IS 16078 (2013): Geosynthetics - Static Puncdture Test (CBR Test) [TXD 30: Textiles]

IS 16078 : 2013
ISO 12236 : 2006

भारतीय मानक

भूवस्त्रादि — स्टैटिक पंचर परीक्षण (सी.बी.आर. परीक्षण)

Indian Standard

GEOSYNTHETICS — STATIC PUNCTURE TEST (CBR TEST)

ICS 59.080.70

BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

May 2013 **Price Group 3**

Geosynthetics Sectional Committee, TXD 30

NATIONAL FOREWORD

This Indian Standard which is identical with ISO 12236 : 2006 'Geosynthetics — Static puncture test (CBR test)' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Geosynthetics Sectional Committee and approval of the Textile Division Council

The California Bearing Ratio (CBR) is a penetration test for evaluation of the mechanical strength of road sub grades and base courses. The harder the surface, the higher the CBR rating.

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
b) Comma(,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their respective places are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 554 Standard atmospheres for conditioning and/or testing — Specifications	IS 6359 : 1971 Method for conditioning of textiles	Technically Equivalent
ISO 9862 Geosynthetics — Sampling and preparation of test specimens	IS 14706 : 1999 Geo-textiles — Sampling and preparation of test specimens	do

The technical committee has reviewed the provisions of the following International Standards referred in this adopted standard and has decided that they are acceptable for use in conjunction with this standard:

International Standard	*Title*
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 10320	Geosynthetics — Identification on site

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

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

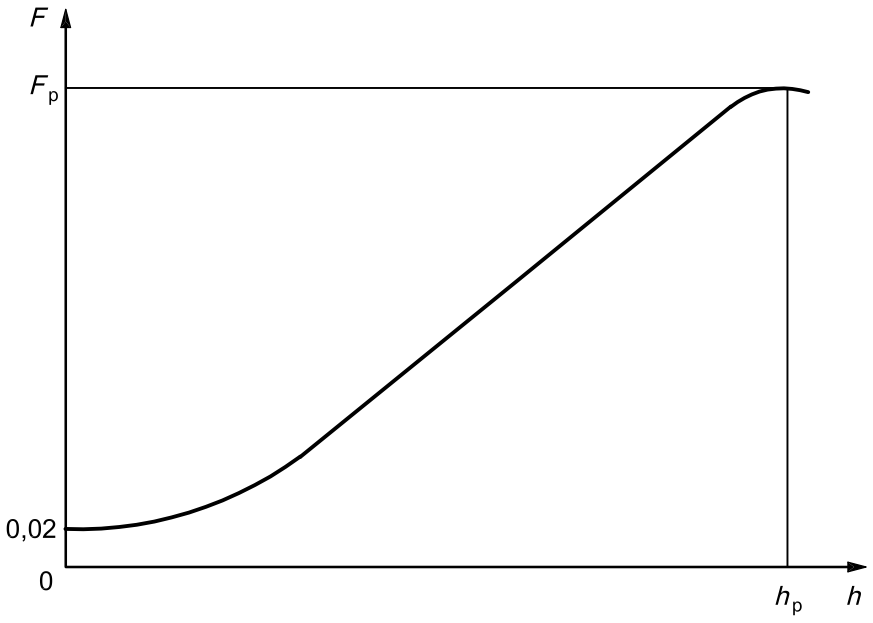
See Figure 1.

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;

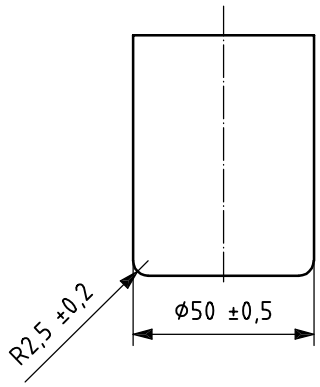
— recording force and displacement;

