
**Textiles — Test methods for
nonwovens —**

**Part 10:
Lint and other particles generation in the
dry state**

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Textiles — Méthodes d'essai pour nontissés —

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Partie 10: Relargage de peluches et autres particules à l'état sec

ISO 9073-10:2003

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 9073-10 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 6: Absorption*
- *Part 7: Determination of bending length*
- *Part 8: Determination of liquid strike-through time (simulated urine)*
- *Part 9: Determination of drape coefficient*
- *Part 10: Lint and other particles generation in the dry state*
- *Part 11: Run-off*
- *Part 12: Demand absorbency*

Textiles — Test methods for nonwovens —

Part 10:

Lint and other particles generation in the dry state

1 Scope

This part of ISO 9073 specifies a test method for measuring the linting of nonwovens in the dry state. It can also be applied to other textile materials.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications*

ISO 14644-1, *Cleanrooms and associated controlled environments — Part 1: Classification or air cleanliness*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

lint

fibre fragments released during handling

3.2

linting

release of lint and other particles during handling

3.3

coefficient of linting

log of the particle count applied to all or to a part of the measurement channels

4 Principle

This procedure describes a modified Gelbo Flex method in which the sample is subjected to a combined twisting and compression action in a test chamber. During the flexing, air is withdrawn from the chamber and particulates in the air stream are counted and classified in a particle counter. Depending on the choice of counter, the size ranges can fall within the limits of 0,3 µm or 0,5 µm to 25 µm.

See Annex A for general information on reproducibility.

5 Apparatus

5.1 Lamina flow hood, vertical, for use in a clean-air station to ensure a clean test environment.

NOTE A Class 5 clean room in accordance with ISO 14644-1 may be used as an alternative.

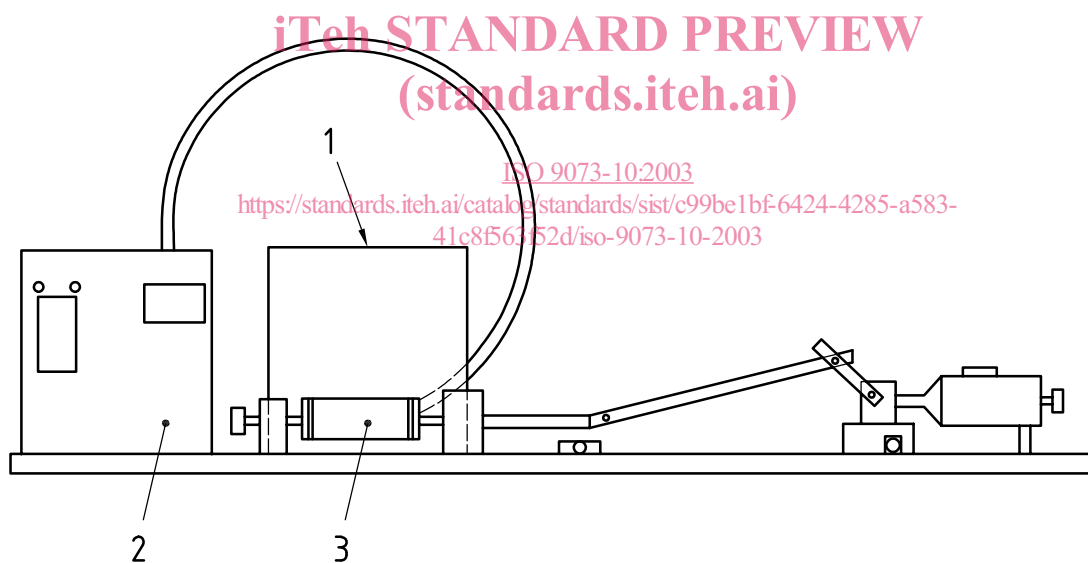
5.2 Flexing unit (modified Gelbo Flex), consisting of two circular plates, of diameter 82,8 mm, one fixed and the other moveable, but located on a mechanism that allows it to move towards and away from the fixed plate at a frequency of 60 cycles/min whilst at the same time rotating clockwise and anti-clockwise through an angle of 180°, in synchronization with a to-and-fro movement. See Figure 1.

The plates have 8 holes (diameter 12,5 mm) located 10 mm from the outer edge and equally spaced.

The distance between the plates at the starting position is (188 ± 2) mm and the stroke of the linear motion is (120 ± 2) mm.

Clamping devices are used to fix the test piece, in a tubular form, to the circular plates.

