INTERNATIONAL STANDARD

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Geotextiles and geotextile-related products — Determination of water permeability characteristics normal to the plane, under load

Géotextiles et produits apparentés — Détermination des caractéristiques de perméabilité à l'eau, perpendiculairement au plan et sous contrainte

Reference number
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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 10776 was prepared by Technical Committee ISO/TC 221, *Geosynthetics*.

Geotextiles and geotextile-related products — Determination of water permeability characteristics normal to the plane, under load

1 Scope

This International Standard describes a method for determining the water permeability characteristics of geotextiles or geotextile-related products normal to the plane when subjected to specific normal compressive loads.

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 2854, *Statistical interpretation of data — Techniques of estimation and tests relating to means and variances*

ISO 5813, *Water quality — Determination of dissolved oxygen — Iodometric method*

ISO 9862, Geosynthetics — Sampling and preparation of test specimens

ISO 10318, Geosynthetics — Terms and definitions

ISO 10320, *Geotextiles and geotextile-related products — Identification on site*

3 Terms and definitions

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

3.1
flow velocity

$v_{N50/\sigma}$

flow velocity normal to the plane at a 50 mm water head under a compressive stress σ (2, 20 and 200 kPa)

NOTE The flow velocity is expressed in metres per second.

4 Principle

The flow of water normal to the plane of a geotextile or geotextile-related product is measured under a range of constant heads under a compressive stress of 2, 20 and 200 kPa.

5 Specimens

5.1 Handling

The sample shall not be folded and shall be handled as infrequently as possible to avoid disturbance to its structure. The sample shall be kept in a flat position without any load.

5.2 Selection

Take specimens from the sample according to ISO 9862.

5.3 Number and dimensions

Cut five test specimens from the sample, each of suitable dimensions for the water permeability apparatus to be used.

Where it is necessary to determine the results to within a given confidence interval of the mean, determine the number of test specimens in accordance with ISO 2854.

5.4 Specimen conditions

The specimens shall be clean, free from surface deposits and without visible damage or folding marks.

6 Apparatus, water supply and measuring devices

6.1 Apparatus

The apparatus shall be capable of allowing free water flow through the specimen in a direction normal to its plane while confining it between two planes. An example of the apparatus is shown in Figure 1.

The test apparatus shall consist of a cylindrical cell as follows,

a) The apparatus shall be capable of installing a 50 mm head loss on the specimen and maintaining a constant head, for example, by adjusting the flow rate for the duration of each test with water on both sides of the specimen.

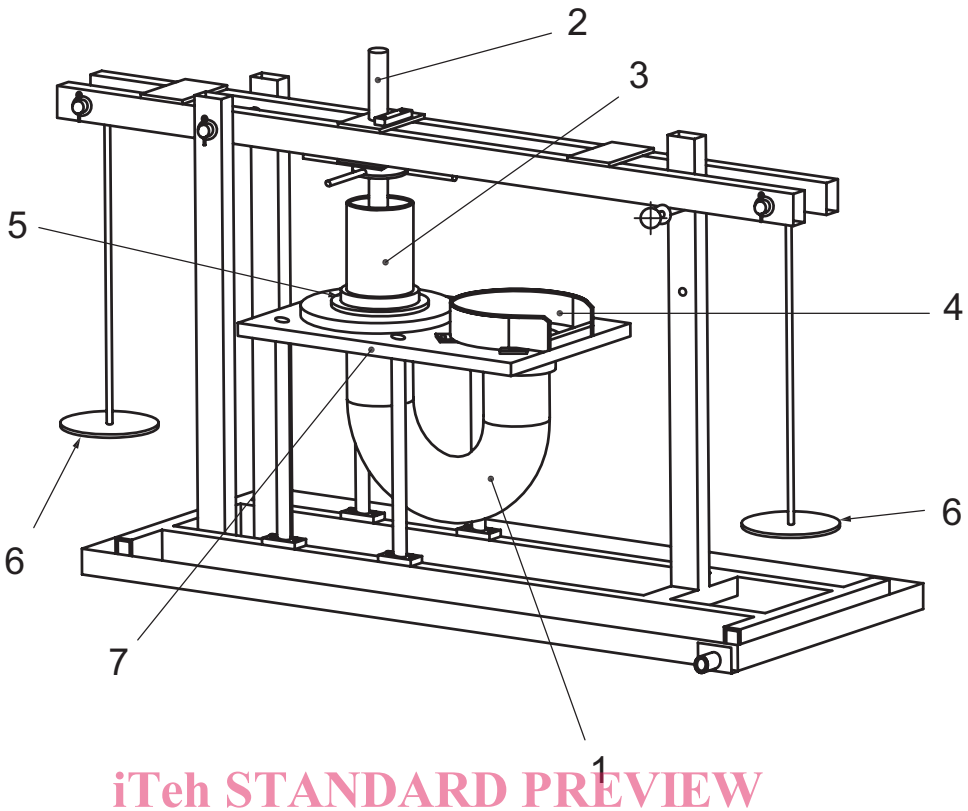
b) The apparatus shall have an internal diameter of 95 mm ± 2 mm. The internal diameter shall have a tolerance of ± 0,1 mm. The diameter of the apparatus shall remain identical on both sides of the specimen. Abrupt changes in diameter shall be avoided (see Figure 2).

