INTERNATIONAL STANDARD

ISO 12236

First edition
1996-10-15

Geotextiles and geotextile-related products — Static puncture test (CBR test)

Géotextiles et produits apparentés — Essai de poinçonnement statique (essai CBR)

Reference number
ISO 12236:1996(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 12236 was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee TC 38, *Textiles,* Subcommittee SC 21, *Geotextiles*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Annex ZZ of this International Standard is for information only.

Annex ZZ provides a list of corresponding International and European Standards for which equivalents are not given in the text.

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Printed in Switzerland

Foreword

The text of EN ISO 12236:1996 has been prepared by Technical Committee CEN/TC 189 "Geotextiles and geotextile-related products", the secretariat of which is held by IBN, in collaboration with Technical Committee ISO/TC 38 "Textiles".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 1996, and conflicting national standards shall be withdrawn at the latest by August 1996.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This European standard specifies a method for the determination of the puncture resistance by measuring the force required to push a flat ended plunger through geotextiles and geotextile-related products.

The test is normally carried out on dry specimens conditioned in the specified atmosphere. Alternatively, on request, the test can be carried out on wet specimens.

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

2 Normative References

This European standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these applications apply to this European standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 963	Geotextiles and geotextile-related products - Sampling and preparation of test specimens
EN 30320	Geotextiles - Identification on site (ISO 10320:1991)
ISO 554	Standard atmospheres for conditioning and/or testing - Specifications
ISO 3696	Water for analytical laboratory use - Specification and test methods
ISO 7500-1	Metallic materials - Verification of static uniaxial testing machines - Part 1: Tensile testing machines

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1 plunger force *F*: The force *F* as the plunger is pushed onto and through the specimen at constant rate of displacement.

3.2 push-through force F_p: The maximum plunger force F_p recorded for each single test (see point M in figure 4).

3.3 displacement h: The distance in millimetres the plunger has travelled after it first comes into contact with the specimen (i.e. after point A on figure 4).

3.4 push-through displacement h_p: The displacement at maximum recorded force F_p (see point M in figure 4).

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 Reagents

5.1 Distilled water

Distilled water in accordance with the grade 3 of ISO 3696 shall be used (for wet specimens only).

5.2 Non-ionic wetting agent

(for wet specimens only)

6 Apparatus

6.1 Testing machine

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

a) a travel of at least 100 mm;
b) a constant rate of travel of (50 ± 10) mm/min;
c) recording force and displacement;
d) providing an autographic read-out of force and displacement.

6.2 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 1).

6.3 Clamping system

The clamping system shall prevent pre-tensioning of the specimen before, and slippage during the test. The internal diameter of the rings shall be (150 ± 0,5) mm. An example of a clamping system is shown in figure 2. The clamping rings and the guide block are shown in figure 3.

> **NOTE:** This arrangement as in figure 2 has been shown to be suitable for performing the test on a universal testing machine operating in a compression mode. However, other arrangements can be used providing they satisfy the principles and conditions of the method.

7 Specimens

Five specimens shall be tested. Take specimens at random from the sample in accordance with EN 963. The specimen size shall allow suitable clamping. If the coefficient of variation of push-through force is greater than 5%, take another five specimens and report the values of ten specimens.

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 using five or ten specimens as the case may be.

The test report shall include details of this extension of the test procedure and separate results for each face shall be given.

8 Conditioning

The specimens shall be conditioned and the tests conducted in one of the standard atmospheres defined in ISO 554.

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

Conditioning and/or testing at a specified relative humidity may be omitted if it can be shown that the results are not affected.

Specimens to be tested in the wet condition shall be immersed in water (5.1) maintained at a temperature of (20 ± 2) °C or (23 ± 2) °C or (27 ± 2) °C. The time of immersion shall be at least 24 h, or longer if required to wet the specimens thoroughly, i.e. until

no significant change in push-through force is measured following a longer period of immersion. To obtain thorough wetting, it may be necessary to add not more than 0,05 % of a non-ionic neutral wetting agent to the water.