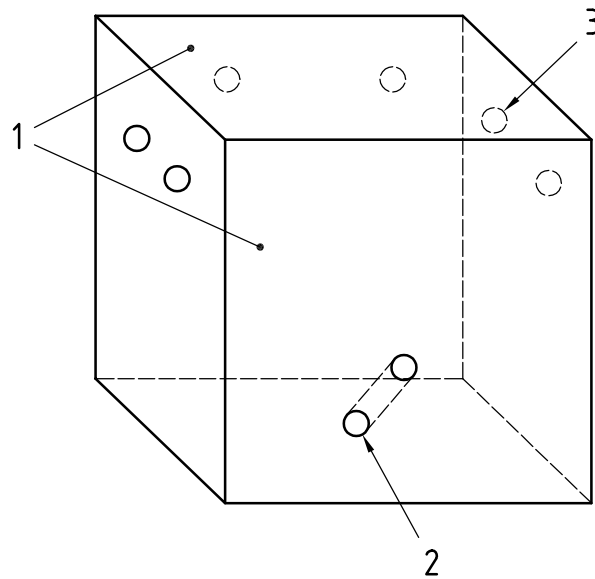
5.3 Flexing chamber and air collector, in which the flexing unit is enclosed in an antistatic perspex box measuring $(300 \times 300 \times 300)$ mm (see Figure 2). This chamber has removable front and back panels for cleaning and purging with filtered, clean air. The back and two sides each have two holes (diameter 10 mm) located 25 mm from the top of the chamber and spaced equally across the 300 mm of each panel.



Key

- 1 test chamber
- 2 particle counter
- 3 test piece

Figure 1 — Gelbo Flex dry particle generator

**Key**

- 1 removable front and back panels
- 2 air collector
- 3 side holes (10 mm in diameter)

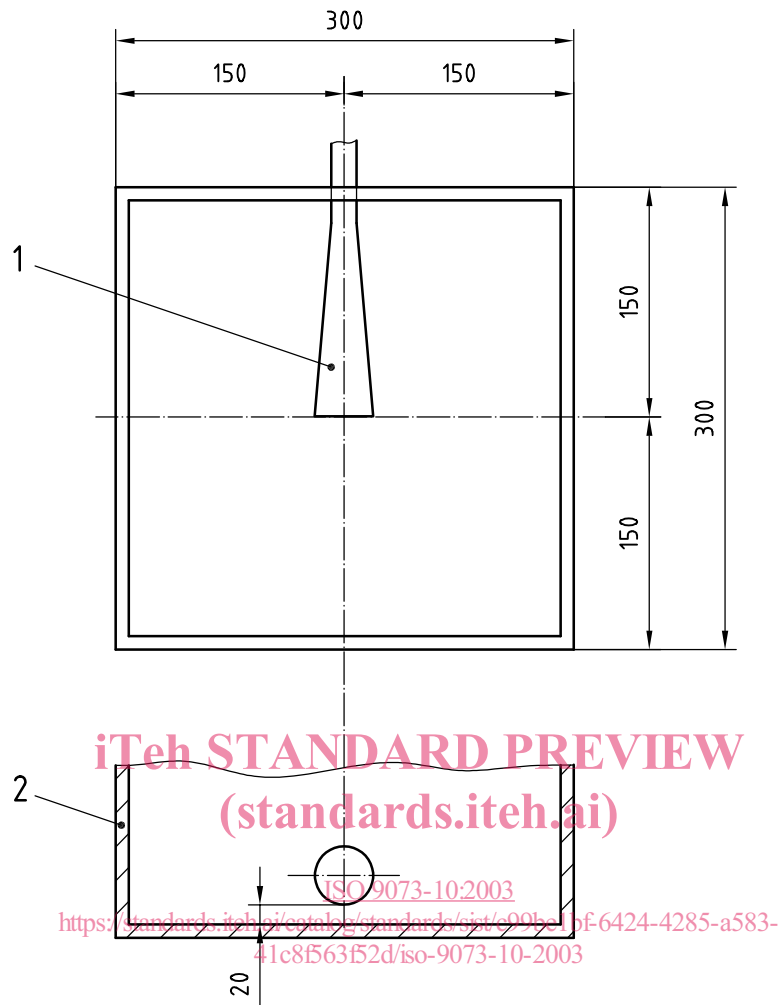
Figure 2 — Flexing chamber and air collector
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The intake probe of the air collector is fixed to the centre of the base in the chamber, 2 cm above the base plate (see Figure 3).

The diameter of the intake probe end is (40 ± 5) mm.

The flexible duct connecting the air collector to the particle counter has the following characteristics.

