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“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

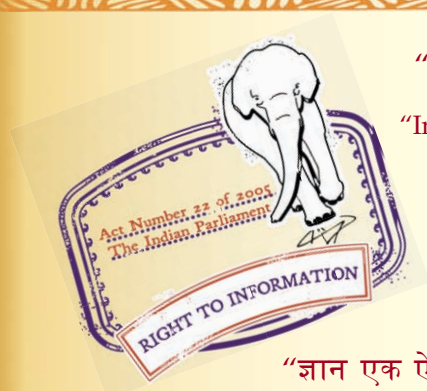
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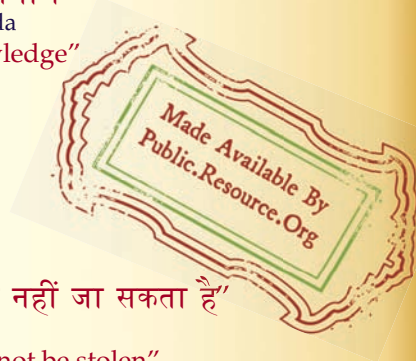
IS 13162-4 (1992): Geotextiles - Methods of test, Part 4:
Determination of puncture resistance by falling cone method
[TXD 30: Geotextiles and Industrial Fabrics]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

भूवस्त्रादि — परीक्षण की पद्धतियाँ

भाग 4 पाती शंकु पद्धति द्वारा पंचर-प्रतिरोध ज्ञात करना

Indian Standard

GEOTEXTILES — METHODS OF TEST

PART 4 DETERMINATION OF PUNCTURE RESISTANCE BY FALLING CONE METHOD

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FOREWORD

This Indian Standard (Part 4) was adopted by the Bureau of Indian Standards, after the draft finalized by the Geotextiles Sectional Committee had been approved by the Textile Division Council.

Geotextiles used as separator and filter in earth constructions are normally subjected to dynamic impact. During the installation process, crushed rock or boulders are dropped onto a fabric supported by weak, water-saturated soil which may penetrate and thus damage the geotextile. It is, therefore, desirable that the geotextiles should resist the sudden impact and penetration of such particles.

In reporting the results of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

GEOTEXTILES — METHODS OF TEST

PART 4 DETERMINATION OF PUNCTURE RESISTANCE BY FALLING CONE METHOD

1 SCOPE

1.1 This standard (Part 4) prescribes a method for determination of the size of the hole made by dropping a standard brass cone onto a geotextile, supported by water, and to provide an indication of the ability of that fabric to resist a sudden impact.

2 PRINCIPLE

2.1 A geotextile sample is clamped in the holding ring free of folds and without pre-stressing, which is placed on the testing frame. The grooves and edges of the holding rings must fit into each other. The holding rings have to be bolted or pressed together (e.g. mechanically, pneumatically or hydraulically) in such a way, that the compressive stress on the geotextile sample, acting uniformly over the grooved area of the holding rings, is sufficient to keep the specimen in place during the test. No slipping of the specimen in the clamping rings shall be allowed during the test.

2.2 Water is added to the container secured to the lower clamping ring until it just touches the fabric. Any excess which may reach the upper surface of the fabric must be sponged away.

2.3 The cone is seated in its initial position in the release mechanism and the distance of 500 mm between the tip of the cone and the fabric upper side is checked. Then the cone is released and caused to fall onto the fabric. The resulting hole in the fabric is measured, using the gradation on the measuring cone.

3 APPARATUS

3.1 Specimen Sample Holder

3.1.1 The specimen sample holder (clamping rings) consists of metal rings which are clamped together with uniformly distributed stress. Dimensions and shape of the sample holder are shown in Fig. 1. The grooved rings must fit into each other. The internal diameter of the rings is 150 mm, the external at least 180 mm. The specimen holding rings are secured to the testing frame.

3.2 Water Container

3.2.1 A trough of water which must have a minimum depth of 200 mm and a volume of approximately 3.5 litres, and which can be fixed

tightly to the lower clamping ring, shall be used. The water is just allowed to touch the clamped fabric.

