INTERNATIONAL STANDARD

ISO 12236

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Geosynthetics — Static puncture test (CBR test)

Géosynthétiques — Essai de poinçonnement statique (essai CBR)

Reference number
ISO 12236:2006(E)

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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 12236 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 189, *Geosynthetics* in collaboration with Technical Committee ISO/TC 221, *Geosynthetics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 12236:1996), which has been technically revised.

Geosynthetics — Static puncture test (CBR test)

1 Scope

This International Standard specifies a method for the determination of the puncture resistance by measuring the force required to push a flat-ended plunger through geosynthetics.

The test is normally carried out on dry specimens conditioned in the specified atmosphere.

The test is applicable to most types of products, but not to materials with apertures greater than 10 mm.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the cited edition 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 7500-1, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system*

ISO 9862, *Geosynthetics — Sampling and preparation of test specimens*

ISO 10320, *Geosynthetics — Identification on site*

3 Terms and definitions

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

3.1
plunger force
F
force as the plunger is pushed onto and through the specimen at a constant rate of displacement

See Figure 1.

NOTE The plunger force is expressed in kilonewtons.

3.2
push-through force
F_p
maximum plunger force recorded for each single test

See Figure 1.

NOTE The push-through force is expressed in kilonewtons.

3.3
displacement
h
distance the plunger has travelled starting from a preload of 20 N

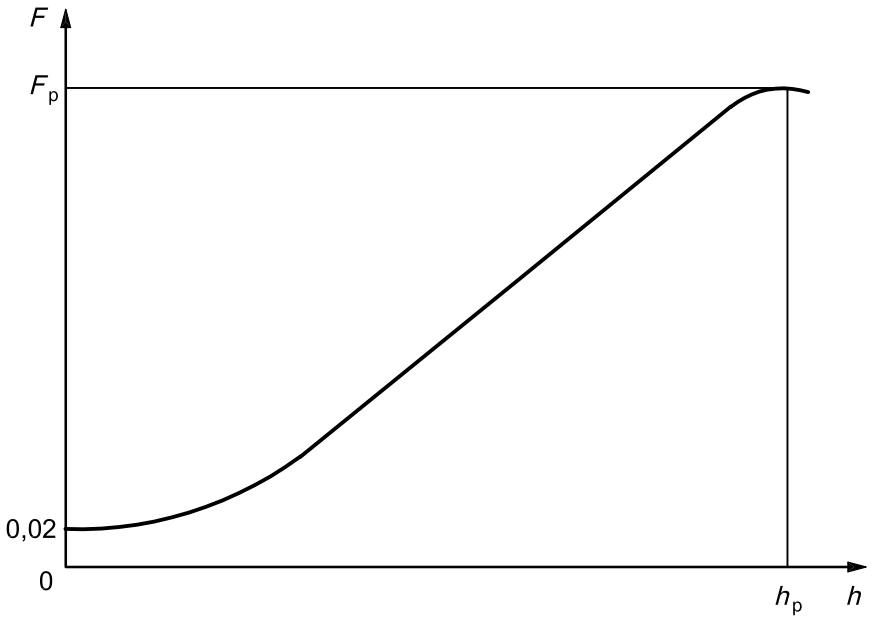
See Figure 1.

NOTE The displacement is measured in millimetres.

3.4
push-through displacement
h_p
displacement at maximum recorded force F_P

See Figure 1.

NOTE The push-through displacement is measured in millimetres.



Key
h displacement, in mm
F plunger force, in kN
F_p push-through force, in kN
h_p push-through displacement, in mm

Figure 1 — Example of a typical curve — Plunger force versus plunger displacement

4 Principle

The specimen is clamped between two steel rings. A plunger is advanced at a constant rate on the centre of the specimen and perpendicularly to it. The push-through force, push-through displacement and force-displacement curve are recorded.

5 Apparatus

5.1 Testing machine.

The testing machine shall be of class 1 or class 0 in accordance with ISO 7500-1 and shall be capable of the following:

— a constant rate of displacement of (50 ± 5) mm/min;

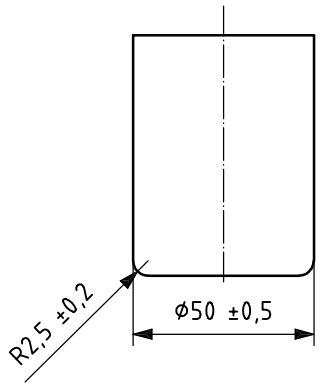
— recording force and displacement;

— providing an autographic read-out of force and displacement.