- polyurethane or polyester lined vinyl or similar;
- maximum length 1 500 mm;
- inner diameter $(8,5 \pm 1,5)$ mm;
- not kinked nor curved with a small curvature radius.



Key

- 1 air collector intake probe
- 2 flexing chamber

Figure 3 — Position of air collector intake probe

5.4 Particle counter, with the following main characteristics:

- 8 measurement channels;
- overall size range: 0,3 µm or 0,5 µm to 25 µm;
- air flow: (28,3 ± 1,4) l/min;
- sampling time selectable between 1 s and 24 h.

5.5 Glue, for sealing the cylindrical test piece.

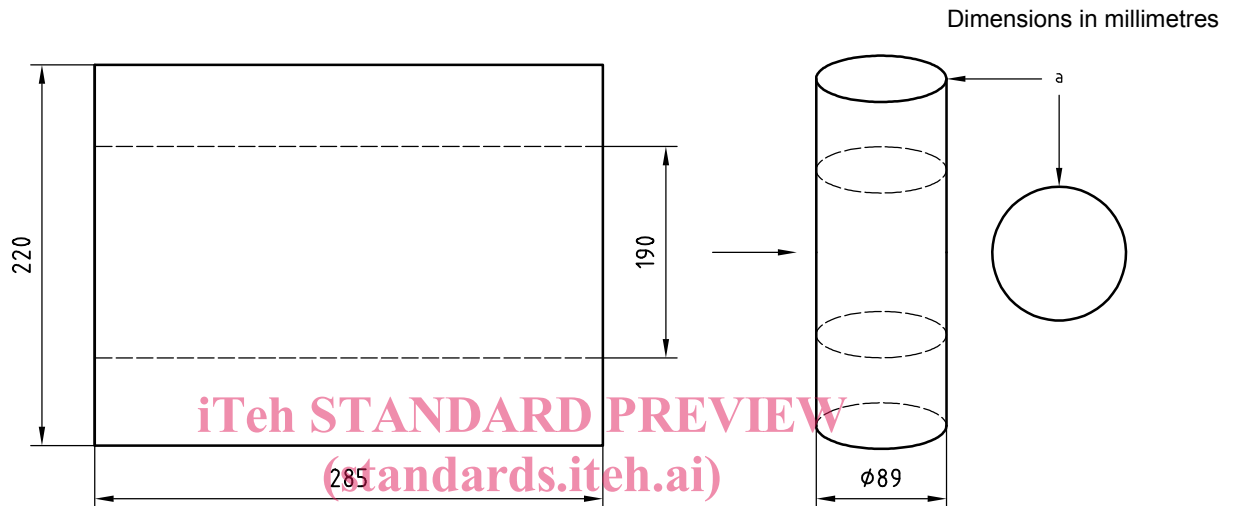
5.6 Gloves, for use in ISO class 5 clean room. See ISO 14644-1.

6 Procedure

6.1 The operator shall wear gloves for handling test pieces.

6.2 Preparation of the test pieces shall be made under clean room conditions (see 5.1) and observing the specifications given in ISO 554.

6.3 Two sets of seven test pieces are cut (see Figure 4), $(220 \pm 1) \text{ mm} \times (285 \pm 1) \text{ mm}$ (larger dimension in the cross direction); one set is marked on one face as side A and the other set on the other face as side B. Only five test pieces are used in the test, the other two (top and bottom) test pieces are to protect those in use. The sets of test pieces shall be free from folds and wrinkles and be kept in a clean antistatic environment.



a Glued

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Figure 4 — Test piece

6.4 The environment in which the tests are carried out shall be dust free (see 5.1). The flexing chamber shall be thoroughly cleaned between each measurement and the air quality in the chamber checked before each test is carried out.

- a) With the back panel removed (to allow clean air to flow into the empty chamber) and the flexing unit turned off and with no sample in place, two measurements are carried out. The total count of particles $\geq 0,5 \mu\text{m}$ in 30 s shall be less than 100. If not achieved, the procedure shall be repeated.
- b) In order to obtain C_0 and take a particle count:
 - 1) the back panel of the chamber shall be closed;
 - 2) with the flexing unit operating but without a sample mounted, and after stabilization for ten 30 s counting periods, the results are recorded;
 - 3) the results are added to obtain C_0 .

In order to report results for each size classification the particle count for each classification shall be recorded to give the C_0 value for each class.

6.5 A tube is made from the test piece with the longer dimension corresponding to the circumference and the free edges glued on a 0,5 cm width using a suitable adhesive product for sealing the cylindrical test piece (see Figure 4).