— 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



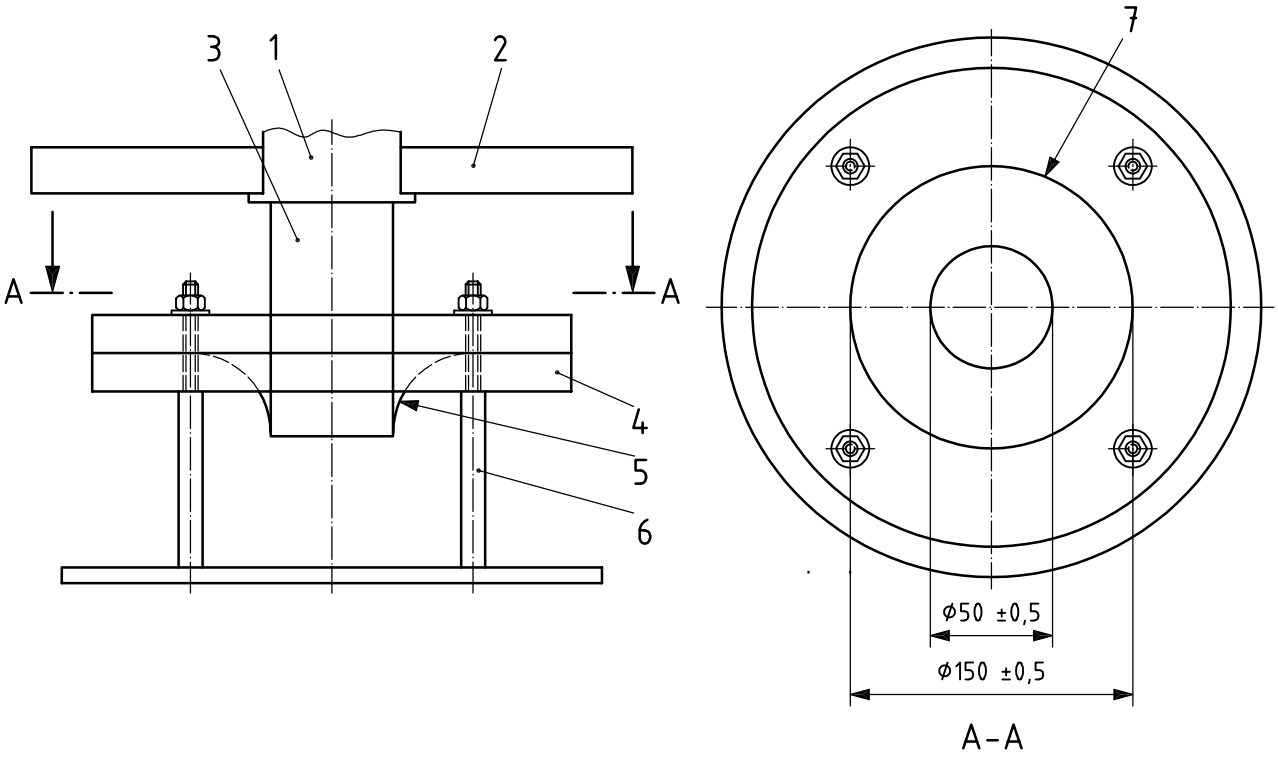
NOTE This figure is not to scale.

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.

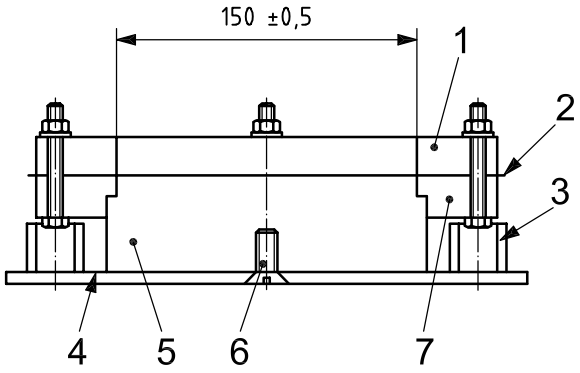
7 Conditioning

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

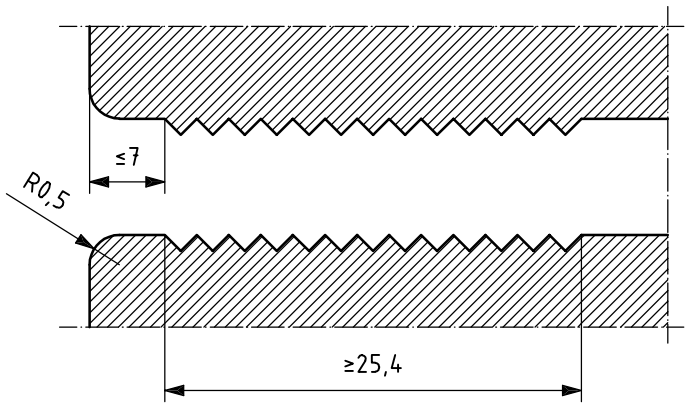
1	upper clamping ring	5	guide block
2	specimen	6	screw
3	tube	7	lower clamping ring
4	clamping aid		

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.

Bureau of Indian Standards

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: TXD 30 (0982).

Amendments Issued Since Publication

Amendment No.	Date of Issue	Text Affected

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