9 Procedure

9.1 Secure one specimen between the clamping rings of the clamping system (see figure 2), e.g. using a guide block (see figure 3). Place the specimen and clamping system in the testing machine.

9.2 Advance the plunger (see figure 1) onto and through the specimen at a rate of (50 ± 10) mm/min.

9.3 Repeat the procedure on the remaining specimens.

NOTE: Experience has indicated that there are problems in clamping some high-strength and high-modulus materials. As a guide it is suggested that if an individual test gives a push-through force below 50% of the average of the other tests and there is evidence of slipping or breaking near the clamping rings, the results should be discarded. If problems arise with the majority of specimens, this test should be regarded as not applicable to the material under test.

10 Recording, calculation and expression of results

10.1 Recording of data

Record the following for each test:

a) push-through force (in kilonewtons) with 3 significant figures;
b) push-through displacement (in millimetres) to an accuracy of ± 1 mm;
c) graph of force versus displacement, if required;
d) plunger force at specified displacement(s), if required;
e) any evidence of slipping or breaking of the product in or near the clamping rings.

10.2 Calculation and expression of results

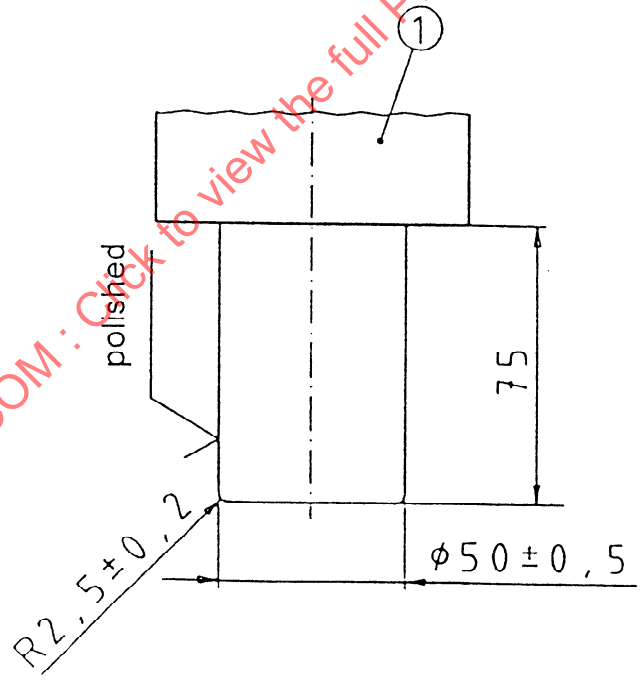
Calculate the mean of the push-through force in kilonewtons and the coefficient of variation in %, the mean of push-through displacement in millimetres, and plunger force at specified displacement(s) if required. A typical graph of plunger force versus displacement is given in figure 4.

11 Test report

The test report shall include the following particulars:

a) number and date of this standard;
b) identification of the sample tested in accordance with EN 30320, date of receipt and date of testing;
c) conditioning atmosphere for the test, and whether tested dry or wet;
d) the number of specimens tested;
e) the results obtained, expressed as in clause 10;
f) any evidence of significant slipping of the geotextile in the jaws, or of jaw breaks;
g) any deviation from this standard.

