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**Textiles — Test methods for
nonwovens —**

Part 9:

**Determination of drape coefficient
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*Textiles — Méthodes d'essai pour nontissés —
Partie 9: Détermination du coefficient de drapé*

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Reference number
ISO 9073-9:1995(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 9073-9 was prepared by Technical Committee ISO/TC 38, *Textiles*.

ISO 9073 consists of the following parts under the general title *Textiles* — *Test methods for nonwovens*:

- Part 1: *Determination of mass per unit area*
- Part 2: *Determination of thickness*
- Part 3: *Determination of tensile strength and elongation*
- Part 4: *Determination of tear resistance*
- Part 7: *Determination of bending length*
- Part 8: *Determination of liquid strike-through time (simulated urine)*
- Part 9: *Determination of drape coefficient*

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Textiles — Test methods for nonwovens —

Part 9: Determination of drape coefficient

1 Scope

This part of ISO 9073 specifies a method for determining the drape coefficient of nonwovens.

NOTE 1 This International Standard describes a test method specific to nonwovens. Other International Standards applicable to textile, paper, plastics, rubber or other materials can also be applied to test certain nonwoven characteristics.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9073. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9073 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 139:1973, *Textiles — Standard atmospheres for conditioning and testing*.

ISO 186:1994, *Paper and board — Sampling to determine average quality*.

ISO 9073-1:1989, *Textiles — Test methods for nonwovens — Part 1: Determination of mass per unit area*.

3 Definition

For the purposes of this part of ISO 9073, the following definition applies.

3.1 drape: Ability of a circular sample of a fabric to deform when suspended under specified conditions.

4 Principle

A circular piece of the nonwoven under test is held horizontally between smaller concentric discs, and the exterior ring of nonwoven is allowed to drape into folds around the lower supporting disc. The shadow of the draped test piece is cast from below onto a ring of paper of known mass and of the same size as the unsupported part of the test piece. The outline of the shadow is traced onto the ring of paper, the paper is then cut along the trace of the shadow and the mass of the inner part representing the shadow is determined. The drape coefficient is the mass of that part of the paper ring representing the shadow expressed as a percentage of the mass of the whole paper ring.

5 Apparatus

5.1 Test equipment, comprising a box-like apparatus with translucent lid, containing

5.1.1 two horizontal discs, of diameter 18 cm, between which the test piece is held, the lower disc having a central locating pin;

5.1.2 point source of light, positioned centrally beneath the discs and at the focus of a concave parabolic mirror which reflects parallel light vertically past the discs onto the lid of the instrument;

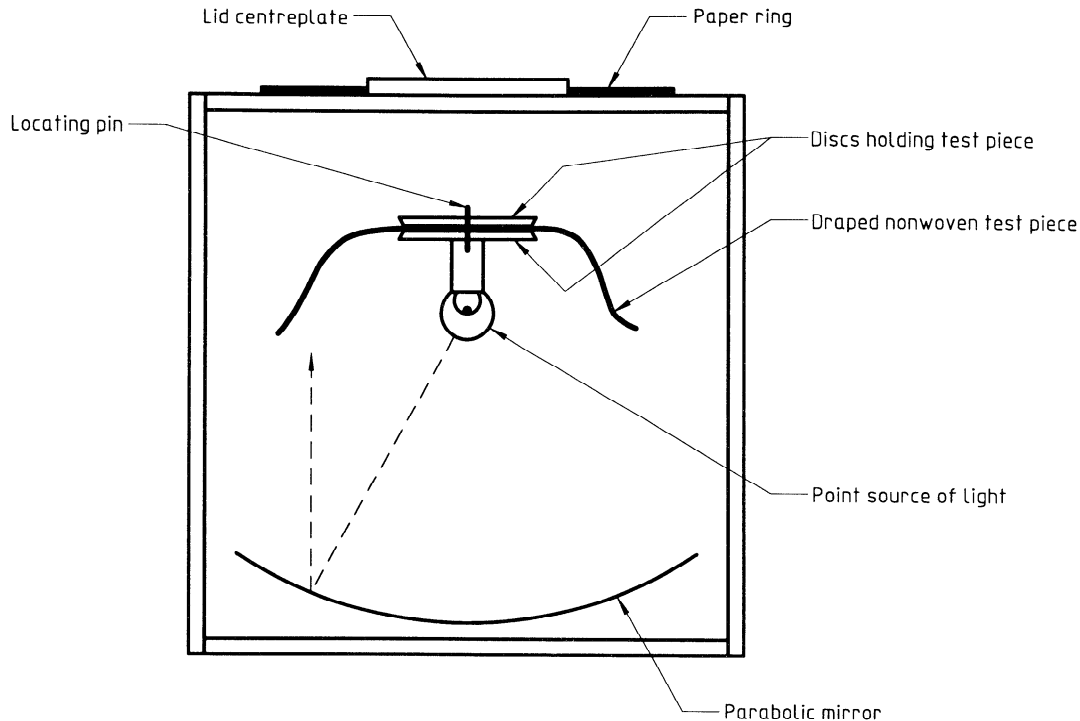


Figure 1 — Section through the test apparatus

5.1.3 centreplate, on the apparatus lid, to locate the paper ring.

A suitable apparatus is shown in figure 1.

