mean value obtained in 5.1).

The result should be rounded to the nearest 0,5 MPa.

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

$$\frac{k + 2d - p}{p} \times 100$$

where

k is the length of the test piece, rounded to the nearest millimetre, in contact with the rollers (equal to 47 mm with rollers of 15 mm diameter);

d is the final distance between the centres of the rollers;

p is the original perimeter of the test piece (twice the distance obtained in 5.2).

The result should be rounded to the nearest 10 %.

7 Test report

The test report shall include the following particulars :

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

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