3.3 Testing Frame

3.3.1 The sample clamping ring, together with the water trough fixed to it, is supported by a frame, which holds the cone and its shaft, in a trigger release mechanism positioned centrally above the clamped sample. The distance between the tip of the cone and the upper surface of the fabric shall be 500 ± 0.5 mm (see Fig. 2).

3.4 Fall Cone

3.4.1 The brass cone and its release shaft shall together have a mass of 1000 ± 1 g. The head of the cone shall have a point angle of 45° tapering to a maximum diameter of 50 ± 0.1 mm (see Fig. 3). To ensure a straight, vertical fall of the cone without roll, the point of gravity shall be situated near to the point of the cone head. To achieve this the cone shall be provided with filled core.

3.5 Penetration Measuring Cone

3.5.1 A cone which serves to measure the diameter of the hole made in the fabric sample by the impact, with a mass of 100 ± 1 g, and a point angle of $14^\circ 15'$ shall be used (see Fig. 4). The material of the cone shall be stable in respect of its dimensions and mass. The tapering wall of the cone shall be graduated in 2 mm stages at the cone diameters from 0-50 mm.

4 PREPARATION OF TEST SPECIMENS

4.1 Cut from each roll selected (7.1 and 7.2) over its full width perpendicular to roll length a sample having a minimum area of 10 m^2 free from visible defects such as dirt, irregular spots, creases or holes, etc.

4.2 Cut from all the samples obtained in 4.1, at least ten specimens of a minimum size with diameter 190 mm.

4.3 Specimens from a sample shall be cut from positions evenly distributed over the full width and length of the sample, but not closer than 100 mm to the selvages.

4.4 Any two specimens shall not contain the same longitudinal or transversal position. If it is not possible, it shall be reported.