5.2 Plunger.

A stainless steel plunger with a diameter of (50 ± 0,5) mm is used. The radius of the leading edge of the plunger shall be (2,5 ± 0,2) mm (see Figure 2).

Dimensions in millimetres



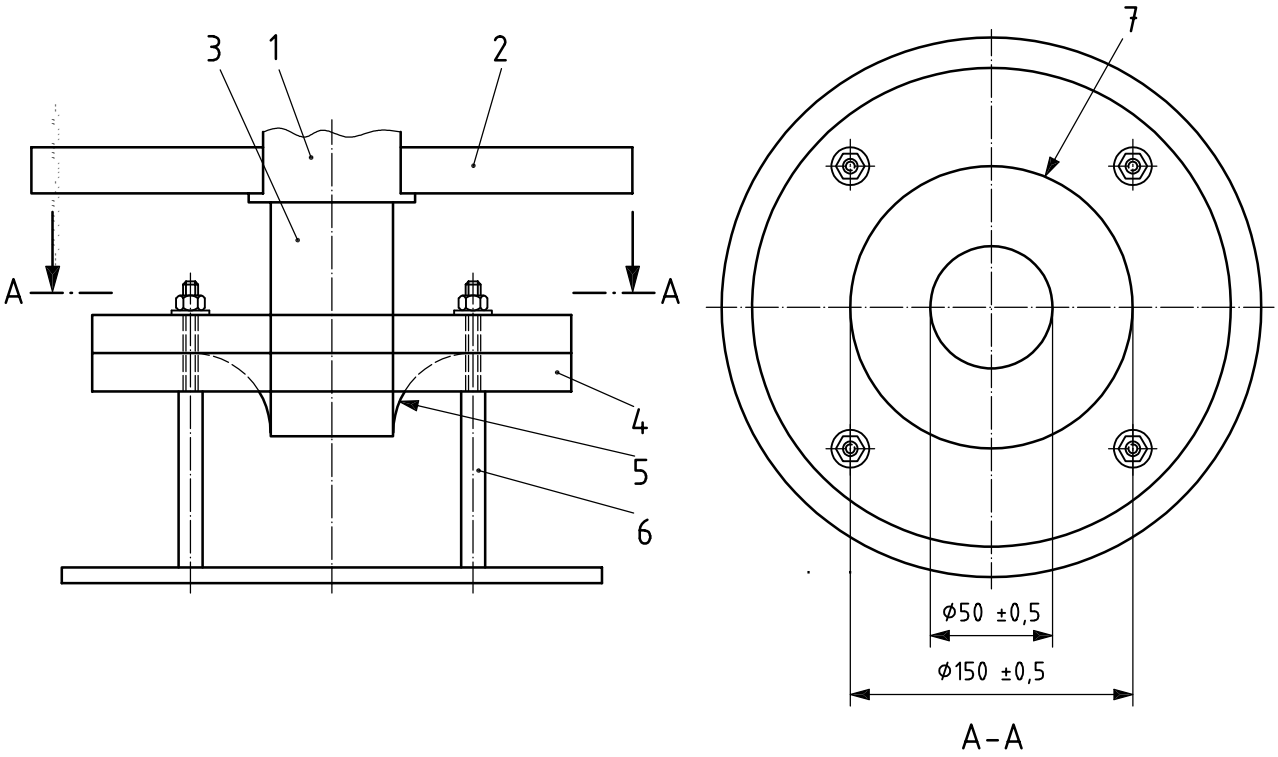
NOTE This figure is not to scale.

Figure 2 — Plunger

5.3 Clamping system.

The clamping system shall prevent slippage or cutting of the specimens. The internal diameter of the clamping rings shall be (150 ± 0,5) mm. Examples of a clamping system and a guide block are shown in Figure 3 and Figure 4. The surfaces should be arranged so that the distance between the inner diameter of the ring and the gripping zone (i.e. start of serration, corrugations, etc.) does not exceed 7 mm.

Dimensions in millimetres



Key

1	load cell	5	specimen
2	cross head	6	support frame or CBR mould
3	plunger	7	rounded inside edges
4	clamping rings		

Figure 3 — Example of clamping system device

6 Specimens

Five specimens shall be tested. Take specimens at random from the sample in accordance with ISO 9862.