5.2 Three circular templates, of diameter 24 cm, 30 cm and 36 cm respectively, adapted to facilitate marking the centre of the test specimen.

5.3 Rings of translucent paper, of internal diameter 18 cm and external diameter 24 cm, 30 cm and 36 cm respectively.

5.4 Balance, capable of determining mass to an accuracy of 0,01 g.

5.5 Stopwatch.

6 Sampling

Carry out sampling of the test nonwoven in accordance with ISO 186.

7 Selection of test piece diameter

Perform a preliminary test (see clause 10) using a test piece of 30 cm diameter and calculate the drape coefficient (see clause 11) for this diameter (D_{30}).

If the drape coefficient is in the range 30 % to 85 %, use test pieces of 30 cm diameter for all the tests.

If the drape coefficient is outside the range 30 % to 85 %, in addition to testing 30 cm diameter test pieces, carry out tests in accordance with a) or b) as appropriate:

- for limp nonwovens characterized by a drape coefficient, D_{30} , of less than 30 %, use test pieces of 24 cm diameter;
- for stiff nonwovens characterized by a drape coefficient, D_{30} , of greater than 85 %, use test pieces of 36 cm diameter.

NOTE 2 Results obtained on test pieces of different diameters are not directly comparable, thus in all cases tests also need to be carried out on 30 cm diameter test pieces, regardless of drape coefficient.

8 Preparation and conditioning of test pieces

8.1 Condition the nonwoven to be tested for at least 24 h in one of the standard atmospheres specified in ISO 139.

8.2 Place the test nonwoven, free from creases, on a flat horizontal surface and using a template (5.2) trace two test pieces, mark the centre of each and cut them out.

8.3 On each test piece, mark the two faces as A and B.

9 Preliminary procedures

9.1 Checking the apparatus

9.1.1 Ensure that the centreplate on the apparatus lid (5.1.3) is horizontal, making adjustments using levelling feet in the base of the apparatus or other suitable means.

9.1.2 Switch on the light. Ensure that the filament of the light source (5.1.2) is at the focus of the parabolic mirror by placing the 30 cm diameter template (5.2) centrally on the lower support disc (5.1.1) of the apparatus. A centrally situated shadow of diameter 30 cm should be cast on a 36 cm diameter paper ring (5.3) placed in position on the lowered lid of the apparatus.

9.2 Preliminary evaluation

Place one nonwoven test piece, with face A downwards, on the lower horizontal disc of the testing equipment.

If the sample drapes to form folds at regular intervals around its circumference, the measurement can be carried out.

If the test piece has a predisposition to bend in line with two planes located on either side of the support disc, do not carry out the measurement but record this fact in the test report.

10 Test procedure

10.1 Place a ring of paper (5.3) of the same outside diameter as the test piece on the apparatus lid.

10.2 Place the test piece of nonwoven on the lower horizontal disc (5.1.1) of the apparatus so that the locating pin passes through the centre of the test piece. Then position the top disc on the test piece with the pin fitting into the hole in the top disc.

10.3 Lower the lid of the apparatus and start the stopwatch (5.5).

10.4 After 30 s switch on the light source (5.1.2) and without delay draw around the periphery of the shadow cast on the paper ring (5.3).

10.5 Remove the paper ring, fold it so that it will fit on the balance (5.4) and determine the mass, m_{pr} , of the paper ring to the nearest 0,01 g.

10.6 Cut the paper ring around the periphery of the shadow which was drawn on the paper, discard the area of the paper ring which was not shaded, and determine the mass, m_{sa} , of the residual portion of the paper ring to the nearest 0,01 g.

10.7 Repeat the procedures of 10.1 to 10.6, on the same nonwoven test piece but with the other surface uppermost, using a fresh paper ring.

10.8 Repeat the procedures on the remaining test piece.

10.9 Repeat the procedures twice more on each test piece, to give a total of six measurements on each test piece (three for each face).

11 Expression of results

11.1 For each test-piece diameter used, carry out separate calculations in accordance with 11.2 to 11.4.

11.2 For each of the six readings on each test piece, calculate the drape coefficient, D , expressed as a percentage, using the following equation:

$$D = \frac{m_{sa}}{m_{pr}} \times 100$$

where

m_{pr} is the initial mass (before cutting) of the paper ring, in grams;

m_{sa} is the mass of the part of the paper ring representing the shadow, in grams.

11.3 Calculate the mean drape coefficient, expressed as a percentage, for face A and the mean drape coefficient for face B.

11.4 Calculate the overall mean drape coefficient, expressed as a percentage.

12 Test report

The test report shall include the following information:

- a) a reference to this part of ISO 9073;
- b) all details necessary for identification of the non-woven test material;
- c) number of test pieces;
- d) diameter of template (i.e. 30 cm and, if appropriate, 24 cm or 36 cm);
- e) whether or not the test pieces drape under the test conditions specified in this part of ISO 9073 (see 9.2);
- f) test results (see clause 11) for 30 cm diameter test pieces and, if appropriate, also for 24 cm or 36 cm diameter test pieces, as follows:
 - 1) individual drape coefficients for each face of each test piece,
 - 2) mean drape coefficients for face A and for face B,
 - 3) overall mean drape coefficient,
 - 4) number of folds in each test piece in each test;
- g) any unusual features noted during the testing, or deviations from the procedure specified in this part of ISO 9073.

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