c) The upper and lower porous circular plates bounding the sample shall consist of metallic plates of diameter that is lower than or equal to 0,5 mm less than the nominal internal diameter of the apparatus. The thickness of each plate shall be greater than or equal to 15 mm. The porous central area of the plate shall be perforated by a series of 2,5 mm ± 0,2 mm holes that are perpendicular to the face of the plate. The pattern of holes shall be uniformly distributed about the horizontal and vertical diameter of the plate in accordance with Figure 3. The plates shall have markings that facilitate alignment of the holes The diameter of the specimen that is exposed to flow shall be greater than or equal to 85 % of the internal diameter of the apparatus.

d) d) A loading mechanism shall be capable of sustaining a constant normal compressive stress on the specimen of 2, 20 and 200 kPa with a tolerance of ± 5 %. For the purpose of calculating the compressive stress, the area to be used shall be the gross area of the upper plate.The normal compressive stress shall be applied to the upper and lower porous plates by a circular stainless steel ring of outer diameter 1 mm less than the internal diameter of the apparatus and a thickness lower than or equal to 2,5 mm. The height of the ring shall be greater than 25 mm. The transference of load from the loading mechanism to the loading ring above the porous plates shall not reduce the flow area of the apparatus by more than 1 000 mm^2.

e) The apparatus shall be capable of maintaining the proposed normal compressive stress on the specimen without deformations that could influence the test results.

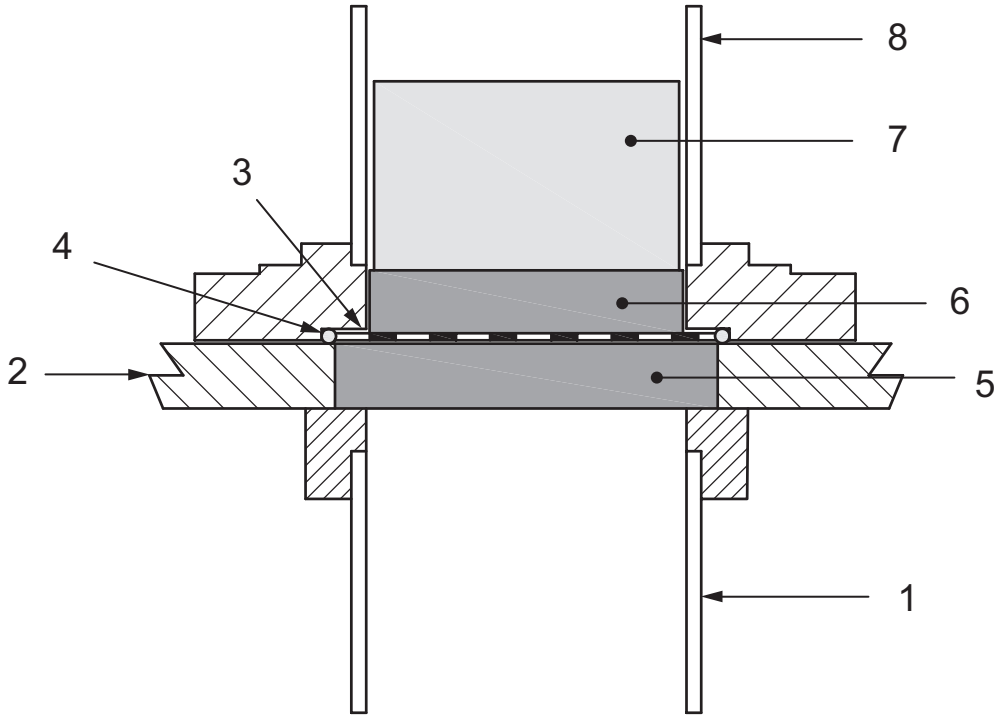
f) The apparatus shall be capable of preventing flow at the edge of the specimen.