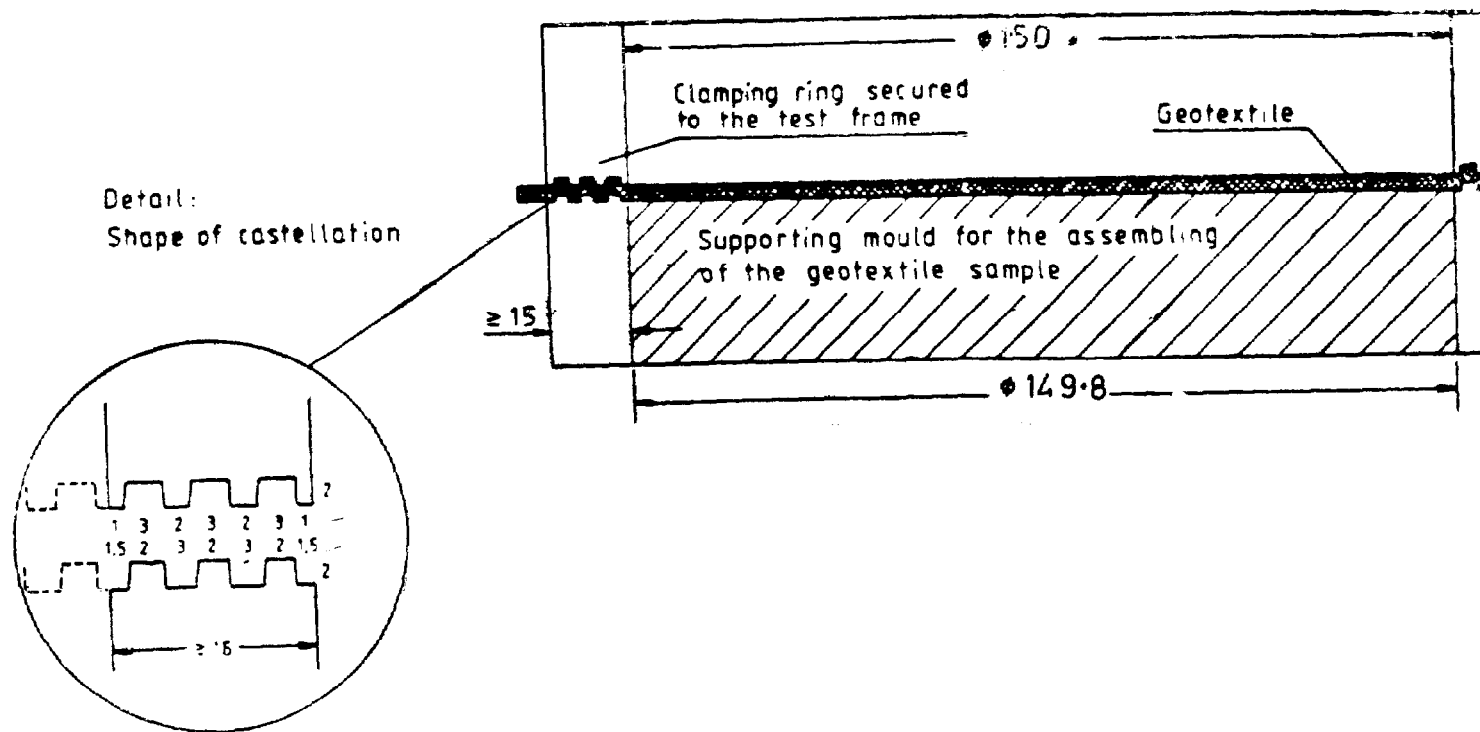


FIG. 1 SHAPE AND DIMENSIONS OF CLAMPING RINGS WITH MOUNTING MOULD

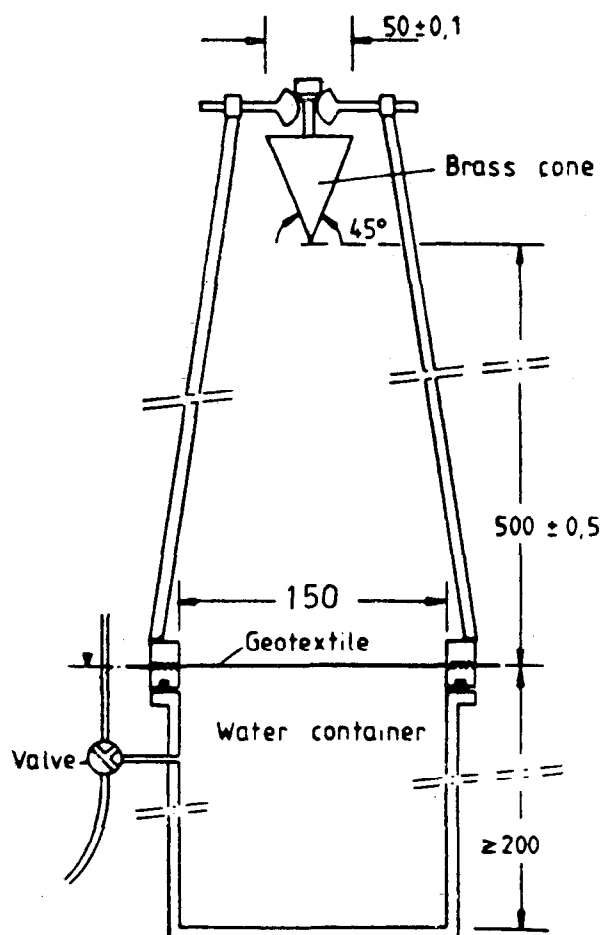


FIG. 2 PRINCIPLES OF TEST ARRANGEMENT

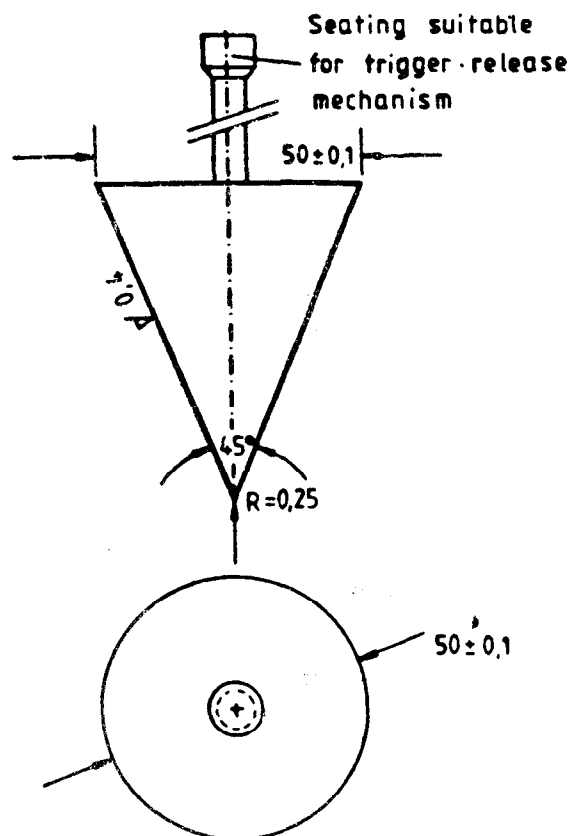


FIG. 3 STANDARD BRASS CONE

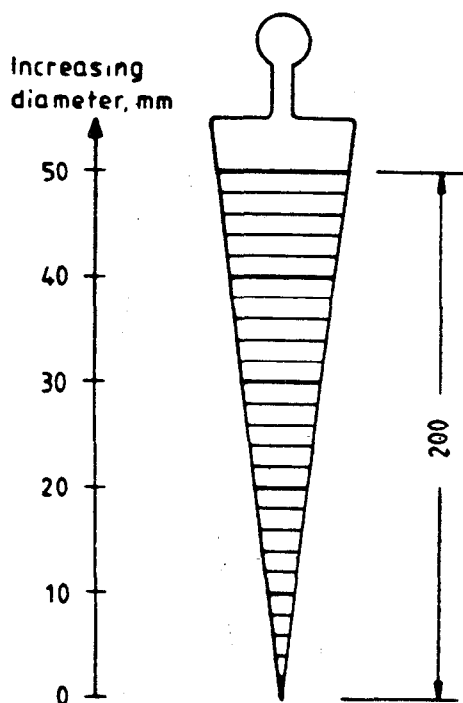


FIG. 4 PENETRATION MEASURING CONE

4.5 Before cutting structured geotextiles, exact instructions for cutting shall be laid down, and these shall be followed with great care.

4.6 If the cutting causes fragments of geotextile to loosen and if this cannot be avoided causing influence on test results, this fact shall be reported.

4.7 The specimens shall be kept free from dust, dry, at ambient temperature in dark and protected against chemical and physical damage until the test is performed.

5 PROCEDURE

5.1 Dry the samples in air under prevailing room conditions. Prepare, store and test the samples at prevailing room conditions.

5.2 Insert the support-mould into the lower clamping ring and ensure that the surface of the mould is levelled with the bottom level of the grooves in the clamping ring castellation.

5.3 Place the geotextile sample onto the lower clamping ring.

5.4 Assemble the upper clamping ring and bolt (or press) it to the lower clamping ring, ensuring that a uniform stress is acting on the fabric sample over the castellation of the rings.

5.5 Remove the support-mould and secure the clamping rings with the sample to the frame. Fix the water trough tightly to the lower clamping ring. Add water to the container until it just touches the fabric. Any excess, which may reach the upper surface of the fabric must be sponged away. Close any valve used for water level adjustments.

5.6 Seat the cone in its initial position in the trigger release mechanism, check and, if necessary, adjust the distance of 500 mm between the tip of the cone and upper surface of the fabric.

5.7 Pull the trigger to release the cone, causing the cone to fall onto the fabric. Remove the fall cone from the hole and measure the size of the hole with the penetration measuring cone.

5.8 Calculate the average hole size and the standard deviation for all the ten test specimens.

6 EXPRESSION OF RESULTS

6.1 Express the puncture resistance as the average size of the hole (in mm) made by dropping the fall cone onto the fabric and

calculate the standard deviation for all the tests performed.

7 REPORT

7.1 The test report shall include the following information:

- a) Description of the tested product;
- b) Conditioning of the test specimens, environmental data during the test (temperature, pressure, RH, etc);
- c) Test results (use SI units) i.e. average hole size and its Standard deviation; and
- d) Any deviations from the test method;

8 SAMPLING

8.1 A random sample shall be selected from the lot. The sample selected should be homogenous and representative of the lot.

8.2 The number of rolls to be selected from a lot shall be in accordance with the procedure laid down in the relevant material specification or as agreed to between the buyer and the seller.

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