Dimensions in millimetres



1 shaft for mounting in testing machine

NOTE: The diagram is not to scale

Figure 1: Plunger

Dimensions in millimetres

1 compression load cell

2 cross head

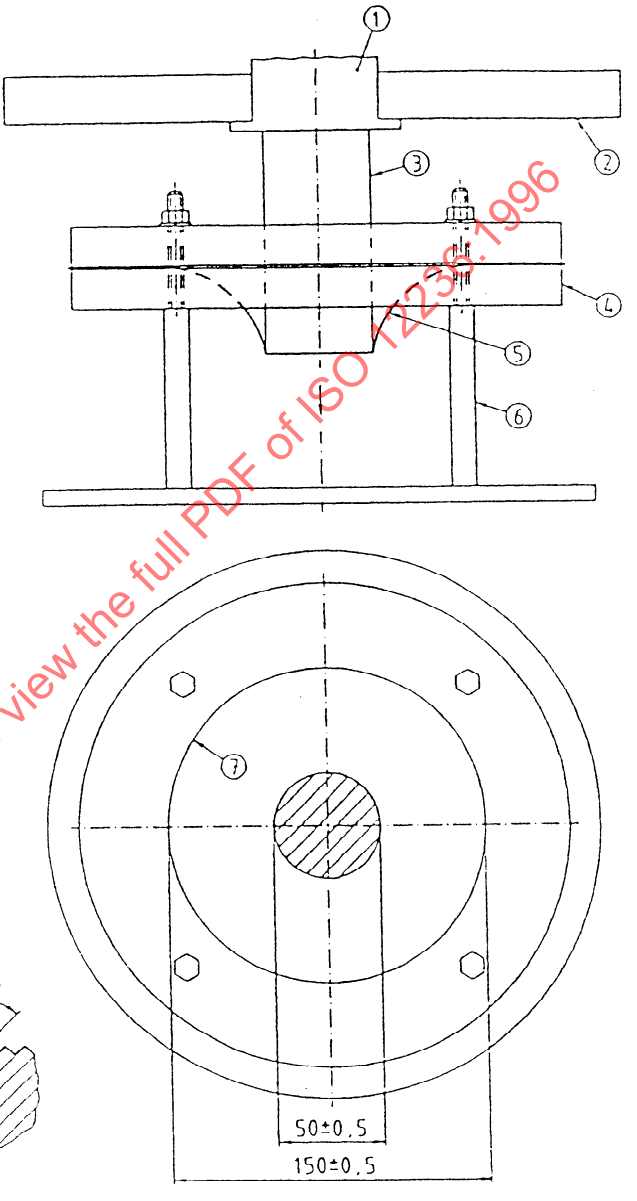
3 plunger

4 clamping rings

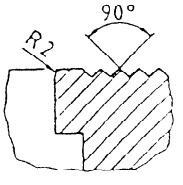
5 specimen

6 support frame or
CBR mould

7 rounded inside edges



Example of details
of serrated surfaces



NOTE: This figure is not to scale

Figure 2: Typical arrangement for CBR test

Dimensions in millimetres.