Key

1 Glass tube
2 Loading device
3 Hydraulic head application device
4 Overflow
5 Specimen location (see detail on Figure 1b)
6 Carrying plate for accommodation of dead weights
7 Central plate

Figure 1 — Example of apparatus; schematic principle for the determination of the permeability characteristics under load

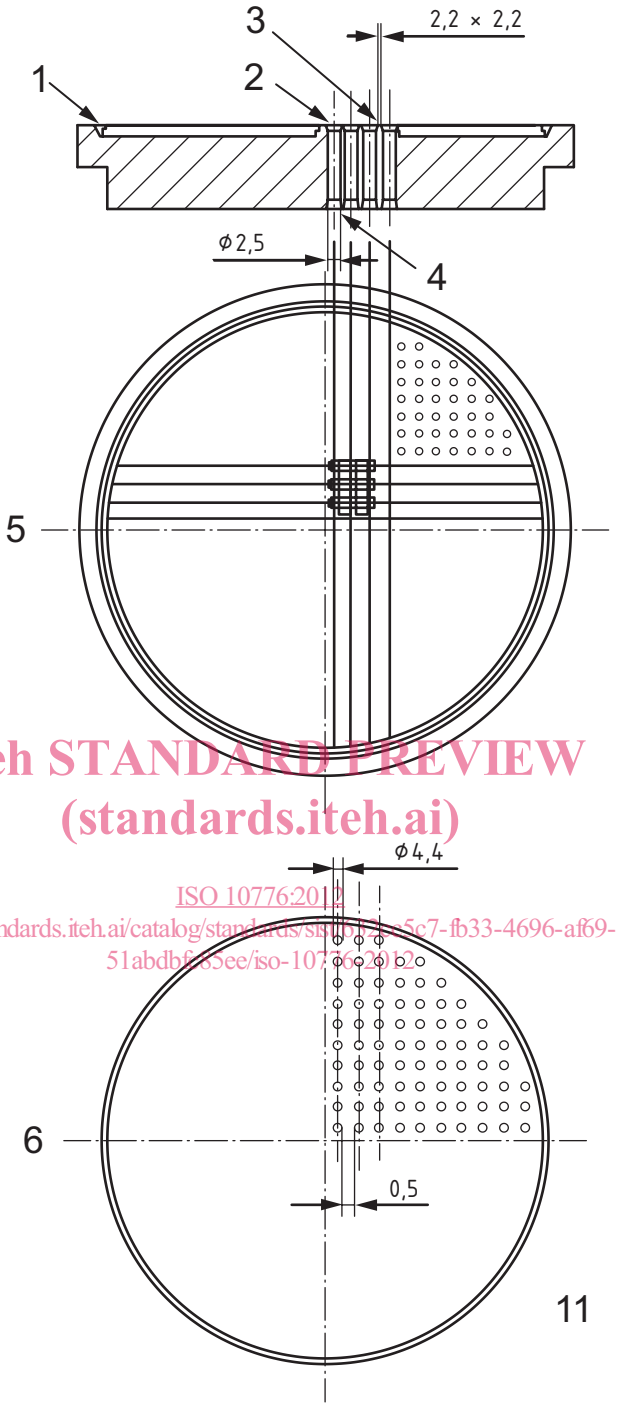


Key

1 Glass tube
2 Central plate
3 Specimen
4 O-ring
5 Lower perforated plate
6 Upper perforated plate
7 Loading device
8 Hydraulic head application device

Figure 2 — Schematic drawing (not to scale) of central part of the cell with specimen

Dimensions in millimetres



Key
1 Ring notch
2 Hole perforation
3 Bearing
4 Hole perforation
5 Lower face of the top plate
6 Upper face of the top plate

Figure 3 — Perforation pattern and upper and lower plate arrangement