If the material to be tested is known to have different characteristics on the two faces (e.g. physical characteristics or as a consequence of the manufacturing process), then the complete test shall be carried out separately on each face.

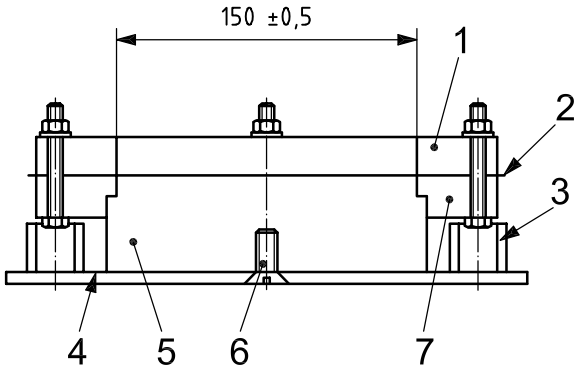
7 Conditioning

The test specimens shall be conditioned in the standard atmosphere for testing (20 ± 2) °C and (65 ± 5) % relative humidity as defined in ISO 554.

The specimens can be considered to be conditioned when the change in mass, in successive weightings made at intervals of not less than 2 h, does not exceed 0,25 % of the mass of the test specimen.

Conditioning and/or testing in the standard atmosphere may only be omitted when it can be shown that results obtained for the same specific type of product (both structure and polymer type) are not affected by changes in the atmosphere exceeding the limits. This information shall be included in the test report.

Dimensions in millimetres



Key

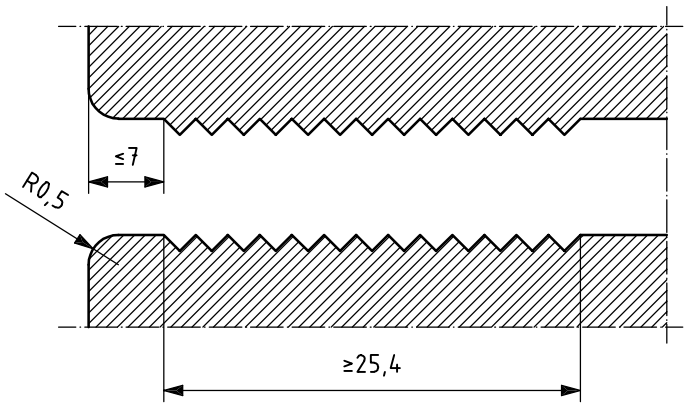
1	upper clamping ring	5	guide block
2	specimen	6	screw
3	tube	7	lower clamping ring
4	clamping aid		

NOTE 1 This figure is not to scale.

NOTE 2 Number of screws to suit the clamping rings being used.

a) Example of guide block used

Dimensions in millimetres



NOTE This figure is not to scale.

b) Example of details of serrated surfaces

Figure 4 — Examples of guide block and details of serrated surfaces

8 Procedure

Secure a specimen between the clamping rings of the clamping system (see Figure 3), e.g. by using a guide block [see Figure 4 a)]. Place the specimen and clamping system in the testing machine.

Advance the plunger (see Figure 2) onto and through the specimen at a rate of (50 ± 5) mm/min and start recording the displacement at preload of 20 N.

Repeat the procedure on the remaining specimens.

9 Recording, calculation and expression of results

9.1 Recording of data

Record the following for each test:

— push-through force (in kilonewtons) with 3 significant figures;

— push-through displacement (in millimetres) to an accuracy of ± 1 mm measured from a preload of 20 N to push-through force, if required;

— graph of force versus displacement, if required;

— any evidence of slipping or cutting of the product in or near the clamping rings.

9.2 Calculation and expression of results

Calculate the mean push-through force in kilonewtons and the coefficient of variation in percent, %.

A typical graph of plunger force versus displacement is given in Figure 1.

10 Test report

The test report shall include the following information:

a) the number and date of this International Standard (ISO 12236:2006);

b) identification of the sample tested in accordance with ISO 10320, date of receipt and date of testing;

c) the conditioning atmosphere for the test;

d) the results obtained, expressed as in 9.2;

e) any evidence of slipping or cutting of the product in or near the clamping rings;

f) any deviation from this International Standard;

g) the side of the material tested, if relevant.

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