1 upper clamping ring

2 specimen

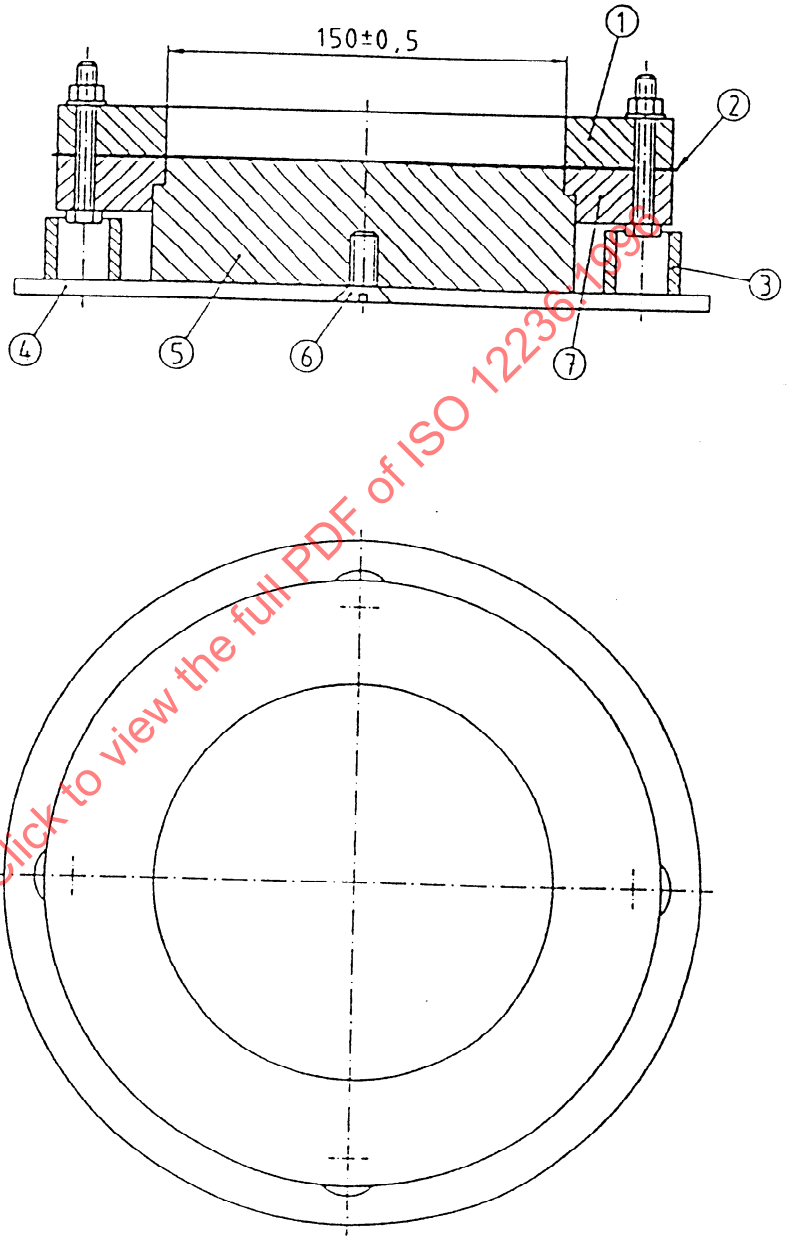
3 tube

4 clamping aid

5 guide block

6 screw

7 lower clamping ring



NOTE1: This figure is not to scale.
NOTE 2: Number of screws to suit the clamping rings being used

Figure 3: Example of guide block use

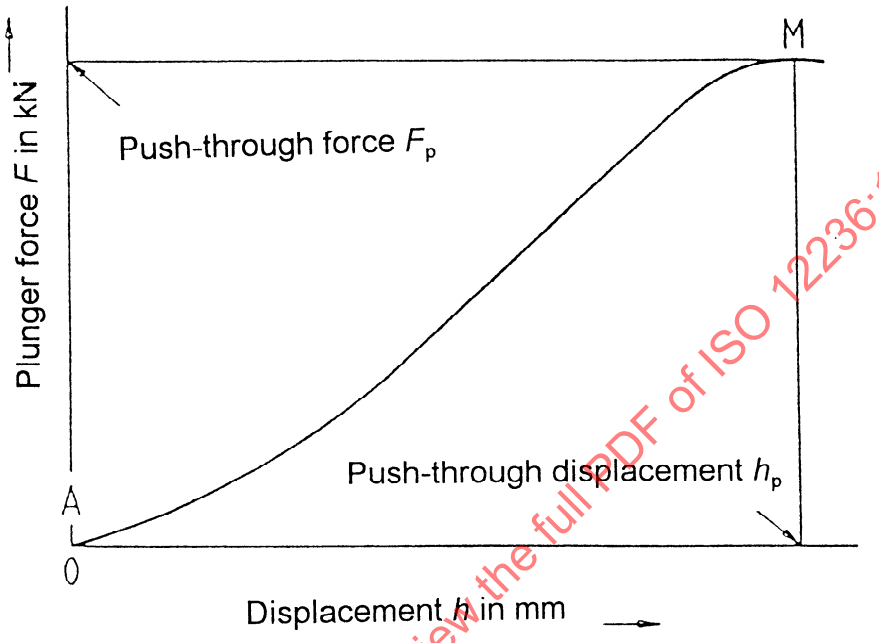


Figure 4: Example of typical curve, plunger force versus plunger displacement